



# City of Franklin

Serving it's Residents



## Overview

One of the most effective ways for cities to reduce their costs and improve environmental performance is to improve their energy efficiency. Many cities have implemented energy saving initiatives for their public buildings, street lighting programs, and municipal vehicles. Ironically, the largest energy users in most cities are often overlooked when energy efficiency is pursued - their drinking water and wastewater treatment systems, which typically use 30-40% of the total city's energy demand. Because about half the electricity used in the Southeast comes from coal-fired power plants, energy efficiency can reduce the emission of air pollutants as well as save money.

During the spring of 2011, the U.S. Environmental Protection Agency, Region 4 - Atlanta (EPA R4), and the Tennessee Department of Environment & Conservation (TDEC) assembled a team to conduct an Energy Management Initiative (EMI) for Tennessee Water and Wastewater Utilities. The team consisted of EPA R4, TDEC, the TN Department of Economic and Community Development, the Tennessee Valley Authority (TVA) - electrical power provider for the entire state, University of Memphis - Civil Engineering Department, University of Tennessee - Municipal Technical Advisory Service, University of North Carolina - Environmental Finance Center, and Schneider Electric. The EMI process involved an initial energy assessment and

benchmarking stage, followed by a series of four workshops that were based on the 'Plan-Do-Check-Act' (PDCA) management framework. PDCA is designed to help water/wastewater utilities better understand their energy consumption, identify opportunities for improvement, prioritize projects for potential funding, measure success, reduce or avoid energy costs, and reduce greenhouse gas emissions. In August 2011, the City of Franklin, TN became one of the seven (7) communities that participated.

## About the City of Franklin

Franklin is a city of approximately 63,000 people about twenty miles south of Nashville and is the County Seat of Williamson Count, population over 190,000, Franklin and Williamson County are among the fastest growing areas in the country, and are rated in the top twenty median household incomes nationally.

The Franklin community has been active in environmental activities and in 2008 formed a sustainability committee that developed a Sustainability Community Action Plan, endorsed by City Officials and local leaders. A few of the many results of that Plan include a municipal building LEED policy, yard waste composting, expanded bike lanes & greenways, and electric vehicle charging stations. Franklin's desire to participate in the EMI was a natural extension of their "green" community mindset.

## Franklin Wastewater Plant

The focus of Franklin's EMI effort was



Franklin Water Reclamation Plant

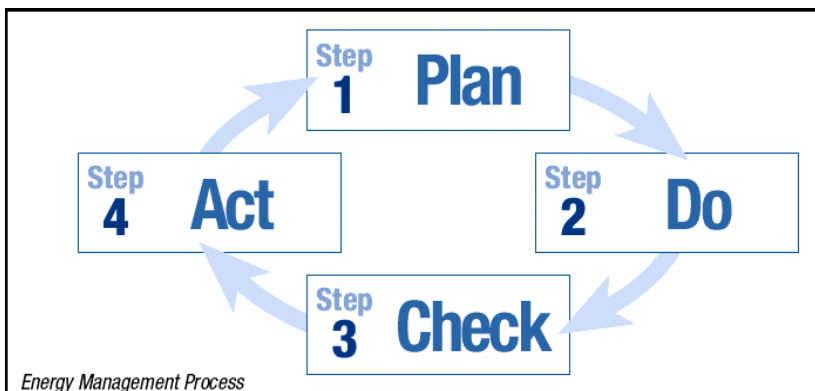
the Franklin Water Reclamation Facility, (WRF) a 12.0 million gallons per day (mgd) design flow oxidation ditch wastewater treatment system that serves the City. The average daily flow is approximately 10 mgd, and the plant provides high level treatment - monthly CBOD limit of 4 mg/l summer, 10 mg/l winter and monthly total nitrogen limit of 5 mg/l in the summer. The WRF effluent is reused for irrigation within the City and discharged to

***"The EMI helped us understand the opportunities for energy savings in our system. We are just starting."***

**Juan Davis**  
WRF Superintendent

the Harpeth River. The WRF has two original and one new oxidation ditches, one of the original and the new ditch are in service. Vertical rotors provide aeration and mixing, supplemented with coarse bubble aeration in the older two ditches. They are operated with anoxic zones to reduce aeration demand and provide nitrogen partial reduction, which is completed in deep bed denitrifying filters with methanol addition. High level disinfection is achieved with UV light.

In October 2011, members of the EMI team



conducted a preliminary energy assessment of the Franklin WRF to identify opportunities to save energy and costs. WRF Superintendent Juan Davis, Assistant Superintendent Wayne Davenport, and Mark Hilty, Director, Franklin Water Management Department, assisted our team in going through their facility.

During that assessment our team identified operational modifications that could provide significant energy demand reduction without compromising performance. The two operating ditches used a desired dissolved oxygen (DO) setpoint of 2.0-2.5 mg/l, a common practice. Following discussions with our team, the WRF managers lowered the DO set point in the older ditch to 1.0 mg/l, essentially eliminating the supplemental air need. After observing the performance of

peak demand reduction

- Adjusted filter backwash, belt filter process operations to off-peak electrical billing periods
- Eliminated duplicate electric meters to reduce billing costs - no energy savings but cost savings estimated to be \$48,000/year
- Implementing off-on blower operation of post aeration and belt press feed tanks to reduce energy use
- Identified potential energy savings in biosolids, UV, aeration upgrades to be evaluated in the future
- Ongoing communication with EPA R4 and TDEC to monitor WRF energy performance

Franklin is committed to pursuing energy efficiency and evaluating additional energy production - possibly from biosolids or other organic wastes streams.

#### Franklin WRF Contacts

- Mark Hilty, Director, Water Mgt. 615-794-4554
- Juan Davis - Superintendent 615-791-9240

#### EPA Region 4 Contacts

- Bob Freeman  
freeman.bob@epa.gov
- Brendan Held  
held.brendan@epa.gov

#### TDEC Contact

- Jennifer Dodd - TDEC  
Jennifer.dodd@tn.gov

## Energy Conservation Measures - Franklin WRF

Action	Project Cost	Annual Energy Savings	Annual Cost Savings
Aeration optimization	\$0	1,700,000 kWh (actual)	\$127,500
Lighting replacement	TBD	11,000 kWh (projected)	\$3000
Solar array installation	\$0	200,000 kWh (actual)	\$7500
Electric Meter Change	\$0	0 kWh	\$48,000
EnerNOC Program	\$0	Demand response only	\$16,000
<i>May 2013 Data</i>	<b>TOTAL:</b>	<b>1,911,000 kWh</b>	<b>\$202,000</b>
		<b>&gt;13% reduction</b>	

that ditch, the DO setpoint in the new ditch was lowered to 1.0 mg/l as well. Those changes have produced energy savings exceeding 100,000 kWh per month.

During the workshop phase of the EMI the Franklin WRF developed a draft Energy Policy that states: "...the WRF is committed to a policy of energy efficiency and energy conservation." Franklin has also identified the following additional energy saving approaches for their facility:

- The WRF signed up for the TVA EnergyRight Solutions process to upgrade the facility lighting systems to reduce energy and costs - long life bulbs save in replacement costs as well as save energy
- Joined the TVA EnerNOC program to manage peak electrical demand and receive TVA incentives for

## Franklin Energy Savings Reduce CO<sub>2</sub> Emissions by 1,835 Tons per Year



**Franklin Solar Array - No capital cost to City - Solar power revenue is shared with solar array installer to pay for system. TVA solar incentive pays power premium for solar produced kW to encourage solar power.**



### Nashville Recognition Ceremony October 11, 2012

- City of Franklin Presentation** (from left)
- Wayne Davenport - WRF Assist. Super. (Ret.)
  - Mark Hilty, Director, Water Management Dept.
  - Robert Martineau - Commissioner - TDEC
  - Ken Moore - Mayor of Franklin
  - Gwen Keyes Fleming - Regional Administrator - Region 4 EPA
  - Juan Davis - WRF Superintendent
  - Andrew Orr - Franklin Sustainability Coord.