Development of an Energy Management Plan for Tarrant Regional Water District

North Central Texas Council of Governments with input from Tarrant Regional Water District

Summary

Tarrant Regional Water District (TRWD) is one of the largest raw water transmission systems in North Central Texas, serving 11 counties (Figure 1) and providing water to more than 2.1 million people. In addition to serving those 11 counties, TRWD has more than 100 facilities, ranging from large office buildings and reservoir spillways to guard lights. As a large raw water provider, TRWD is a huge energy consumer, annually using between 150,000,000 kWh to 550,000,000 kWh. TRWD's water transmission system which, consists of pump stations, interconnect valves, balancing reservoirs, pipelines, cathodic protection systems and chemical feed systems, is responsible for consuming 90% of the energy footprint in the service area. As a result, energy management has been an essential part of TRWD's best practices for many decades. In late 2018, TRWD began formalizing the long-standing best management practices into an energy management program. Formalizing the energy management program for TRWD's operations was motivated by the need to effectively participate in an ever-increasingly volatile energy market, further reduce energy usage and energy costs, protect the ecosystem, conserve natural resources, and minimize the strain on infrastructure. This case study briefly examines TRWD's Draft Energy Management Plan, energy management applications and software, and the lessons learned during the Energy Management Plan development process.

This document is current as of October 2019.

TRWD's Energy Management Program

TRWD purchases regulated electric market electricity in the Navarro County Electric Cooperative service area, and deregulated electric market electricity in the Oncor service area. Depending on the time of year, real time energy prices can range from $20 to $40/MWh; however, during times of extreme stress, energy cost can spike up to $9,000/MWh. To mitigate the impacts of potentially damaging fluctuations in energy prices, TRWD created an Energy Management Team composed of employees from its Fleet, Engineering, and Facilities departments. The Energy Management Team (EMT) is responsible for fostering open dialogue and developing and maintaining the Energy Management Policy, Energy Management Plan, and Energy Management Best Practices. These three documents feed into one another providing a rounded approach to energy management. The Energy Management Policy provides details regarding the energy management goals adopted by senior management. The Energy Management Best Practices is the system used to direct, coordinate and control energy related activities. The Energy Management Plan outlines the steps involved in setting a strategic direction for the energy management program and implementation strategies. As of the development of this case study, the Energy Management Plan (EMP) is still in draft form. The Draft EMP details TRWD's development of the EMP, steps to building an energy management program, a review of operations that effect energy performance, the implementation plan, an annual review, and an adjustments plan.

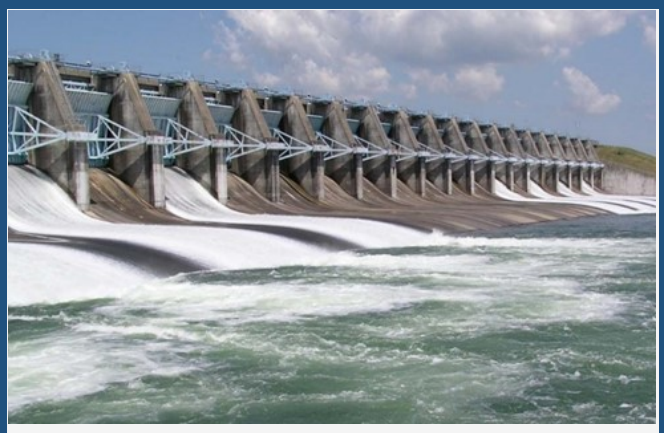

Image 1- Richland Chambers Dam

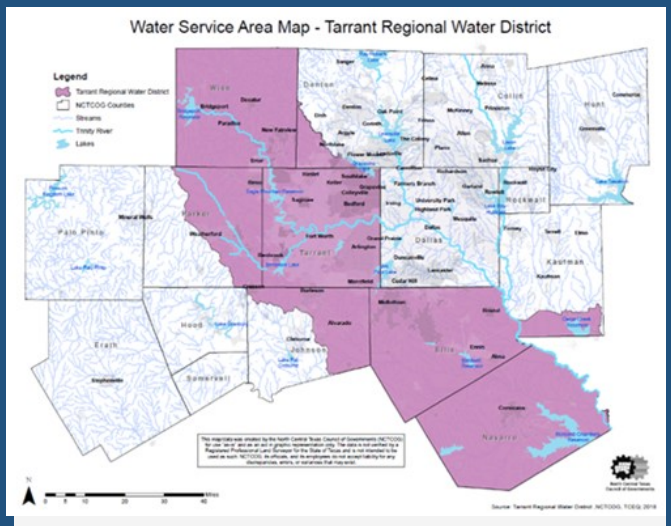

Figure 1 - TRWD service area

Energy Management Applications and Software

As part of the Energy Management Program, TRWD utilizes a host of applications and programs to track data in each of the areas of significant energy use. ENERGY STAR® Portfolio Manager, a free energy and water consumption tracking tool provided by the Environmental Protection Agency, was used for a short period of time to track energy usage data from metered accounts for building facilities and pump stations. Due to the volatile nature of water demands and the complexities of TRWD's operations, ENERGY STAR® Building Portfolio Manager was not able to capture the data needed by TRWD. This obstacle led to the development of custom applications utilizing SQL, Power BI, and Microsoft Excel to capture data and information about TRWD's energy consumption. Electric supplier data from Oncor, Navarro County Coop, Direct Energy, Cavallo – GLO and several other smaller cooperatives is collected and fed into the custom applications (SQL and Power BI, and Microsoft Excel) to be reviewed by the EMT to ensure the data is reliable.

Implementation

During the first year of implementing the Energy Management Plan, TRWD will develop Energy Action Plans. These Action Plans will detail initial projects that are intended to save TRWD money. The projects will primarily focus on the three areas of significant energy use; pumping, facilities, and fleet. Over the course of the project, data will be collected to verify that the project is performing as expected. TRWD will conduct annual reviews of the Energy Management Plan to update the Best Management Practices (BMPs) and energy key performance indicators, and recommend changes if necessary. In addition, action plans will also be reviewed on an annual basis for performance and, if applicable, new projects will be added. Lastly, TRWD has identified, funded, and implemented activities that were identified in their EMP and are informing energy consumption including:

General

- Wholesale energy procurement

Water transmission and conservation

- Multitude of hydraulic optimization studies and mechanical optimization practices to increase pump efficiency
- Water resource optimization and storage reliability studies and practices
- TRWD and Dallas Water Utilities partnership in the *Water is Awesome* conservation program and other regional conservation awareness efforts
- Use of drought tolerant landscaping

Image 3 - Tarrant Regional Water District Annex — Fort Worth, Texas

Facilities

- Voluntary recycling program at most buildings for paper, plastic, and aluminum
- Drip irrigation
- 236-kW roof-mounted solar array
- HVAC and lighting replacement programs, including LED lighting retrofits
- The first LEED Gold certified building in Tarrant County

Fleet

- 4-day work week for field staff to reduce windshield time
- Tier 4 heavy equipment including fleet and heavy construction and mowers.

Lessons Learned

By implementing goals, and verifying data as mentioned in the draft Energy Management Plan, TRWD has collected and analyzed energy data detailing its energy use from pumping operations, facilities and fleet. This data has been, and will continue to be, used to benchmark the progress of implemented conservation measures, prioritizing best practices and action plans that target significant energy uses. The nature of the TRWD's water transmission system puts the raw water provider in a unique position to seek innovative ideas and techniques for tackling their energy management goals. While TRWD is in the process of implementing their Energy Management Plan and has accomplished improvements that are leading to lowering their energy consumption, challenges remain. TRWD must consider organizational constraints, including cultural and political aspects; capital costs; regulatory requirements and limits; operations and maintenance capabilities and non-energy operation and maintenance costs; engineering constraints; and, space availability.

Energy management touches everything that TRWD does and the need for this effort will only continue to grow as the population of the service area, along with water supply demands, grows. Currently a quantifiable energy consumption reduction goal is not possible. The nature of TRWD's water delivery requirements are completely tied to surface water availability and climate variability. Despite not having a energy consumption reduction goal, continuous improvement is essential to the success of the energy management program. Although, TRWD has set goals based on benchmarks and requires dedicated time from the TRWD staff to better understand the cost of implementing such a large energy management program and the return on investment.

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Sources

Tarrant Regional Water District Interviews

Tarrant Regional Water District. (2018) Draft Energy Management Plan.