

# Fairfield-Suisun Sewer District Wastewater Treatment Plant Fairfield, California

## I. Respondent and Presenters:

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## II. Treatment Plant Characteristics:

- Wastewater Treatment Plant
- 140,000 customers served
- 60 employees

## III. Innovation:

### A. Description

The Fairfield-Suisun Sewer District has established a varied portfolio of traditional and renewable energy sources to power its treatment plant. The District's energy portfolio includes: utility power from PG&E (dual feeders), 1.4 megawatts (MW) of cogeneration from digester gas/natural gas, 1.0 MW photovoltaic array with single-axis ground tracking, and 200 kilowatts (kW) of wind turbine generation. District Operations staff continuously works to optimize timing of major energy uses and maintenance work to maximize use of renewables and minimize energy costs for the District.

Upcoming projects that are being implemented and/or considered include bio-solids processing (agreement with Lystek International, Inc.) that will yield a more readily degradable product that is expected to produce additional biogas, and installation of an on-the-fly biogas/natural gas blending skid. The District also plans to investigate other uses for biogas (CNG fueling station) should gas production increase from the additional of the Lystek product to the District's digesters.

## **B. Type of Innovations**

- Increased use of Informational Technology
- New treatment process
- New approach to documentation, technical training, staff development, or knowledge management
- Optimization of existing resources

## **C. Motivation for Innovations**

This change has been gradually implemented over time as new energy technologies are added to the District's portfolio and new processes are implemented at the treatment plant that change the way it is operated. Drivers include reducing energy costs at the plant, utilizing resources that are produced in the process (biogas), and increasing operational reliability by having a diverse network of electrical sources.

## **D. Barriers/Challenges**

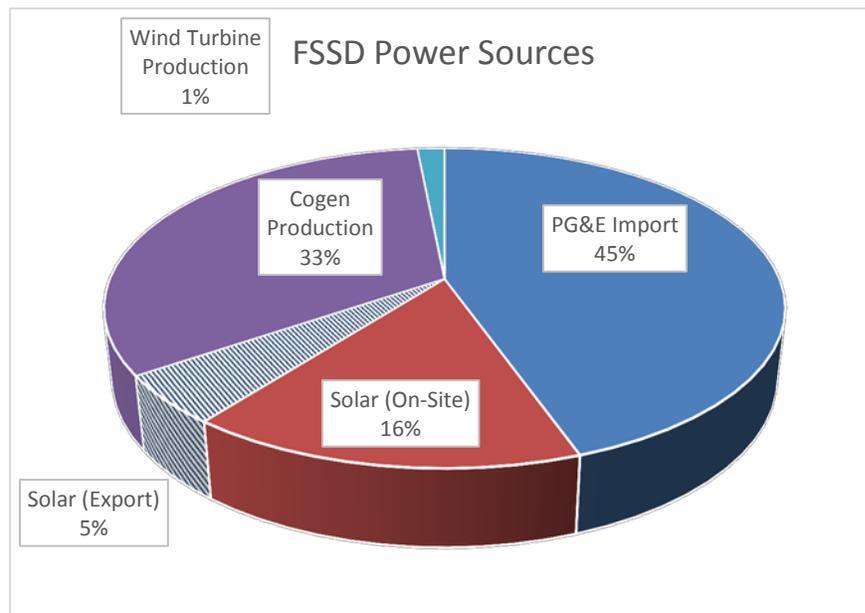
Planning – as new projects were conceptualized, a significant planning effort went into analyzing the financials of these projects, determining potential rebates from PG&E/CPUC, and navigating ever-changing energy regulations and procedures.

Operational Philosophy- as new energy technology was implemented, Operations staff had to rethink process control and energy usage. Before the photovoltaic array and wind turbines, the focus was to limit energy usage during PG&E's peak time-of-use hours. Biogas was stored to ensure that cogeneration could operate at maximum output during this peak time only. Various equipment was offline or operated at low speeds while the majority of the day's flow was equalized in balancing reservoirs. During off peak hours there was more equipment operated and the equalized flow was processed. After the photovoltaic array and wind turbines were implemented, the focus shifted towards decreasing the District's PG&E demand charges. This required operating more equipment during the peak hours while solar was producing power, instead of operating during off peak hours. This change was contrary to

what many operators were trained to do, and so a new operational philosophy had to be introduced, taught, and accepted.

## E. Benefits

Over the past year (Aug 2014 – Jul 2015), the District has been able to produce approximately 53% of its treatment plant's electrical power demand from on-site sources (~5,900 MWh), reducing the quantity of utility power purchased. Approximately 500 MWh of solar-generated power was exported to the PG&E grid throughout the year. Note that the cogeneration units were down for 3 months during this time period for major overhauls, which reduced the amount of on-site electrical generation.



## F. Effect on Staff Training

With the complex electrical system that now exists at the Fairfield-Suisun Wastewater Treatment Plant, a high priority is placed on training staff in the nature of utility power charges (on-peak, partial-peak, off-peak pricing; usage versus demand charges) to best serve the District when performing electrically-intense activities or performing maintenance on equipment.

With the future implementation of the Lystek process, although the process will be operated by Lystek employees, District staff will receive training on how to recognize and respond to Lystek process issues during times when Lystek staff are not present.

## **G. Lessons Learned**

- The District has found that because of the cost of maintaining the cogeneration equipment, the generators must be kept running 85 – 90% of the year to make the cogeneration system cost competitive with purchase of PG&E power. This has resulted in the District testing operating equipment at higher speeds than usual during hot weather.
- A power purchase agreement on the solar system has been a good arrangement for the District. The power purchase agreement minimized the District's up-front costs and routine maintenance costs for maintaining the system, but provides a unit price break over PG&E power. There are periods of the day when the District can sell back excess solar power to the PG&E grid (however, the district has a non-export arrangement on cogeneration/wind power, so that cannot be sold back to the grid).
- The agreement between the District and Lystek International, Inc. will provide a long-term bio-solids management solution for the District and other local wastewater agencies, while providing a financial benefit to the District and Lystek. The recirculation of Lystek's product to the District's digester will allow increased gas production for use in cogeneration engines or a new technology (i.e., CNG fueling station).
- Financial analysis of energy projects needs to consider every aspect of the life-cycle, because minor changes can affect the overall benefit of the project. It is useful to determine from the manufacturers in advance what the maintenance schedule is like so that can be accurately accounted for. If maintenance costs are higher than anticipated, it could change the favorability of the project.

- In order to maximize our alternative energy sources and minimize reliance on PG&E power, staff had to learn new methods of energy management. This was not instantaneous, and even faced some resistance. However, a captain must steer his ship gently into a new direction or risk capsizing his boat. Likewise, introducing staff to new ideas and ways of doing things is a gradual process. What we found to be successful in training staff is frequency and diversifying the training format. This led to a successful and unified operation.

#### **IV. Drought Response**

The majority of the Fairfield-Suisun Sewer District's effluent serves a beneficial use by being discharged into the Suisun Marsh to improve salinity and mixing. The District treats its full dry weather flow to California Title 22 Secondary-23 Disinfected Recycled Water quality. Some of this effluent is used for on-site utility water, some is provided to a turf farm that surrounds the treatment plant site, and some is provided to a truck fill station that is used by the local landfill for dust control. A distribution pipeline extends approximately 7,600 feet into an adjacent business park, but this pipeline is not currently in use due to leakage.

While the water supply situation is better in Solano County than in many other places in California, efforts are being made to investigate further steps the District can take to increase the use of recycled water in Solano County.

#### **V. Information Sharing**

- We would be willing to host an on-site tour (45 minutes to an hour) that would include a demonstration or discussion of your innovation.
- We would be willing to visit another regional water/wastewater facility to provide a presentation on this innovation.

- We would be willing for a staff member from another water/wastewater utility to conduct a follow-up visit to our utility to learn more about our innovation.