

The Balance of Power

By Betty-Ann Curtis & Mark Pamperin

We hear a lot lately about the rising cost of energy and even more about green and sustainable technologies that are on the market to minimize power use in a wastewater treatment plant. This article demonstrates a methodology used to estimate the future cost of power in each U.S. state. It also will show why an accurate power cost estimate can change the selection results for wastewater treatment processes, depending on the unique inflation rate in each state.

Predicting future power costs to determine wastewater treatment processes

Predicting Power Costs

Wastewater treatment plants are often among the largest consumers of electricity in a community. Between 50% and 70% of the power used in a plant is attributed to the aeration processes for biological treatment, depending on the plant size, design and processes.

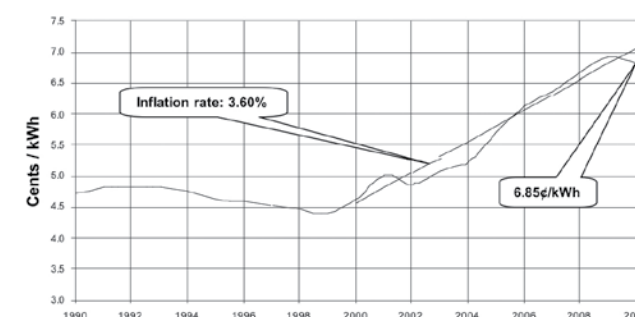
Given this significant demand for power, it is critical not only to select an energy-efficient biological treatment process, but even more so to balance the capital cost with the predicted future power cost. The only way to correctly select the technology with the most economical capital equipment cost and power usage cost is to use an accurate inflation rate for power over the 20-year expected operating life of the plant.

To assist process engineers in selecting a biological treatment technology that offers the best overall value for a particular plant, including energy efficiency, Siemens Water Technologies began investigating the values being used for inflation rates during its process evaluations. The U.S. government maintains all energy records within the Energy Information Administration (EIA). This agency maintains the historical cost of power for each state based on the unique mix of its power sources (e.g., coal, natural gas, hydro, petroleum, wind, solar or wood) and on local regulations for the power industry. Siemens plotted the historical data from EIA for each state, with regression lines used to determine the inflation rates over specific time periods. This has become a valuable tool used by process design engineers when providing 20-year present-worth analyses for various technologies.

Figure 1 shows the historical data for the cost of power as a national average. The cost of power began to rise in 2000, which was the same year several states deregulated their power industries. The average cost of power in the U.S. is currently 6.85 cents/kWh. The rate of inflation over the past 10 years is 3.6%. At that rate, the projected cost of power by 2030, representing the rise in power over the 20-year life of the plant, is 13.9 cents/kWh.

With power costs expected to more than double over the life of the plant, it is critical to evaluate the energy efficiency of each technology being considered for any project based on accurate inflation rates.

Figure 1. Average Industrial Power Costs for U.S. — Total



Different States, Different Rates

Because each state has unique energy issues, sources and costs, engineers must learn the power trends for a specific region in order to make accurate

decisions on selected technologies. Including certain energy-efficient products in a treatment plant design, such as automatic aeration controls or high-efficiency aeration systems, can be cost-effective depending on the state-specific rate of inflation.

For example, the state of Arizona has a current average energy cost of 6.8 cents/kWh (see Figure 2). Its rate of inflation over the past 10 years is 2.34%, which, when extrapolated, translates to a 20-year power cost of 10.81 cents/kWh.

The return on the investment (ROI) may be longer for high-efficiency aeration processes or automated controls in a state with a low energy inflation rate compared to a state with a significantly higher inflation rate.

In contrast, the state of Delaware has the highest rate of inflation for energy costs in the U.S. at 9.05% over the past 10 years (see Figure 3). The current cost of power is 9.67 cents/kWh, but when the rate of inflation is applied to the current costs, the 20-year power cost is estimated to be more than 50 cents/kWh. The majority of the state's power comes from coal. This is not unusual, as more than half of states obtain 60% or more of their power from coal.

The EIA estimates that the cost of power will continue to increase in coal-burning states because of recently passed laws that will affect the price of electricity. The American Clean Energy and Security Act of 2009 requires the reduction of carbon dioxide emissions for coal power plants, which will require either significant investments in coal plant emission upgrades or construction of new power plants using cleaner resources. Either way, costs are expected to be passed directly to the customer.

Figure 2. Average Industrial Power Costs for Arizona



Figure 3. Average Industrial Power Costs for Delaware



Conclusion

With wide variation in the rates of energy inflation, it can be critical to accurately select the appropriate, state-specific inflation rate when evaluating technologies with significant

energy requirements. Something as simple as evaluating the cost of automated aeration controls can indicate a range of five to 15 years on the ROI calculation depending on the rate of inflation for a specific region. Siemens uses this power analysis for its biological treatment design requests to ensure that the most energy-effective solution is provided for a specific project. **www**

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