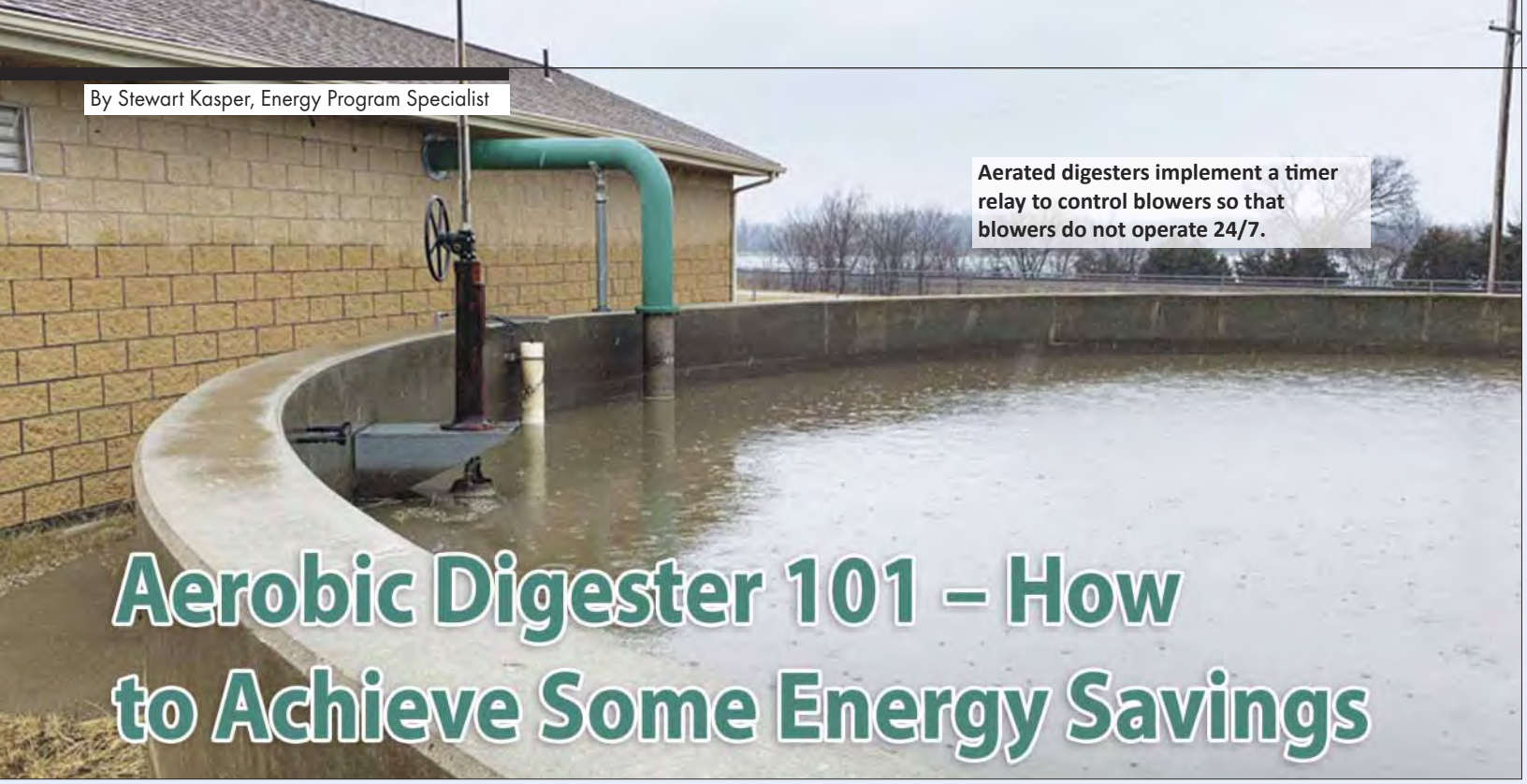
By Stewart Kasper, Energy Program Specialist



Aerated digesters implement a timer relay to control blowers so that blowers do not operate 24/7.

Aerobic Digester 101 – How to Achieve Some Energy Savings

Biosolids… every mechanical wastewater treatment system across Kansas has to deal with them. Biosolids are the mostly organic solids that are produced by activated sludge wastewater treatment plants. Biosolids are basically old, used sludge after the wastewater is treated. This article will focus primarily on treating biosolids with aerated digesters. For many wastewater plants, the digester blowers continuously run so long that they simply become background noise, noticed only when the pitch changes on the motor or they finally shut down but is that necessary? The question is how to operate in the most efficient manner that we can in order to save money on their operation.

A digester is a tank at a mechanical wastewater plant that stores the waste-activated sludge (WAS) that settles in the secondary clarifier. Whether a SCADA program operates the WAS pump or an operator must do it manually, proper sludge wasting is a very important step to a healthy activated sludge plant. By not wasting, the sludge will build up to the point where it is discharged through the effluent, causing several issues downstream at disinfection.

Once in the aerated digester basin, the biosolids, or sludge whichever you prefer, no longer has access to a regular food source. The blower is keeping them supplied with dissolved oxygen (DO), but with no food, they will seek other sources. The microbes in the aerated digester utilize "Endogenous Respiration", which means without available food, they will begin to oxidize themselves. This process, turns the wasted activated sludge, into biosolids.

This photo show the reading from DO analyzers that control the blowers when to slow down or speed up.

Once the wasted activated sludge is in the aerated digester, providing the biosolids with constant DO is the difference between an aerobic digester and an anaerobic digester. Aerobic digesters need consistent air, but here's a little secret, they don't need the blowers running at 100% speed for 24 hours a day.

An energy-conscious operator should shoot for a DO level near 1.0 mg/L in the aerobic digester. However, many operators, including myself when I was operating an aerated digester, have no clue what the DO levels in their aerated digester are. As long as the blowers are running there should be more than enough DO in there to keep the microbes supplied.

There have been many advances in controlling energy use and extending equipment life just in the last 18 years that I have been in this industry. For instance, Variable Frequency Drives (VFD) used to be a luxury that only the largest systems could afford to put on their equipment, but advances in technology and new suppliers getting in the game have brought the cost of the equipment down to affordable levels.

Most mechanical systems already have SCADA implemented at their wastewater plant. These programs can control much of the plant and give operators real-time data on what the

Having redundant blowers prevents potential more significant problems when one of the blowers fails.

plant is doing at all times of the day. It's very interesting to me that so many SCADA programs stop short of controlling the aerated digesters though. If we can extend the reach of the SCADA programming to the digesters, we can gain so much more control, AND save some money along the way.

One of the largest singular expenses at a wastewater plant is electricity for aeration. This makes sense if the aerated digesters are running at 100 percent speed all of the time. By including the digesters into the SCADA programming, the operator can maintain complete control of the digester blowers. Additionally, online controllers, like DO analyzers, can speak to the VFD on the blowers through the SCADA program and tell it whether they have too much air or not enough. When the DO in the digester is above 1.0 mg/L, the blower's motor speed can be turned down significantly to reduce the amount of electricity required to run the blower.

For systems that are charged for peak and off-peak times, the SCADA program can be set so the parameters are lower during peak time when energy costs are higher, reducing the amount of electricity required. VFDs are excellent tools for systems that are working with demand charges, reducing the total demand on a system, and reducing the monthly cost of electricity for the facility.

I hesitate to guarantee a savings amount, as every system is different. Most reports show with VFD control of aerated digesters, the system can save between 30%-60% on the electricity used, greatly reducing the cost to operate the digesters. With the steadily rising cost of basically everything, this can be a huge savings for a utility.

If you would like more information on how your system can use SCADA and VFDs to save money at your wastewater plant's aerobic digester, and for the entire wastewater plant, please feel free to reach out to me for more information.

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2023 Conference coming up . . .

The Annual Conference & Exhibition sponsored by KRWA is almost here. It's March 28 – 30 at Century II in Wichita. I want to draw readers' attention to the programs that are of special interest to wastewater systems. Also, I encourage attendance at the session on Thursday at 10:45 in Room 210 B. Jeff Flathman, P.E. will discuss and demonstrate how many system upgrades (water and wastewater) can be funded just through energy savings. I hope you will review all the sessions. Programs were mailed on January 17 and the entire program is printed again in this magazine and is also posted online at www.kwa.net/conference.

Stewart Kasper joined KRWA staff in August 2020 as Technical Assistant/ Trainer. He holds a Class IV operator certification for water and Class IV operator certification for wastewater in Kansas. Prior to joining KRWA, he was water plant operator at Rural Water District No. 2, Miami County.