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SENTRY Water Tech “helps double biogas production”

SENTRY Water Tech, is helping municipal co-digesters and standalone ADs double their biogas production and plant revenue, thanks to the real-time biomass health data their microbial sensors are able to provide operators. Patrick Kiely, CEO, tells Bioenergy Insight more.

SENTRY has developed the first and only bio-electrode sensor that measures consumable VFA (volatile fatty acids) and biomass health in real time, said Kiely. This provides a minute-by-minute snapshot of the health of anaerobic digesters and alerts operators when conditions indicate a potential upset.

“Our most typical clients in the AD space are operators of treatment systems that manage variable feedstocks, and those that are looking to optimise organic loading and biogas production,” he said. “To manage changing or variable feed stocks, or to try and optimise digester performance operators need reliable information to let them see that their biomass and VFA levels are stable which is the information we uniquely provide.”

The SENTRY platform is currently deployed in over 400 unique locations globally, which supports over 650 operators better understand their biological imbalances and optimises their processes. This includes AD operators who are looking to increase biogas production and plant revenue, added Kiely.



SENTRY sensor at CMSA

How it works

The company’s microbial sensors provides health data that was previously unavailable. Bioenergy Insight asked how the technology achieves this.

“Our biofilm-based sensors are known for ‘boldly going where no sensor has gone before’ and are low maintenance, calibration-free and thrive in the same biofouling that makes other sensors fail,” said Kiely. “They run on biofilm and are designed to be in wastewater.”

“In the case of AD applications, this means they mount right in the effluent or recirculation lines of digesters uniquely providing a real-time signal indicating the health of the biomass degrading the wastes. The sensors are designed to adapt to the AD environment and AD operators don’t have to worry about fouling and finally get direct, real-time monitoring of their anaerobic biomass health.”

Kiely’s experience as an environmental microbiologist meant that, over a decade ago, he saw the need to monitor wastewater treatment performance in a way that could change treatment processes based on influent conditions.

“Traditional sensors for measuring wastewater quality were originally designed for drinking water and in reality just don’t work well in wastewater as they get clogged or covered in biofilm,” he said. “Manual sample techniques such as VFA analysis or FOS/TAC measurements can provide good data but are time consuming, costly and provide just one data point per test.

“This type of data is just not good enough for operators that are operating systems that are receiving variable feedstocks or those that are looking to increase loading to systems. Real-time, low maintenance, VFA and biomass health data is the only reliable solution that can allow operators to load their digesters and have the confidence that they will be alerted the moment the conditions in the reactor are moving in the wrong direction.”

Challenges

When Bioenergy Insight asked about any major challenges faced, Kiely said developing the technology and sensor platforms that can solve problems was the easy part.

“The most challenging aspect is to build trust with the designers and operators of AD treatment systems. AD treatment is really well established and industry experts are sometimes reluctant to try and rely on new technologies,” he added.

“We understand this and it is clear that we have to be patient and work with the industry over years to test and validate our solution. We are now five years along with some of our earliest clients and this track record has provided us the data, case studies and references that have the weight that allows more and more clients to trust our signal and use us in their systems.”

CMSA relationship

Central Marin Sanitation Authority (CMSA) provides wastewater treatment, disposal, and related environmental services for Marin County, California. About a decade ago, it upgraded its two digesters to allow for co-digestion (taking in multiple feed sources). However, it found its anaerobic digestion difficult to monitor and control in real time because the industry lacked a better alternative to three-day volatile fatty acids (VFAs) analyses resulting in unstable digester operation and limited organic loading. It developed a working relationship with SENTRY.

“Timing was everything in getting started with CMSA. At the time they had just built a pilot AD system at their facility to test the impact of blending different off-site waste streams into their digesters,” explained Kiely. “It was colleagues at HACH (now Veralto), Daniel Benitez and Dan Kroll, who

suggested us to CMSA as they were equally intrigued to see if our sensor really did perform the way we were suggesting.

“We worked to show the CMSA operations team the impact from 10% up to 50% of off-site organics on reactor performance. The penny dropped for people when we detected one particularly challenging feedstock and alerted the operators as it was being added into the reactor. Our alert arrived three days before the manual VFA test showed this impact which really proved out the value in having real-time alerts.”

As a result of installing SENTRY sensors in the digester feed and recirculation line, CMSA has been able to load with 30-50% of off-site organics. This has doubled their biogas production and significantly increasing revenue from energy production, according to Kiely.

“According to CMSA technical service manager, Peter Kistenmacher, they’ve been able to minimise digester disruptions since the SENTRY sensors show an upset event in real time vs. the several days it normally took previously to get the monitoring data. They were also able to optimise how their two digesters were working.

“Due to the success of the SENTRY sensor platform so far, CMSA is looking to increase their organic loading beyond 50% and will do so leveraging the signals and daily digester loading data our sensors provide. For facilities in California following this example they could expect this to result in an extra \$600,000 (€551,443) in revenue for municipal co-digestion facilities.”

The rest of the year

Bioenergy Insight then asked about SENTRY’s main focus for the rest of this year.

“At this point, we’ve proven our sensors make a significant impact at facilities around the world, whether a municipal wastewater treatment plant, a standalone anaerobic digester plant or an industrial manufacturer. And we’ve shown a strong return on investment for our customers since for about \$40 (€36) a day, they’re gaining insight into wastewater conditions they’ve never had before.

“However, not everybody’s heard about our company and what our sensor platform can do for them so our main focus this year is spreading the word that an affordable solution exists for plant operators looking to improve their treatment and outcomes with better data. As we like to say at SENTRY when it comes to ADs... digester health equals biogas wealth.”

