



Variable Influent. Predictable Outcomes.™

150% More Biogas Production With Real-time VFA Monitoring & Stabilized Digester Performance

Location: Massachusetts, USA

Client: A national leader in agricultural and food waste recycling

Type of Plant: A dairy farm operating an on-site anaerobic digester with manure and food waste co-digestion

Location of Sensors: Installed in the feed and discharge lines of the digester

Problem Statement: Highly variable feedstock negatively impacted digester process stability and biogas production

Outcome: SENTRY™ sensors' real-time consumable VFA monitoring reduced manual sampling by up to 60%, prevented costly digester upsets saving up to \$40,000 annually, and increased biogas production by over 150%



Overview and Problem Statement:

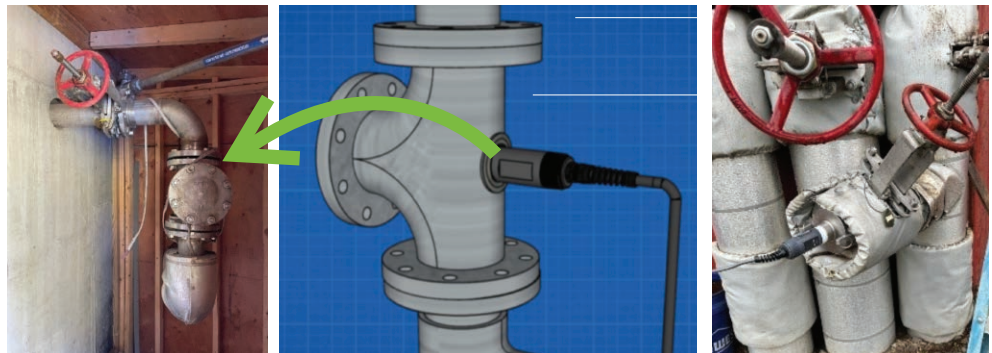
A dairy farm in Massachusetts operates a 1 MW co-digestion continuous stirred-tank reactor (CSTR) plant processing approximately 42,400 tons of waste annually, with 10-15% manure and the remainder consisting of organic food waste. The biogas produced is converted to energy via a combined heat and power (CHP) unit.

The anaerobic digester (AD) faced ongoing challenges due to the inconsistent and often unknown composition of incoming organic waste making it difficult to maintain stable digestion conditions. Traditional monitoring methods required frequent manual sampling and provided limited early-warning capabilities. This absence of real-time feedback increased the risk of digester performance drops, system upsets, and degraded effluent quality. Because of this, the facility aimed to enhance biogas production, reduce manual sampling, and gain better visibility into process stability.

Deployment Experience:

To support the facility goals, the operations team deployed SENTRY™ real-time bio-electrode sensors with zero calibrations, moving parts, and routine maintenance to monitor consumable volatile fatty acids (VFA) levels and detect early signs of imbalance at plant locations never possible before.

Two SENTRY sensors were installed, one in the feed line into the digester and one in the discharge line:



Test Results and Values:

Real-time Digester Health/Performance Monitoring

SENTRY delivered a real-time VFA signal which could be related to organic loading giving operators enough lead time to intervene and prevent digester imbalances.

Event 01: April 2024

The facility received approximately 15,000 gallons of waste sourced from a manufacturing process that produces ice cream toppings (including fudge, caramel, and fryer oil from waffle cones). Using SENTRY sensors, the operator closely monitored digester health and determined that, despite a noticeable increase in the sensor signal, the tank successfully assimilated the waste without any major disruptions.

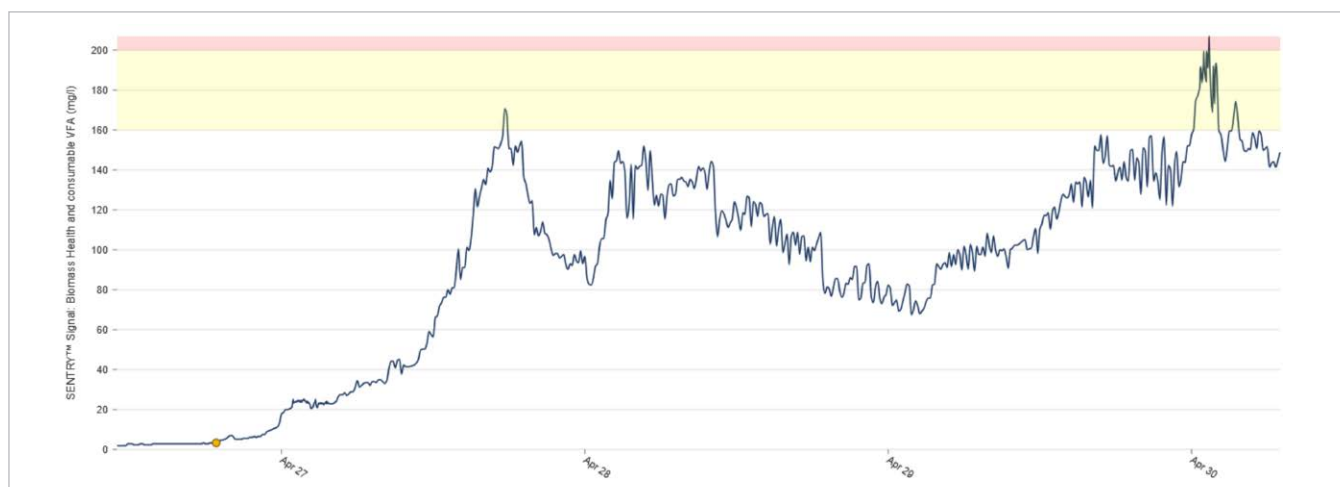


Figure 1: SENTRY web dashboard showing high VFA detected due to addition of ice cream topping waste to the digester

Event 2: September 2024

During nighttime hours, the SENTRY sensor installed on the feed line detected an unexpected change in biological activity. Upon investigation, the team identified an operational error. Thanks to the early alert from SENTRY, the operator promptly reduced the loading target by approximately 25% to address signs of biological stress, preventing a potential upset.

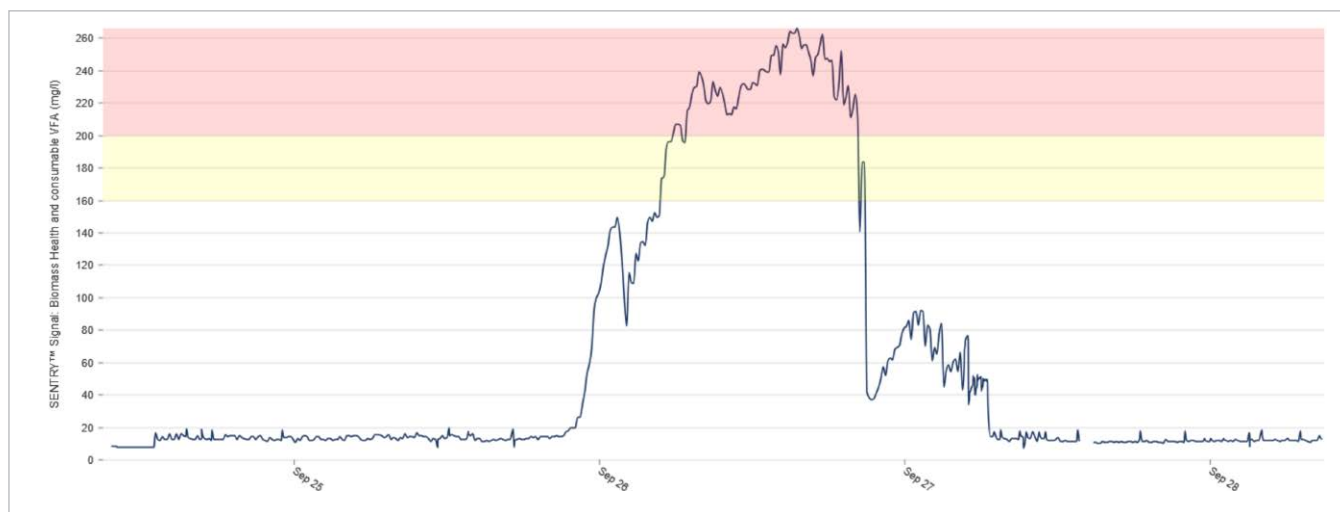


Figure 2: SENTRY web dashboard showing an unexpected change in biological activity

Improved Biogas Production

Within just two months of implementing the SENTRY real-time monitoring system, the facility saw an over 150% increase in biogas production, rising from 160,937.73 cubic feet per day (cf/d) in February 2024 to 416,070.00 cf/d in August 2024.

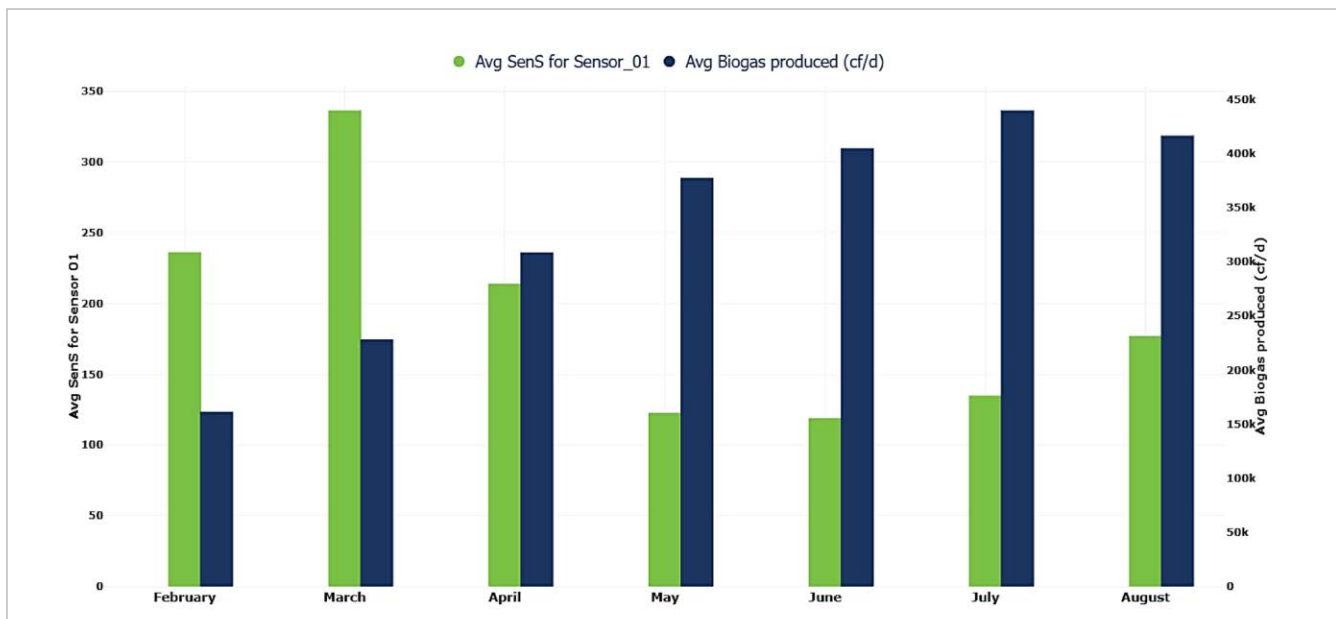


Figure 3: Increased biogas production levels with SENTRY sensors installed

Reduced Manual Sampling

Routine lab sampling confirmed that SENTRY's real-time VFA signals closely aligned with lab-measured VFA trends validating the sensor's ability to provide dependable, real-time assessments of digester health. By utilizing SENTRY data, the facility can reduce manual sampling by up to 60%, enabling faster, smarter decision-making and more stable digester performance.

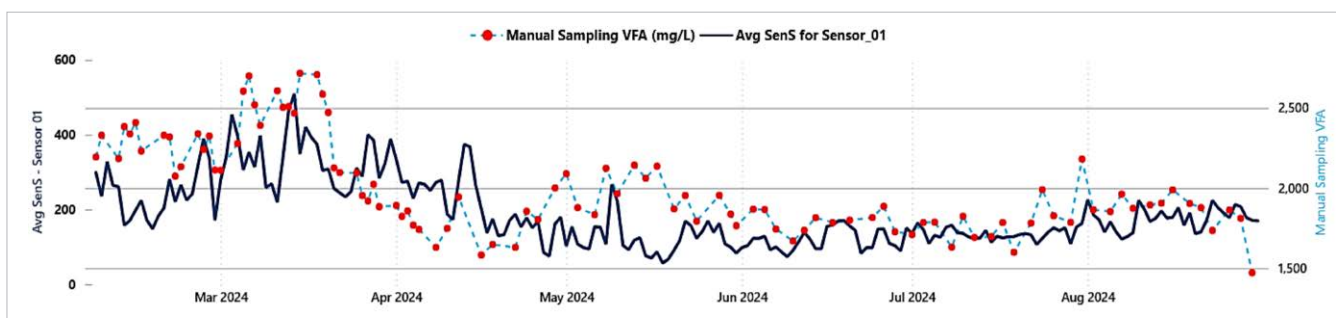


Figure 4: Correlation between lab-measured VFA levels and SENTRY sensor real-time VFA levels

Final Outcome:

By integrating SENTRY into their process, this dairy farm co-digesting facility not only stabilized their anaerobic digestion performance but also unlocked significant operational and financial value including:

- ✓ **Upset Prevention**
Early detection of imbalance events allowed operators to proactively adjust feed strategies preventing potential digester upsets that could have led to downtime or costly recovery efforts. These avoided disruptions are estimated to have **saved the facility \$25,000–\$40,000 annually** in maintenance and lost biogas production.
- ✓ **Reduced Manual Sampling**
With real-time VFA monitoring now in place, manual sampling frequency can be **reduced by up to 60% saving approximately \$15,000–\$20,000 per year** in labor and lab analysis costs.
- ✓ **Biogas Production Increase**
An over **150% increase** in biogas yield enabled the facility to generate substantially more renewable energy. This translates to an **estimated annual revenue increase of over \$100,000** depending on energy pricing and utilization.

Visit the SENTRY website to see how other AD facilities are using our sensors to optimize digester performance for just a few dollars a day!

