Alexandra Arndt, director of marketing at Digester Doc, explains the company's recent partnership that has maximised an anaerobic digestion (AD) system's efficiency

Middlebury food waste AD system sees unprecedented performance

Digester Doc, a leading private research establishment in the anaerobic digestion (AD) industry, has partnered with Valkyrie Analytics, Inc., a provider of groundbreaking real-time data analytics technology that aims to simplify AD and maximise its efficiency.

Together, they have successfully stabilised and optimised the food waste and fat, oil and grease (FOG) anaerobic digestion system located in Middlebury, Indiana. The partnership has been fruitful — the facility saw a 317% increase in per-day energy and biomethane production and avoided multiple costly foaming events. The results that were achieved are testament to the game-changing impact of avant-garde operational techniques in shaping the future of AD.

Culver Duck site

Digester Doc: Transforming anaerobic digestion optimisation

For over ten years, Digester Doc has been at the forefront of simplifying and improving AD processes. Thanks to the company's expertise in biological and chemical system optimisation, every project it has undertaken has seen a 30% increase in biogas yields and a significant displacement of GHG emissions.

The organisation's deep understanding of AD systems has allowed it to develop pioneering strategies to address operational challenges and maximise

Will Charlton, president of Digester Doc and founder/ CEO of Valkyrie Analytics

system performance.

Will Charlton, president of Digester Doc and founder/ CEO of Valkyrie Analytics, stated: "We are unique specialists in renewable energy who consistently push the boundaries of what is thought possible for RNG. From education to science-driven policy to operational efficiencies, we are on the cusp of innovation in all aspects of anaerobic digestion."

Valkyrie Analytics: Real-time data analytics for enhanced decision-making

Valkyrie Analytics, a sister company of Digester Doc, brings cutting-edge real-time data analytics technology to the table. Its advanced systemic solutions empower owners and operators of AD facilities to make informed decisions, optimise processes and drive growth.

"Our platform is designed to empower businesses of all sizes to make better decisions by leveraging the power of data," said Carl Hinchman, chief analytical officer of Valkyrie Analytics. "We understand businesses must be agile and responsive to evolving market and system conditions; our platform is built with that in mind. The goal is to help owners and operators

make data-driven decisions that help them thrive and avoid system failures."

The Middlebury system challenge

The food waste and FOG AD system put Digester Doc and Valkyrie Analytics' collaboration to the test. Facility owners, a prominent player in the poultry industry, rely heavily on its AD system to manage waste streams and produce renewable energy.

However, the system faced recurring challenges related to foaming events, which compromised its performance, efficiency and overall profitability. These foaming events not only reduced biogas production but also resulted in downtime and significantly increased recurring maintenance costs.

Optimising the system: A multi-faceted approach

Site operators called upon the expertise of Digester Doc and Valkyrie Analytics to address the challenges their AD system was facing. A multi-faceted, pioneering approach was quickly implemented that coupled biological and chemical system optimisation with real-time data analytics.

First, Digester Doc leveraged its mastery of understanding the complexities of microbial communities, nutrient balance and operational parameters to identify areas for improvement. By reconditioning the biological processes within the system, the company enhanced stability and efficiency, resulting in increased biogas production and enhanced overall performance.

Its team of specialists also focused on balancing the chemical aspects of the AD system. By carefully analysing and adjusting micronutrient levels, microbial populations, and other key aspects of overall biological and chemical system health, the team achieved an optimal equilibrium that further boosted system performance and mitigated foaming events.

Valkyrie Analytics played a critical role in the collaboration by providing advanced real-time data analytics solutions. Through a single-point system continuously monitoring the AD's influent and analysing operational data such as temperature, pH levels, alkalinity and other relevant parameters, Valkyrie Analytics' platform generated actionable insights. These insights allowed operators to detect potential issues in advance, optimise operational parameters and ensure the system functioned at peak efficiency from the palm of their hands with Valkyrie Analytics' user-friendly dashboard.

The operators were enthusiastic about the results. "Our goal was to have Valkyrie and Digester Doc assist us in identifying events that pose a threat and give us the knowledge and advance notice to make the correct changes. Within a very short time, that goal was realised," they said.

The results: Unrivaled energy production and revenue

Before the integration of Valkyrie Analytics' technology, the Middlebury system produced 8.5 MWh/day of energy. The collaboration's optimisation efforts bolstered their output to over three times that — 27 MWh/day.

The partnership also had a transformative impact on biomethane production. Before Valkyrie Analytics' involvement, the system produced 132.06 m^3/hr of biomethane. Through their strategies, Digester Doc and Valkyrie Analytics amplified the biomethane production to 419.48 m^3/hr.

Increased energy revenue also meant they were able to allocate funds toward replacing a third CHP unit that was previously out of commission. This investment ensures the system's long-term stability and efficiency, further strengthening its economic viability.

By implementing personalised strategies for balancing bacteria and customising additives to accommodate high food waste feedstock diets, three costly foaming events were successfully avoided, which previously disrupted operations and incurred weighty maintenance expenses.

"Valkyrie Analytics and Digester Doc have provided a significant risk-mitigation factor. We have been able to operate the digester system at a higher level than anticipated in operational planning, and this has resulted in increased gas production and revenues," said Middlebury AD operators.

Revolutionising AD systems for maximum production and profitability

The partnership between Digester Doc and Valkyrie Analytics represents a significant milestone in AD. By combining their respective expertise, these two industry leaders are set to revolutionise the way AD systems are operated.

Current performance limits will be reimagined while improved stability, enhanced energy & biogas production and reduced foaming events will lead to significant cost savings and increased profitability.

"Anaerobic digestion system transparency is the key that unlocks unparalleled potential for our industry, empowering operators to uncover hidden opportunities, optimise performance and pave the way for a sustainable and prosperous future," Charlton concluded. ●

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View of the Culver Duck site