Application Sheet

Water & Environmental Technologies

BioVentris®

BioVentris® is a proprietary enzyme mixture designed for municipal sewage and industrial wastewater treatment plants equipped with anaerobic digesters (AD). BioVentris® improves organic conversion efficiency in the digester, resulting in more gas production and less sludge to dispose of after dewatering.

Benefits

BioVentris offers a multitude of benefits to wastewater treatment processes. It significantly boosts biogas production, with potential gains of up to 15% in gas output, and minimizes the volume of sludge generated after dewatering, reducing disposal requirements by as much as 10%. In addition to these advantages, BioVentris provides a notable reduction of up to 10% in polymer consumption, decreasing overall operational costs. It promotes sustainability by enhancing energy recovery, reducing energy consumption, and shrinking the carbon footprint of the system. Notably, its enzyme-only technology provides a cost-effective treatment solution suitable for even low COD waste streams.

Performance

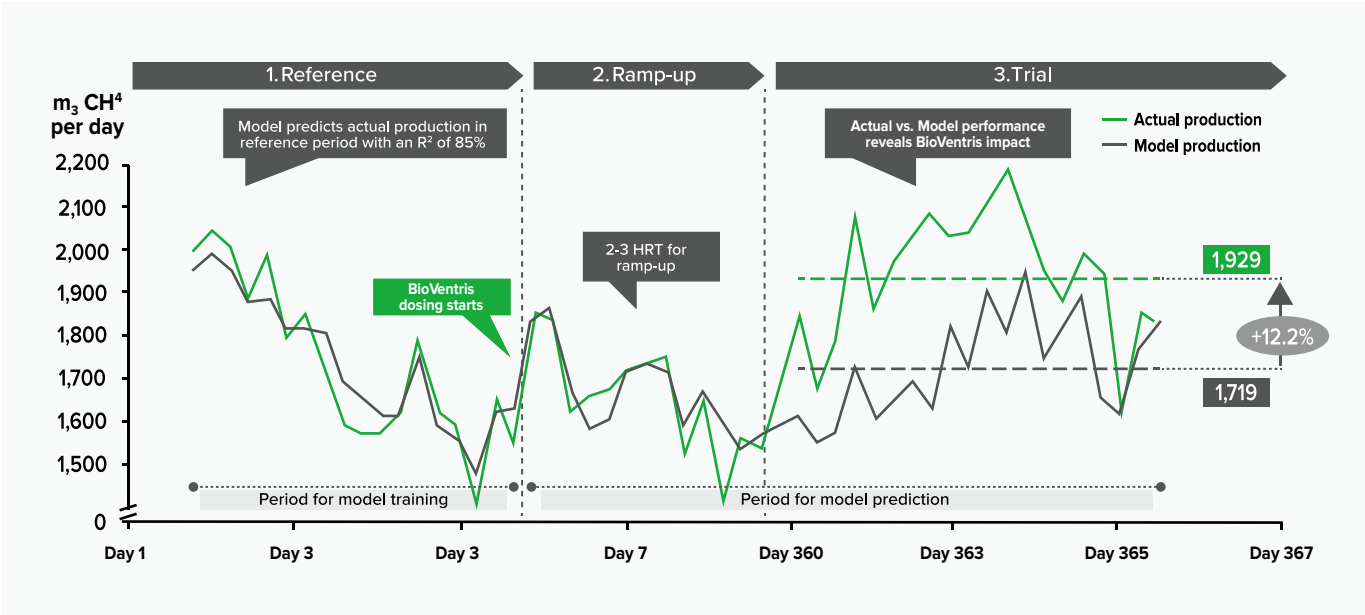
BioVentris® was trialed at a mid-sized sewage treatment plant in Scandinavia, treating the wastewater from a population of approximately 200,000 people. The key results from the trials include a 12% increase in average daily methane production (Fig. 1).

The wastewater plant was seeking to improve the performance of its anaerobic digesters to generate more biogas and reduce the volume of dewatered sludge. To achieve this goal, BioVentris was proposed. First, a reference period (1) and a baseline for methane production was established. A statistical model was developed to predict the daily methane generation (m^3 of CH_4 per day) based on a number of process variables (e.g., water flow, TS content at the inlet/outlet, VS content at the inlet/outlet, primary/secondary sludge ratio, temperature, alkalinity). The model was found consistent with real data collected during the reference period, with 85% of points falling within the regression. This indicated that the selected features were very good at explaining variation in methane generation using the model in question. Next, dosing of BioVentris program was initiated (2), with some initial calibration/ramp-up to cater to optimal dosing and make sure the enzymes were fully mixed in the digester. For the trial plant, this took 2 - 3 hydraulic retention times (HRT).

During the trial period, increased methane (3) production started to show, with actual methane production being 12.2 % higher on average compared to the model prediction in the same period. The plant also reported decreased sludge volumes and improved dewatering performance.

ENVIROZYME®

Fig. 1 *BioVentris® trial performance at a Scandinavia-based municipal sewage treatment plant*



Recommended Use

The dosing of the product should happen as close to the anaerobic reactor as possible, preferably at the digester inlet. See Fig. 2.

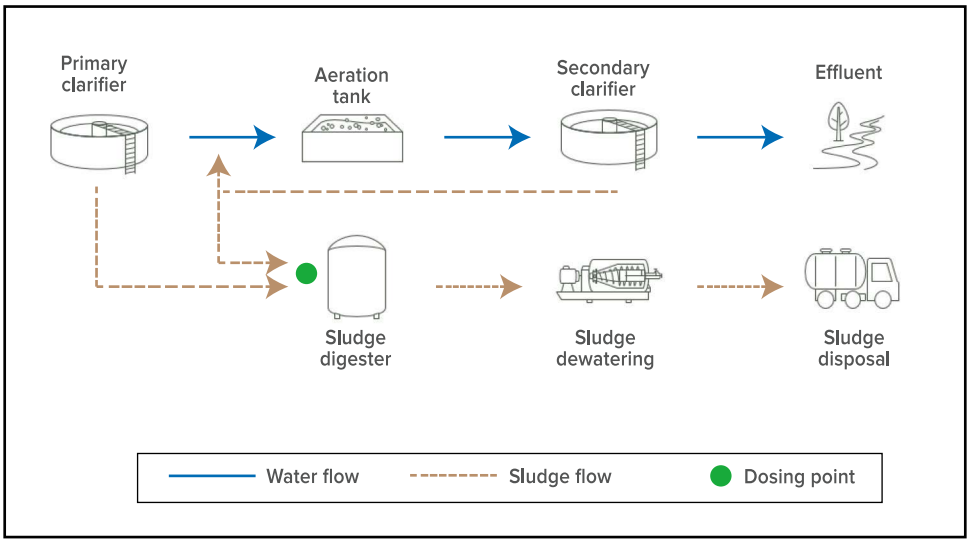


Fig. 2 *BioVentris® dosing should take place as close to the digester inlet as possible*

ENVIROZYME®

Calculation of Product Dosage

The dosing of BioVentris® depends on the volatile solids (VS) load going into the anaerobic digester. To determine product dosing, first calculate the daily weight (in tons) of the total VS load into the digester.

SLUDGE TYPE	TOTAL SOLIDS (TS)	VOLATILE SOLIDS (VS)
Primary sludge load (kg/day)	**TS_1** = Volume of sludge flow from primary clarifier (m^3/day) x dry solids content (kg/m^3)	**VS_1** = TS_1 x volatile solids fraction (%)
Secondary sludge load (kg/day)	**TS_2** = Volume of sludge flow from primary clarifier (m^3/day) x dry solids content (kg/m^3)	**VS_2** = TS_2 x volatile solids fraction (%)
Total sludge load (kg/day)	**TS_T** = TS_2 + TS_2	**VS_T** = VS_2 + VS_2

BioVentris® base dosing is set to **0.625 kg per 1,000 kg of total volatile solids (VST)**. As most facilities have more frequent measurements of the TS fraction of the sludge, dosing can also be expressed as **0.5 kg per 1,000 kg of total solids (TST)** provided that VST/TST stays close to 80%.

During application start-up, apply **2x base dosage** during a period corresponding to ½ hydraulic retention time (HRT) to ensure faster mixing of product and digester content, and maintain daily base dosage from here.

The above refers to the **total dosing of both BioVentris® C and BioVentris® P**. The default dosing split between the two products is 1/3 of BioVentris® C and 2/3 of BioVentris® P.

Dosing rates are summarized in the table below for common sludge loads.

Daily TS_T load (tons)	Daily VS_T load (tons)*	BioVentris® total daily base dosage (kg)	BioVentris® C base dosage (kg)	BioVentris® P base dosage (kg)	BioVentris® total start-up dosage (kg)	BioVentris® C start-up dosage (kg)	BioVentris® P start-up dosage (kg)
15	12	7.5	2.5	5	15	5	10
30	24	15	5	10	30	10	20
60	48	30	10	20	60	20	40
120	96	60	20	40	120	40	80

Product Characteristics

BioVentris® consists of, two separate products, BioVentris® C and BioVentris® P.

PRODUCT	MAIN ENZYME ACTIVITY	PHYSICAL FORM
BioVentris® C	Cellulase	Liquid
BioVentris® P	Protease	Liquid

Find more information at www.envirozyme.com.

Safety, Handling, and Storage

Store in a cool, dry place at 10 – 25° C (50 – 77° F). Wash hands thoroughly with soap and water after handling. Avoid contact with eyes.

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