

## Supplementary Materials:

Table S1. Changes in oxidation-reduction potential across variants.

[illegible]

Table S2. Changes in TOC across variants.

[illegible]

Table S3. Changes in H<sub>2</sub>S in the biogas across variants.

Day	1	2	3	4	5	6	7	8	9	10	11	12	13
S1V1	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	1.3±0.2	1.8±0.7	1.6±0.5	1.8±0.4	1.6±0.3	1.2±0.2	1.0±0.2	1.3±0.4
S1V2	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	1.1±0.2	1.2±0.3	2.3±0.6	2.2±0.3	2.7±0.5	2.3±0.4	2.0±0.2
S1V3	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.4±0.1	1.3±0.3	1.0±0.2	1.5±0.4	1.1±0.4
S2V1	0.0±0.0	0.0±0.0	0.0±0.0	1.0±0.2	1.4±0.3	1.2±0.1	2.3±0.4	2.1±0.2	3.7±1.1	2.9±0.9			
S2V2	0.0±0.0	0.0±0.0	0.0±0.0	1.7±0.6	2.1±0.5	1.9±0.4	2.4±1.1	2.2±0.5	1.9±0.6	3.8±0.8			
S3V3	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.3±0.1	0.9±0.0	1.3±0.4	1.4±0.2	1.1±0.1			
S3V1	0.0±0.0	0.0±0.0	5.3±1.1	6.3±0.9	5.7±1.3	7.2±2.7	7.3±0.9						
S3V2	0.0±0.0	0.0±0.0	0.0±0.0	2.9±0.6	4.4±1.1	4.7±0.8	3.9±0.6						
S3V3	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	1.0±0.2	1.3±0.3						
S4V1	0.0±0.0	0.0±0.0	1.7±0.2										
S5V1	0.0±0.0	0.0±0.0	2.0±0.4										

**Table S4.** Concentrations of gas constituents (except for H<sub>2</sub>S) in S1.

Day		1				2				3				4			
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	
Raw wastewater	0.0	20.5 ±1.3	79.5 ±2.1	0	0.5 ±0.1	19.8 ±0.9	79.6 ±1.8	51 ±3	0.7 ±0.1	19.3 ±1.5	79.9 ±2.1	24 ±2	1.1 ±0.1	19.3 ±1.7	79.5 ±1.9	121 ±8	
S1V1	0.0	20.5 ±1.2	79.5 ±3.5	0	0.7 ±0.1	32.6 ±1.5	66.6 ±2.2	0	0.7 ±0.1	27.4 ±1.9	71.8 ±3.2	0	1.8 ±0.2	24.2 ±2.0	73.9 ±2.3	0	
S1V2	0.0	20.5 ±1.1	79.5 ±3.0	0	0.7 ±0.1	37.8 ±1.7	61.4 ±2.4	0	0.7 ±0.1	34.6 ±2.0	64.6 ±2.5	0	1.7 ±0.1	27.4 ±1.6	70.8 ±2.8	0	
S1V3	0.0	20.5 ±1.3	79.5 3.2	0	0.6 ±0.1	41.2 ±2.1	58.1 ±2.7	0	0.6 ±0.1	38.1 ±2.2	61.2 ±2.2	0	1.2 ±0.1	37.5 ±2.6	61.2 ±2.5	0	
Day		5				6				7				8			
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	
Raw wastewater	1.4 ±0.1	18.8 ±1.0	79.7 ±1.9	>500	1.4 ±0.1	18.9 ±2.1	79.6 ±1.8	>500	1.3 ±0.1	18.2 ±1.6	80.4 ±2.1	>500	1.3 ±0.1	18.3 ±1.9	80.3 ±1.7	>500	
S1V1	1.8 ±0.1	21.1 ±1.2	77.0 ±2.1	0	2.0 ±0.2	19.5 ±2.2	78.4 ±2.0	0	1.8 ±0.1	17.7 ±1.5	80.4 ±1.8	72 ±2	1.7 ±0.1	17.5 ±1.7	80.7 ±1.6	77 ±4	
S1V2	1.8 ±0.2	22.9 ±1.4	75.2 ±2.0	0	2.0 ±0.1	20.3 ±1.7	77.6 ±1.9	0	1.8 ±0.1	18.4 ±2.1	79.4 ±1.9	20 ±2	1.6 ±0.1	18.3 ±1.5	79.9 ±1.5	19 ±2	
S1V3	1. ±0.1	38.0 ±1.3	60.5 ±2.3	0	2.0 ±0.3	28.2 ±1.9	69.7 ±2.2	0	2.0 ±0.1	22.1 ±1.8	75.8 ±1.8	21 ±1	1.9 ±0.1	20.2 ±2.0	77.8 ±1.9	17 ±1	
Day		9				10				11				12			
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	
Raw wastewater	0.7 ±0.1	20.0 ±1.9	79.2 ±2.0	>500	1.0 ±0.1	18.9 ±1.6	80.0 ±1.7	>500	0.8 ±0.1	19.3 ±1.7	79.8 ±1.9	500>	0.7 ±0.1	20.0 ±2.1	79.2 ±2.1	>500	
S1V1	1.2 ±0.1	18.4 ±1.9	80.3 ±2.1	93 ±3	1.8 ±0.1	16.7 ±1.5	81.4 ±1.8	78 ±4	1.8 ±0.1	16.8 ±1.8	81.3 ±1.8	58 ±3	1.2 ±0.1	18.4 ±1.9	80.3 ±1.9	93 ±4	
S1V2	0.8 ±0.1	19.9 ±1.7	79.2 ±1.8	16 ±1	1.2 ±0.1	19.0 ±1.6	79.7 ±1.6	16 ±1	1.0 ±0.1	19.3 ±1.7	79.6 ±1.7	23 ±1	0.8 ±0.1	19.9 ±1.7	79.2 ±1.9	16 ±2	
S1V3	1.1 ±0.1	20.4 ±1.8	78.3 ±2.0	14 ±1	1.7 ±0.2	18.7 ±1.8	79.5 ±2.0	12 ±1	1.6 ±0.1	18.5 ±1.9	79.8 ±1.9	11 ±1	1.1 ±0.1	20.4 ±2.0	78.3 ±1.8	14 ±1	
Day		13															

Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm
Raw wastewater	0.7	19.3	79.9	>500
	±0.1	±1.5	±1.8	
S1V1	2.0	15.8	82.1	48
	±0.2	±1.7	±1.9	±2
S1V2	0.7	19.7	79.5	47
	±0.1	±1.7	±1.8	±5
S1V3	1.8	17.9	80.2	12
	±0.1	±1.6	±1.8	±1

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**Table S5.** Concentrations of gas constituents (except for H<sub>2</sub>S) in S2.

Day		1				2				3				4			
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	
Raw wastewater	0.0	20.5 ±1.3	79.5 ±2.1	0	0.5 ±0.1	19.8 ±0.9	79.6 ±1.8	51 ±3	0.7 ±0.1	19.3 ±1.5	79.9 ±2.1	24 ±2	1.1 ±0.1	19.3 ±1.7	79.5 ±1.9	121 ±8	
S2V1	0.0	20.5 ±1.4	79.5 ±2.0	0	1.5 ±0.1	22.5 ±1.1	75.9 ±2.0	0	0.8 ±0.1	21.5 ±1.4	77.6 ±1.8	0	0.6 ±0.1	21.4 ±1.7	77.9 ±2.0	0	
S2V2	0.0	20.5 ±1.6	79.5 ±1.8	0	0.5 ±0.1	22.3 ±1.5	77.1 ±2.1	0	0.4 ±0.1	22.3 ±1.6	77.2 ±2.0	0	0.4 ±0.1	22.1 ±1.9	77.4 ±2.1	0	
S2V3	0.0	20.5 ±1.5	79.5 ±1.9	0	1.6 ±0.1	24.3 ±1.7	74.0 ±1.8	0	1.5 ±0.1	23.7 ±1.7	74.7 ±1.9	31 ±2	1.2 ±0.1	23.1 ±1.3	75.6 ±2.0	0	
Day		5				6				7				8			
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	
Raw wastewater	1.4 ±0.1	18.8 ±1.0	79.7 ±1.9	>500	1.4 ±0.1	18.9 ±2.1	79.6 ±1.8	>500	1.3 ±0.1	18.2 ±1.6	80.4 ±2.1	>500	1.3 ±0.1	18.3 ±1.9	80.3 ±1.7	>500	
S2V1	0.7 ±0.1	21.3 ±1.1	77.9 ±2.0	0	1.7 ±0.1	20.4 ±2.1	77.8	0	2.0 ±0.1	19.5 ±1.7	78.4 ±2.0	90 ±3	1.9 ±0.1	19.2 ±1.7	78.8 ±1.9	103	
S2V2	0.4 ±0.1	22.2 ±1.3	77.3 ±1.9	0	0.7 ±0.1	23.2 ±2.0	76.0	0	0.7 ±0.1	22.5 ±1.6	76.7 ±1.9	0	0.8 ±0.1	21.4 ±1.6	77.7 ±1.8	0	
S2V3	0.9 ±0.1	22.6 ±1.4	76.4 ±2.1	0	1.1 ±0.1	22.8 ±1.9	76.0	0	1.0 ±0.1	22.4 ±1.7	76.5 ±2.0	0	0.9 ±0.1	22.3 ±1.7	76.7 ±2.0	0	
Day		9				10											
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm									
Raw wastewater	0.7 ±0.1	20.0 ±1.9	79.2 ±2.0	>500	1.0 ±0.1	18.9 ±1.6	80.0 ±1.7	>500									
S2V1	1.7 ±0.1	19.3 ±1.6	78.9 ±2.1	150 ±5	1.6 ±0.1	19.4 ±1.5	78.9 ±1.9	148 ±5									
S2V2	0.7 ±0.1	20.6 ±1.5	78.6 ±1.9	0	0.7 ±0.1	20.7 ±1.5	78.5 ±1.8	0									
S2V3	0.7 ±0.1	22.0 ±1.7	77.2 ±1.9	0	0.7 ±0.1	22.1 ±1.6	77.1 ±2.0	0									

**Table S6.** Concentrations of gas constituents (except for H<sub>2</sub>S) in S3.

Day		1				2				3				4			
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	
Raw wastewater	0.0	20.5	79.5	0	0.5	19.8	79.6	51	0.7	19.3	79.9	24	1.1	19.3	79.5	121	
		±1.3	±2.1		±0.1	±0.9	±1.8	±3	±0.1	±1.5	±2.1	±2	±0.1	±1.7	±1.9	±8	
S3V1	0.0	20.5	79.5	0	0.1	20.8	69.0	16	0.7	21.0	66.2	119	1.4	21.9	74.6	150	
		±1.4	±1.9		±0.1	±1.5	±1.9	±1	±0.1	±1.1	±1.8	±4	±0.1	±1.5	±2.0	±5	
S3V2	0.0	20.5	79.5	0	0.3	21.3	48.3	29	0.7	17.1	52.1	25	1.4	21.1	67.4	76	
		±1.2	±2.0		±0.1	±1.4	±1.5	±2	±0.1	±1.2	±1.9	±1	±0.1	±1.2	±2.1	±4	
S3V3	0.0	20.5	79.5	0	0.2	18.8	30.9	34	0.3	21.4	38.2	31	0.4	21.9	45.6	30	
		±1.3	±2.1		±0.1	±1.3	±1.5	±2	±0.1	±1.6	±1.6	±1	±0.1	±0.9	±1.6	±3	
Day		5				6				7							
Variant	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm					
Raw wastewater	1.4	18.8	79.7	>500	1.4	18.9	79.6	>500	1.3	18.2	80.4	>500					
		±0.1	±1.0	±1.9	±0.1	±2.1	±1.8		±0.1	±1.6	±2.1						
S3V1	1.9	19.5	78.5	169	2.2	16.5	81.2	102	2.4	16.0	81.5	116					
		±0.2	±1.2	±2.0	±2	±0.1	±1.8	±2.1	±3	±0.2	±1.2	±1.9	±4				
S3V2	1.6	15.3	73.0	209	2.0	20.9	77.0	151	2.3	18.7	78.9	85					
		±0.1	±1.3	±2.1	±6	±0.2	±1.7	±1.8	±4	±0.3	±1.1	±2.1	±3				
S3V3	0.6	18.9	59.4	31	1.4	17.5	66.0	28	2.1	17.4	70.4	30					
		±0.1	±1.4	±1.9	±1	±0.1	±1.8	±1.9	±1	±0.2	±1.3	±2.0	±1				

**Table S7.** Concentrations of gas constituents (except for H<sub>2</sub>S) in S4 & S5.

Stage												
S4												
Day		1				2				3		
Variant		CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	NH <sub>3</sub> ppm
Raw wastewater		0.0	20.5 ±1.3	79.5 ±2.1	0	0.5 ±0.1	19.8 ±0.9	79.6 ±1.8	51 ±3	0.7 ±0.1	19.3 ±1.5	79.9 ±2.1
S4V1		0.0	20.5 ±1.6	79.5 ±2.2	0	0.2 ±0.1	20.7 ±0.9	79.0 ±2.1	12 ±1	0.5 ±0.1	20.0 ±1.1	79.4 ±1.9
Stage												
S5												
Day		1				2				3		
Variant		CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	N <sub>2</sub> %	NH <sub>3</sub> ppm	CO <sub>2</sub> %	O <sub>2</sub> %	NH <sub>3</sub> ppm
Raw wastewater		0.0	20.5 ±1.3	79.5 ±2.1	0	0.5 ±0.1	19.8 ±0.9	79.6 ±1.8	51 ±3	0.7 ±0.1	19.3 ±1.5	79.9 ±2.1
S5V1		0.0	20.5 ±1.3	79.5 ±2.0	0	1.7 ±0.2	20.1 ±1.9	78.1 ±1.8	0	2.8 ±0.3	19.2 ±1.3	77.9 ±1.7