



**Evaluation of process data from operation of real
scale biogas plants**

**Lessons learnt and approaches for practical plant
optimisation based on continuous process
monitoring ?**

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Knowledge, Innovation, Sustainability

Consulting | Technology | Research | Concepts

**Biomethane -
Technology and
use**

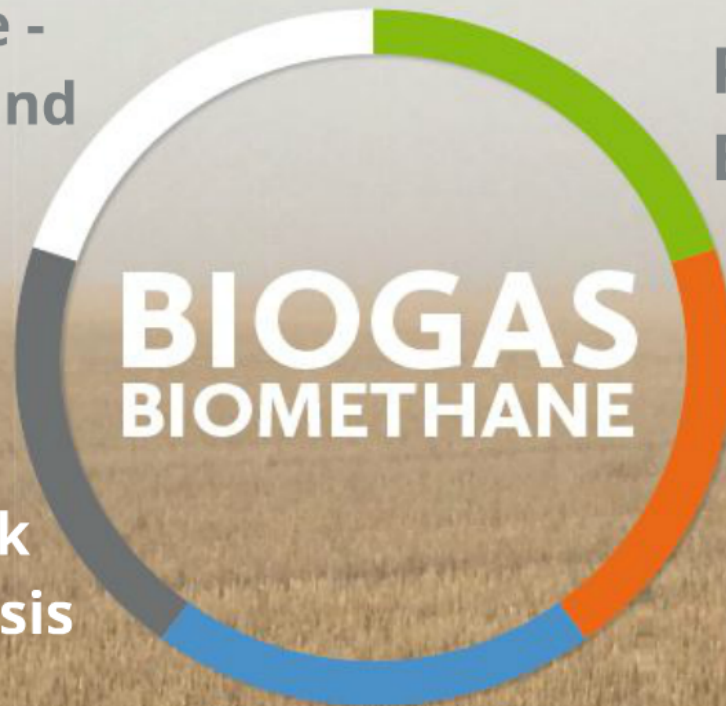
**Process
Biology**

**BIOGAS
BIOMETHANE**

**Biogas weak
point analysis**

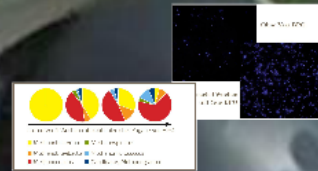
**Knowledge
Transfer**

System Integration

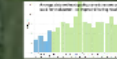


Today: Data accumulate every second - a monthly evaluation takes place

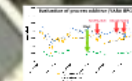
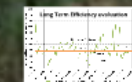
- Analysis of annual and daily course of heat consumption / flexible operation enables income optimisation
- CHP efficiency evaluation



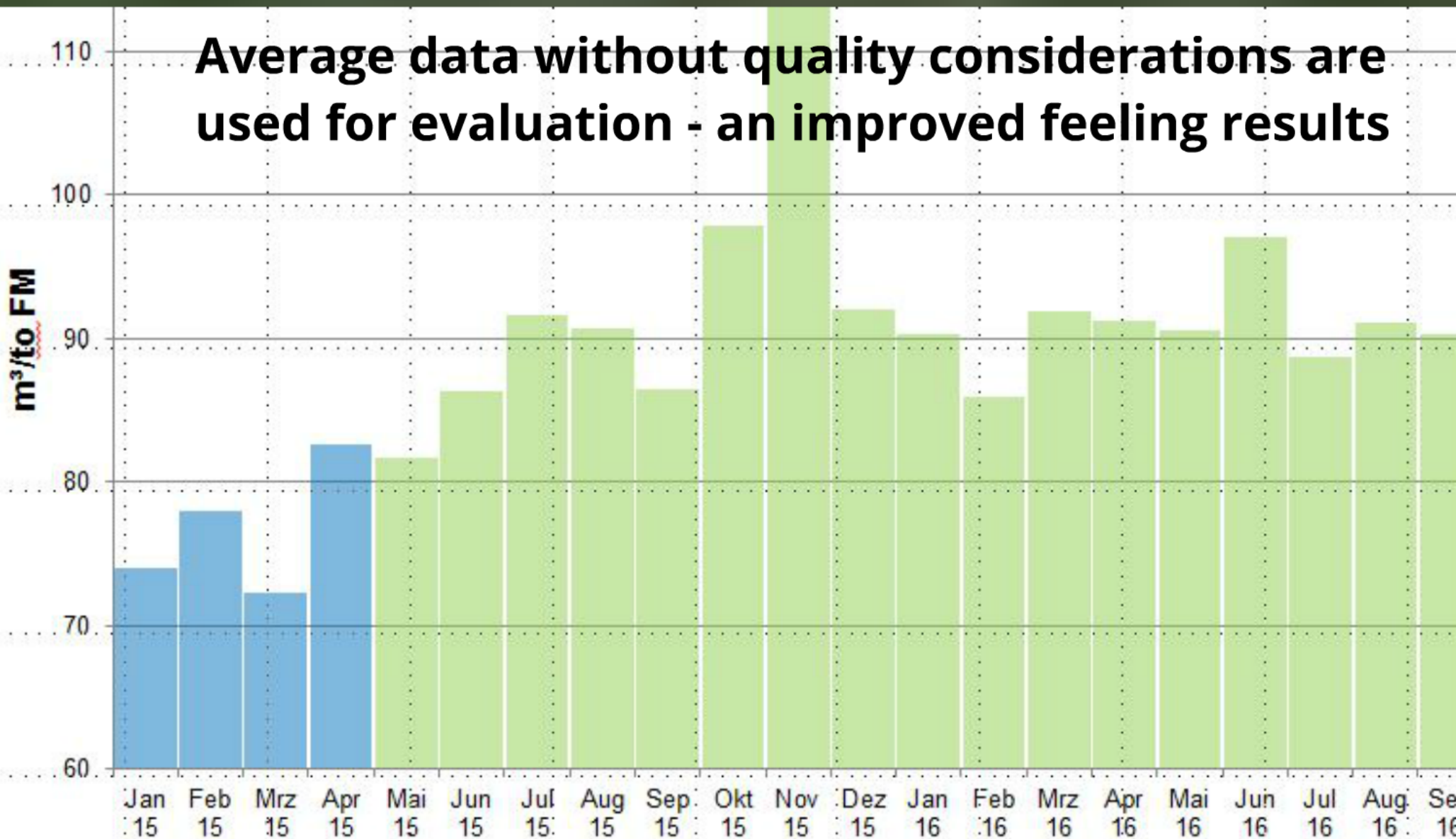
Pictures: YARA Industrial



Parameter	Value
Heat consumption	12345
Efficiency	0.85
Temperature	120
Pressure	10

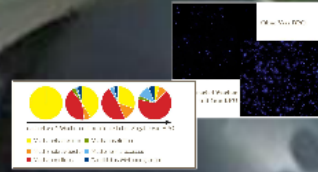


Average data without quality considerations are used for evaluation - an improved feeling results

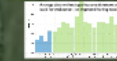


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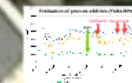
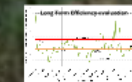
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Pictures: YARA Industrial

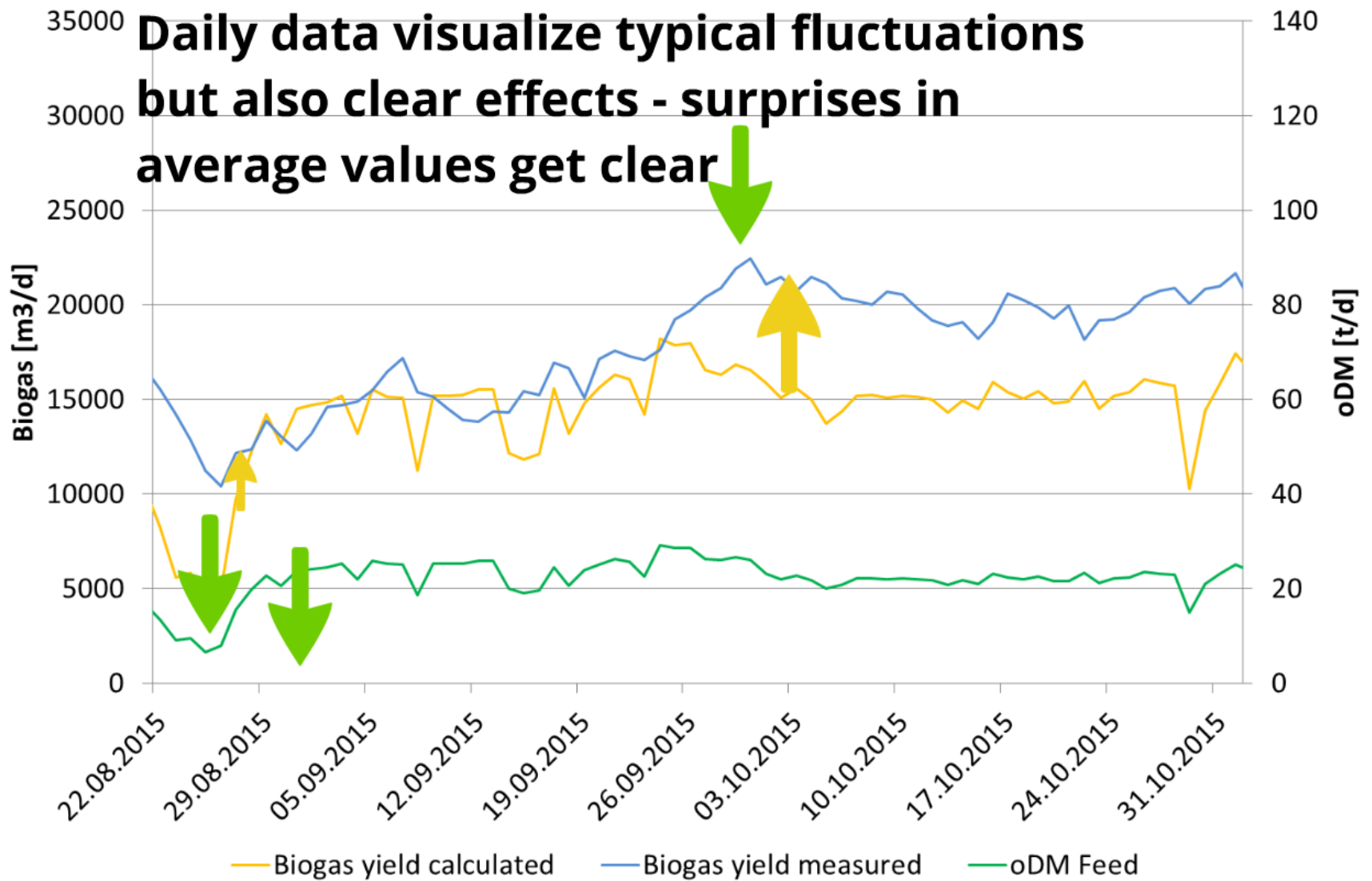


Parameter	Value
1	10.5
2	15.2
3	8.7
4	22.1
5	11.3

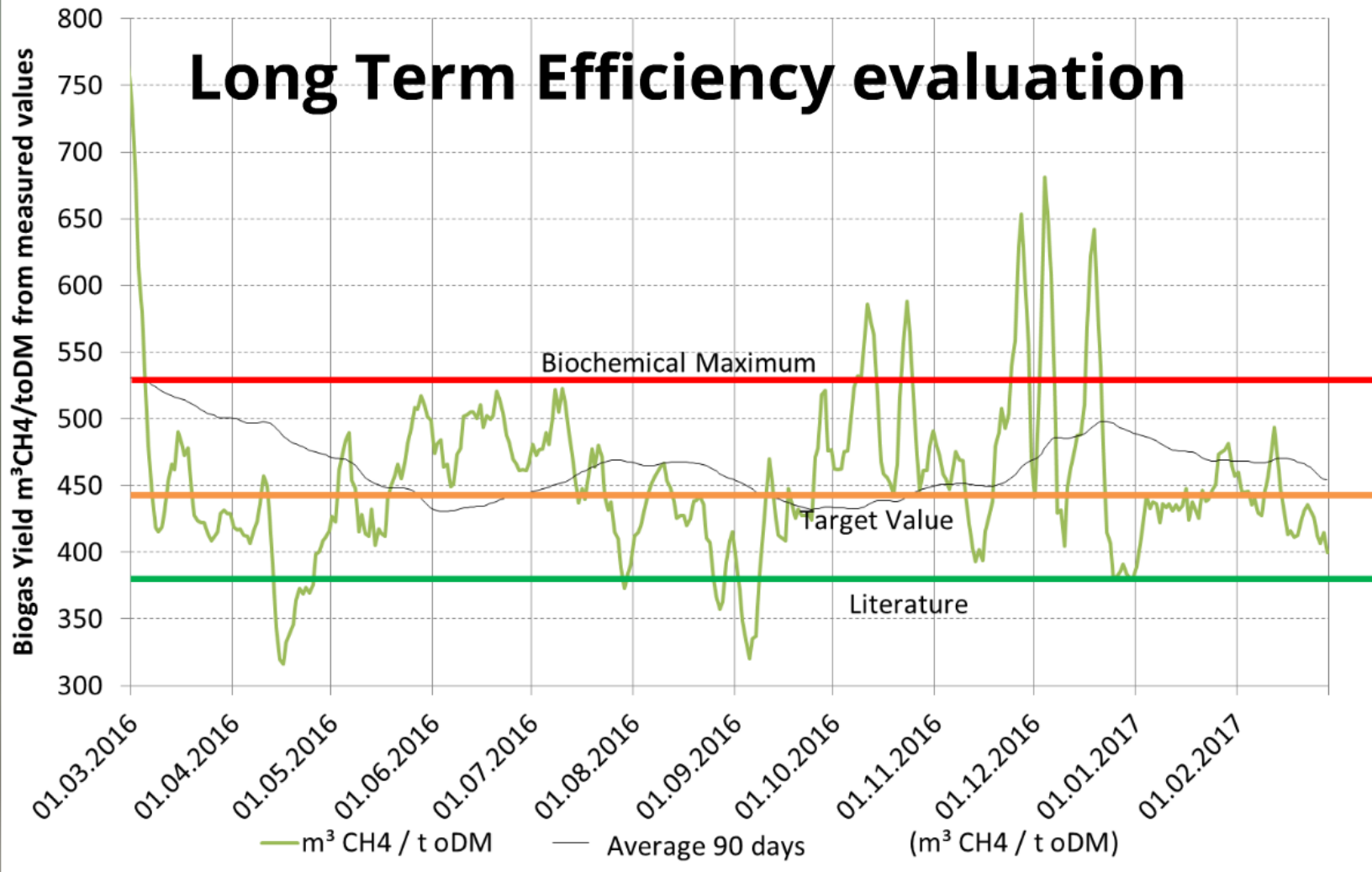


	B	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
	Time	F1 Rüh	F2 Rüh	Hydra	Steine	Trogfö	Verteil	Vertik	NG2	NG2	NG2	FNG2	FNG1	R	NG1	FNG1
	Time	BGA_F	BGA_F	BGA_	BGA_F	BGA_F	BGA_F	BGA_F	BGA_	BGA_	BGA	BGA_	BGA_	BGA_	BGA_	BGA
0017	00:00:00	18,4	14,4	1,9	0,1	0,8	1,4	2,7	9,3	0	9,2	8,7	7,7	3	3,1	
0017	01:00:00	18,3	14,4	1,9	0,1	0,9	1,4	2,7	9,3	0	9,2	8,7	7,7	3	3,1	
0017	02:00:00	18,4	14,5	1,9	0,1	0,8	1,4	2,7	9,3	0	9,2	8,7	7,7	3	3,1	
0017	03:00:00	18,6	14,6	2	0,1	0,8	1,4	2,7	9,3	0	9,1	8,7	7,7	3	3,1	
0017	04:00:00	18,4	14,6	2,1	0,1	0,8	1,4	2,7	9,3	0	9,1	8,8	7,6	3	3,1	
0017	05:00:00	18,3	14,7	2,3	0,1	0,8	1,4	2,8	9,4	0	9,2	8,8	7,6	3	3,1	
0017	06:00:00	18,3	14,7	2,3	0,1	0,8	1,4	2,8	9,4	0	9,2	8,8	7,6	3	3,1	
0017	07:00:00	18,5	14,7	2,4	0,1	0,8	1,5	2,9	9,4	0	9,2	8,7	7,6	3	3,1	
0017	08:00:00	18,4	14,8	2,5	0,1	0,8	1,5	2,9	9,4	0	9,2	8,7	7,6	3	3,1	
0017	09:00:00	18,4	14,8	2,5	0,1	0,8	1,5	2,9	9,4	0	9,2	8,7	7,6	3	3,1	
0017	10:00:00	18,7	14,8	1,8	0,1	0,9	1,3	2,6	9,4	0	9,2	8,7	7,6	3	3,1	
0017	11:00:00	18,6	14,8	1,8	0,1	0,9	1,3	2,6	9,4	0	9,1	8,7	7,6	3	3,1	
0017	12:00:00	18,6	14,5	1,8	0,1	0,8	1,3	2,5	9,4	0	9,2	8,7	7,5	3	3,1	
0017	13:00:00	18,7	14,5	1,8	0,1	0,8	1,3	2,6	9,4	0	9,2	8,7	7,5	3	3,1	
0017	14:00:00	18,6	14,4	1,8	0,1	0,7	1,3	2,4	9,3	0	9,2	8,7	7,5	3	3,1	
0017	15:00:00	18,6	14,4	2	0,1	0,6	1,2	2,1	9,2	0	9,2	8,7	7,5	3	3,1	
0017	16:00:00	18,6	14,6	2,3	0,1	0,6	1,2	2,2	9,1	0	9,2	8,7	7,5	3	3,1	
0017	17:00:00	18,6	14,6	2,3	0,1	0,6	1,2	2,3	9,1	0	9,2	8,7	7,6	3	3,1	
0017	18:00:00	18,4	14,7	2,2	0,1	0,6	1,2	2,2	9,1	0	9,2	8,7	7,6	3	3,1	
0017	19:00:00	18,5	14,6	2,2	0,1	0,6	1,2	2,2	9,0	0	9,2	8,8	7,6	3	3,1	

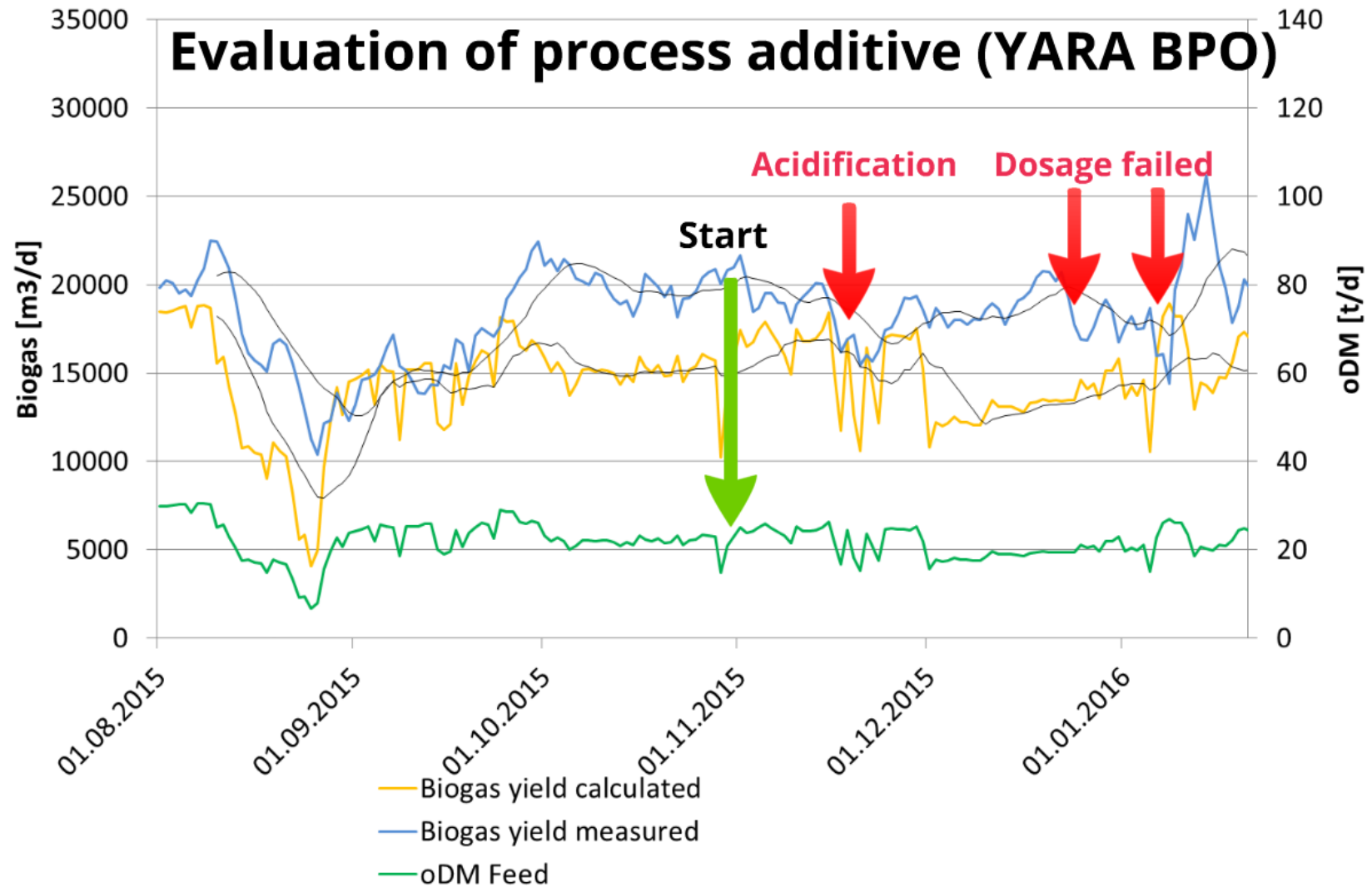
Unlimited Data are online available - substrate feed, gas storage tank, gas production, electricity production, pumps, mixers...

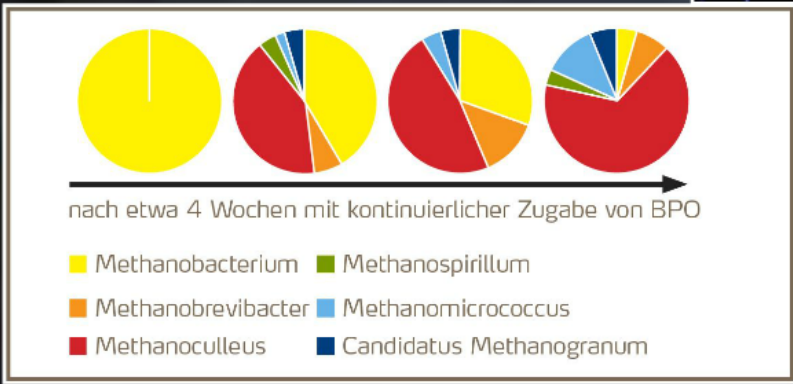
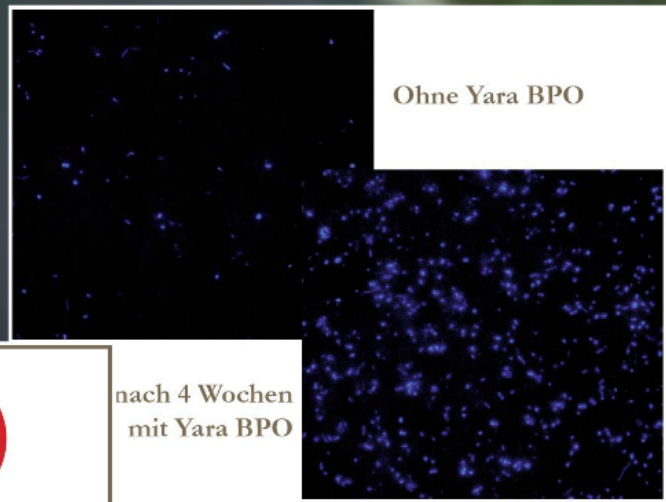


Long Term Efficiency evaluation



Evaluation of process additive (YARA BPO)

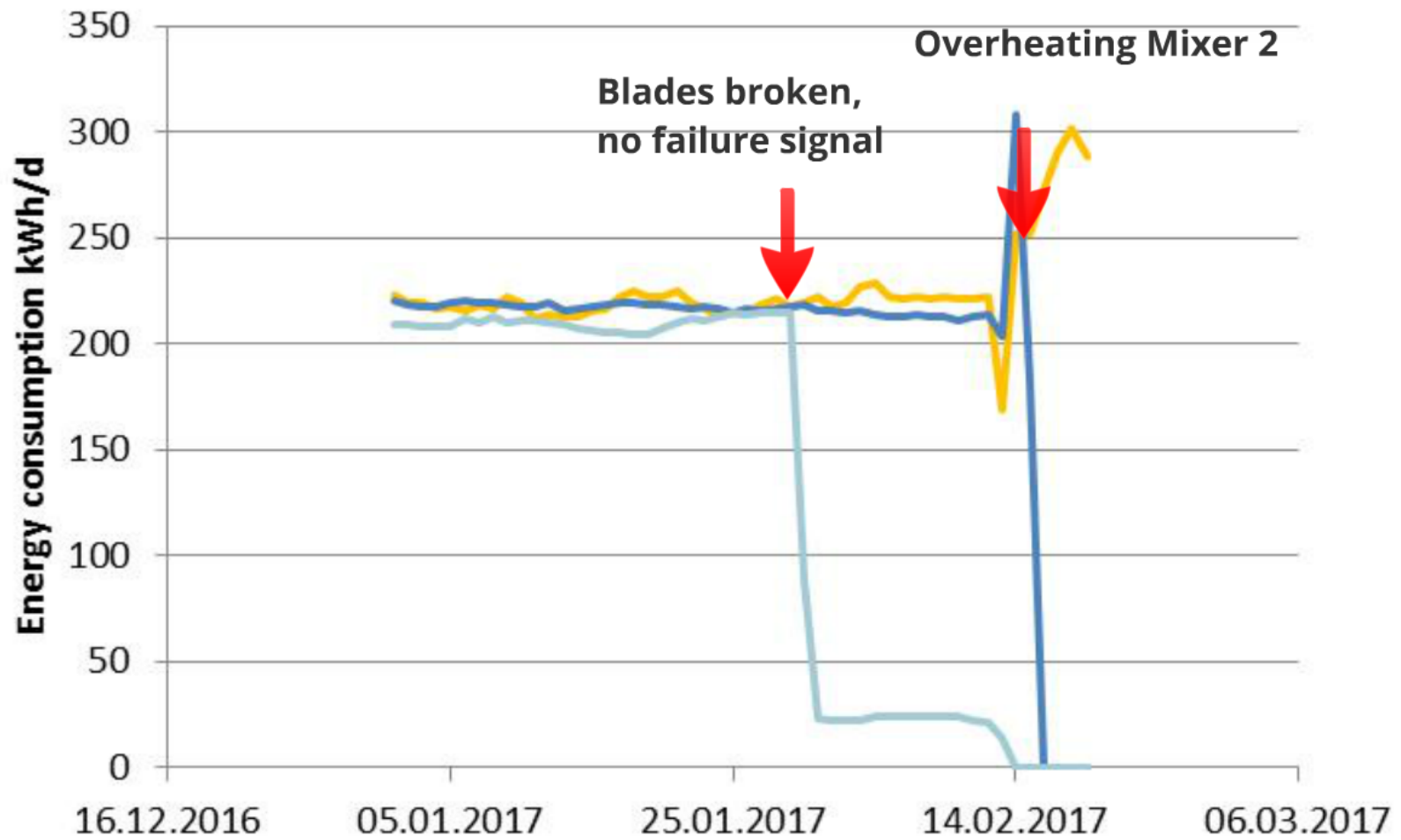




Pictures: YARA Industrial



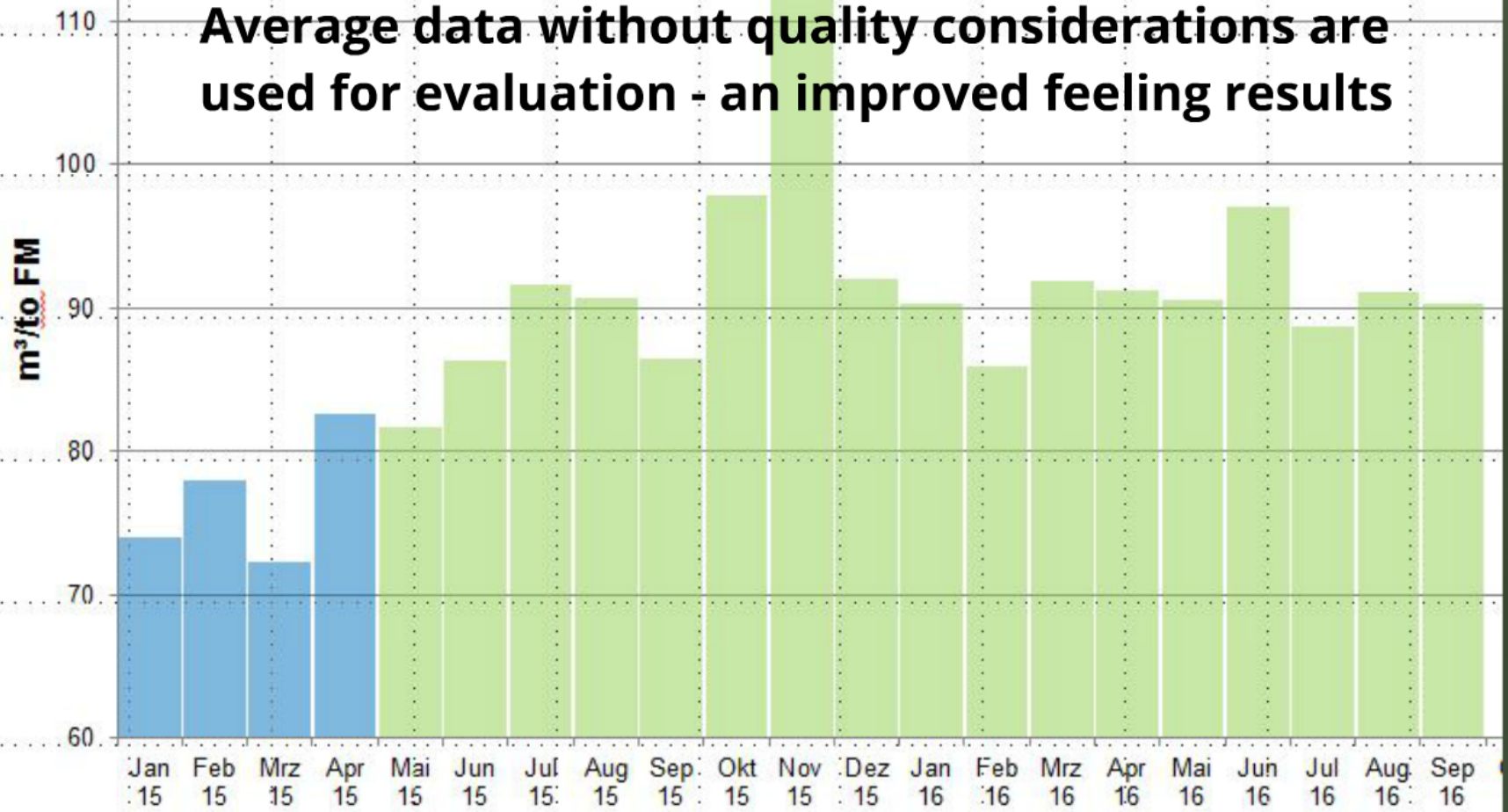
Readout Frequency converter

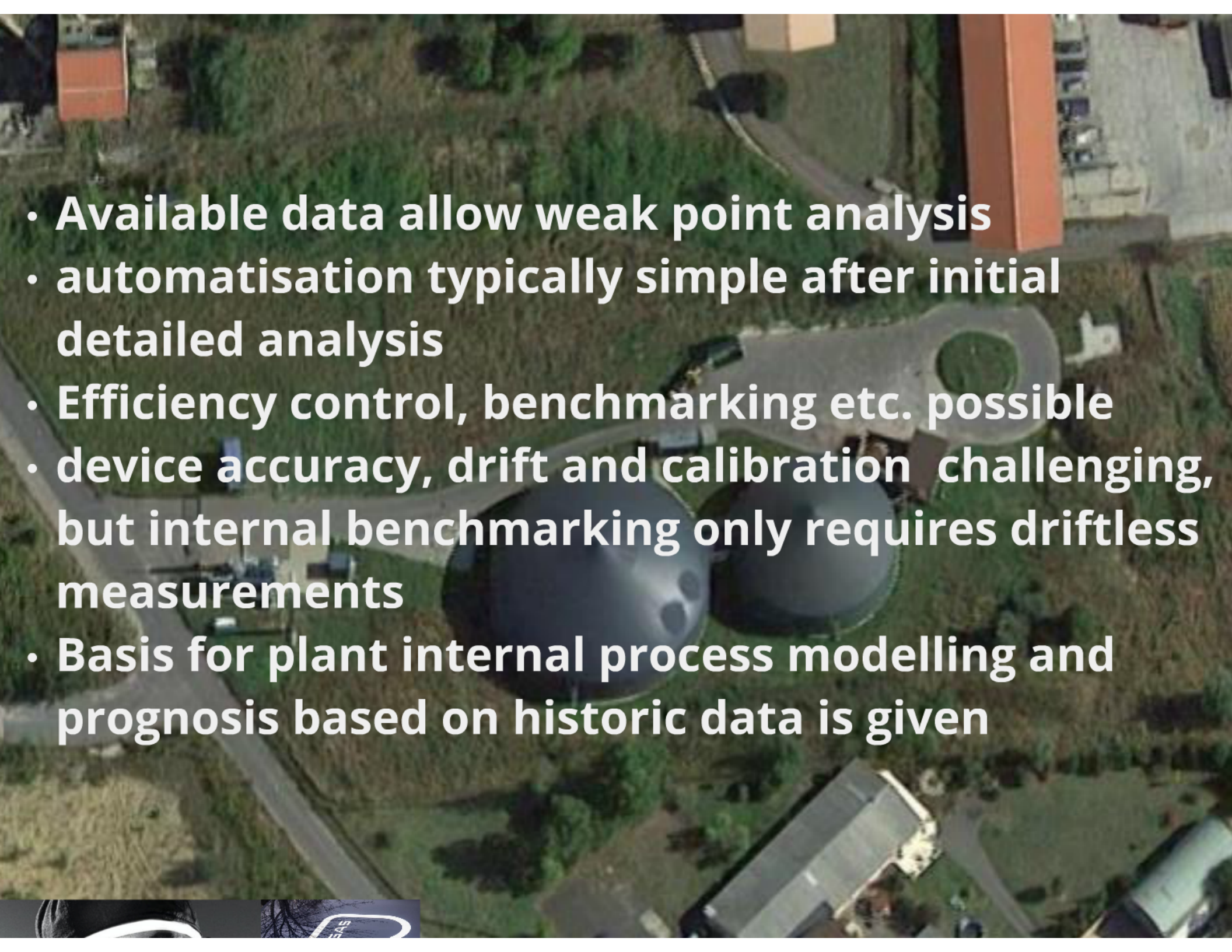


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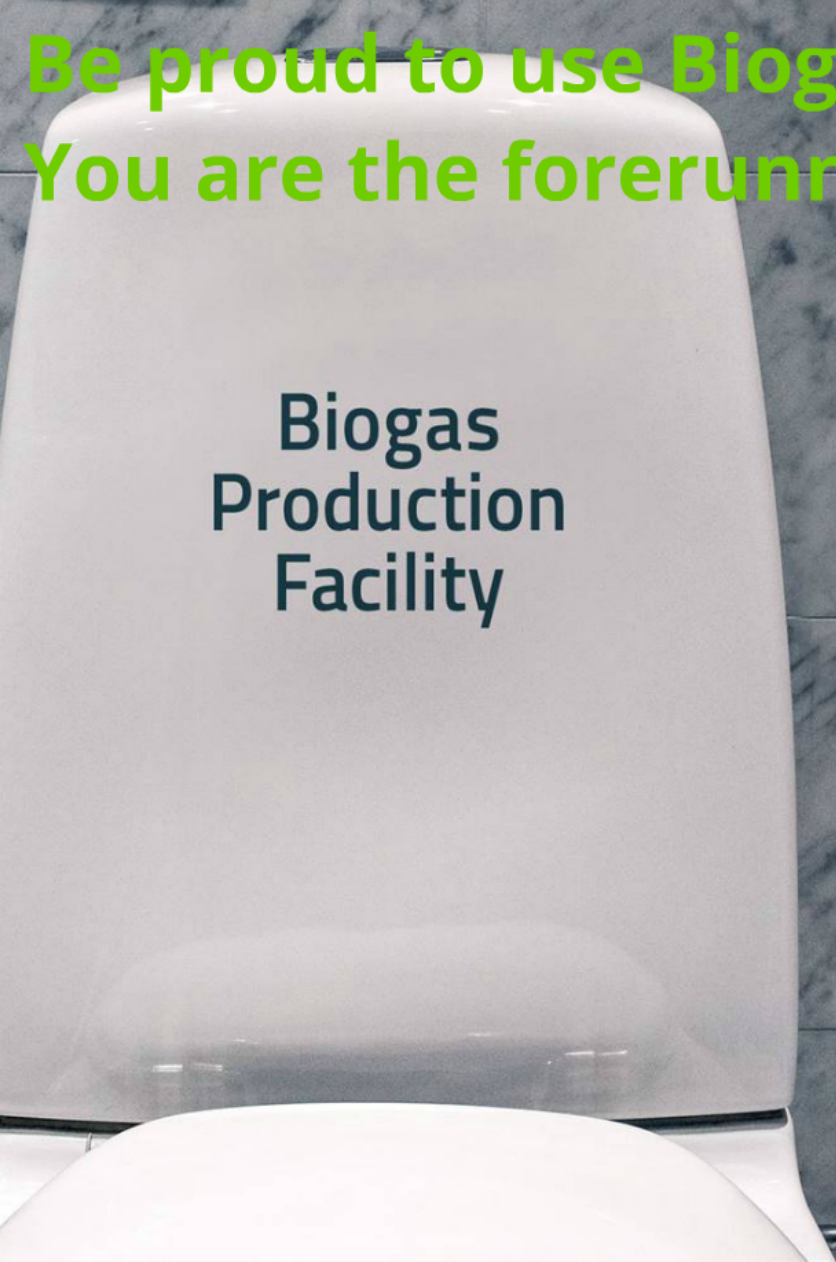
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- An aerial photograph of an industrial site, likely a water treatment plant. The image shows several large, dark-colored cylindrical storage tanks in the center. To the right, there are several rectangular buildings with light-colored roofs. A paved road or walkway winds through the site. The surrounding area is a mix of green grass and some bare earth. The text is overlaid on the left side of the image.
- Available data allow weak point analysis
 - automatisisation typically simple after initial detailed analysis
 - Efficiency control, benchmarking etc. possible
 - device accuracy, drift and calibration challenging, but internal benchmarking only requires driftless measurements
 - Basis for plant internal process modelling and prognosis based on historic data is given

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