IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Treatment of digestates and recovery of nutrients

Poznań, 23.08.2017

CONTENTS

1. Movement of charge with the help of an electrical field
2. Second step of solid-liquid separation
3. Recovery of ammonia
4. New research project in Germany / recovery of potassium

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

ZetaOptimizer

Movement of charge on the surface of solids

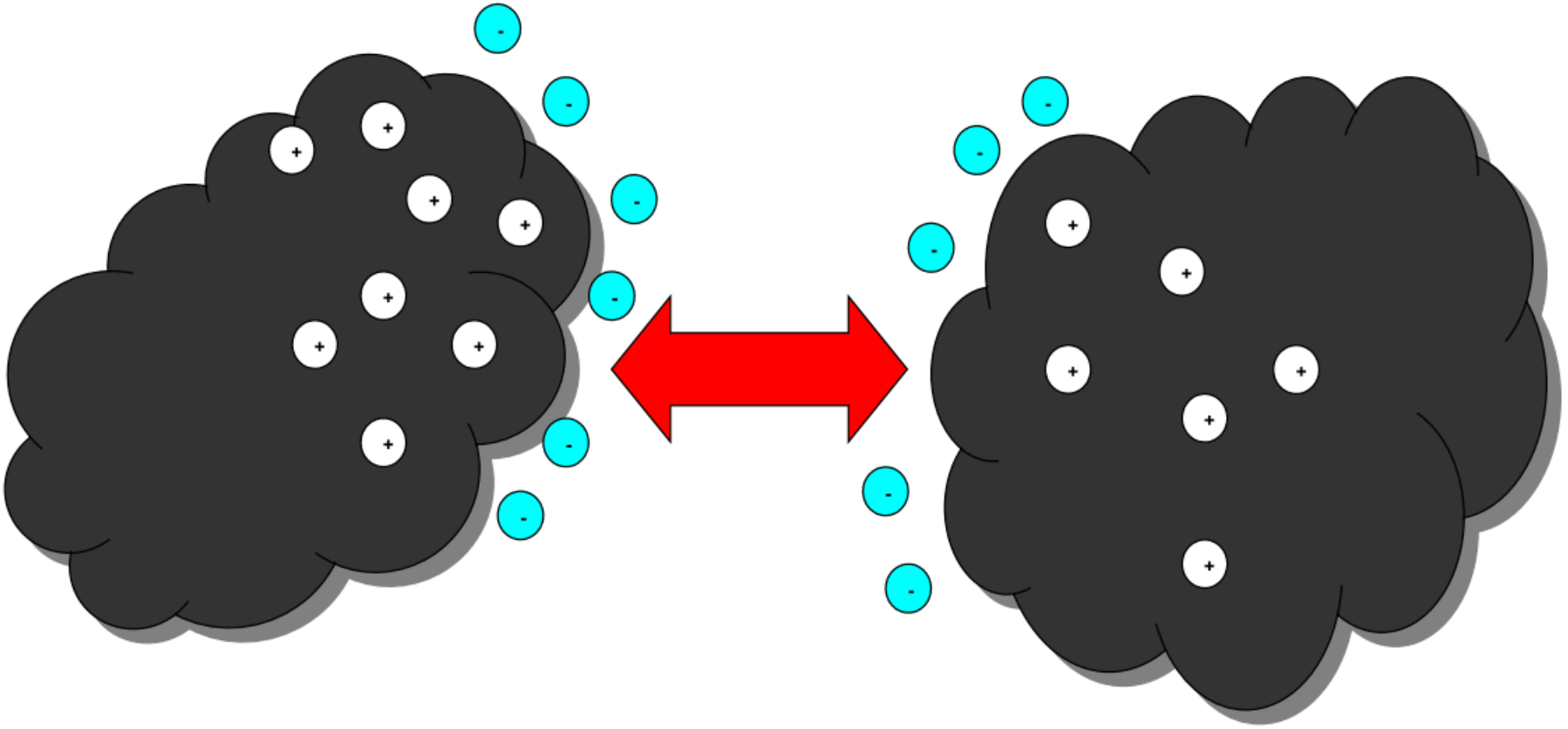
- **higher content of total solids after dewatering**
- **lower consumption of flocculation aid**
- **better separation of solids**

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

ZetaOptimizer

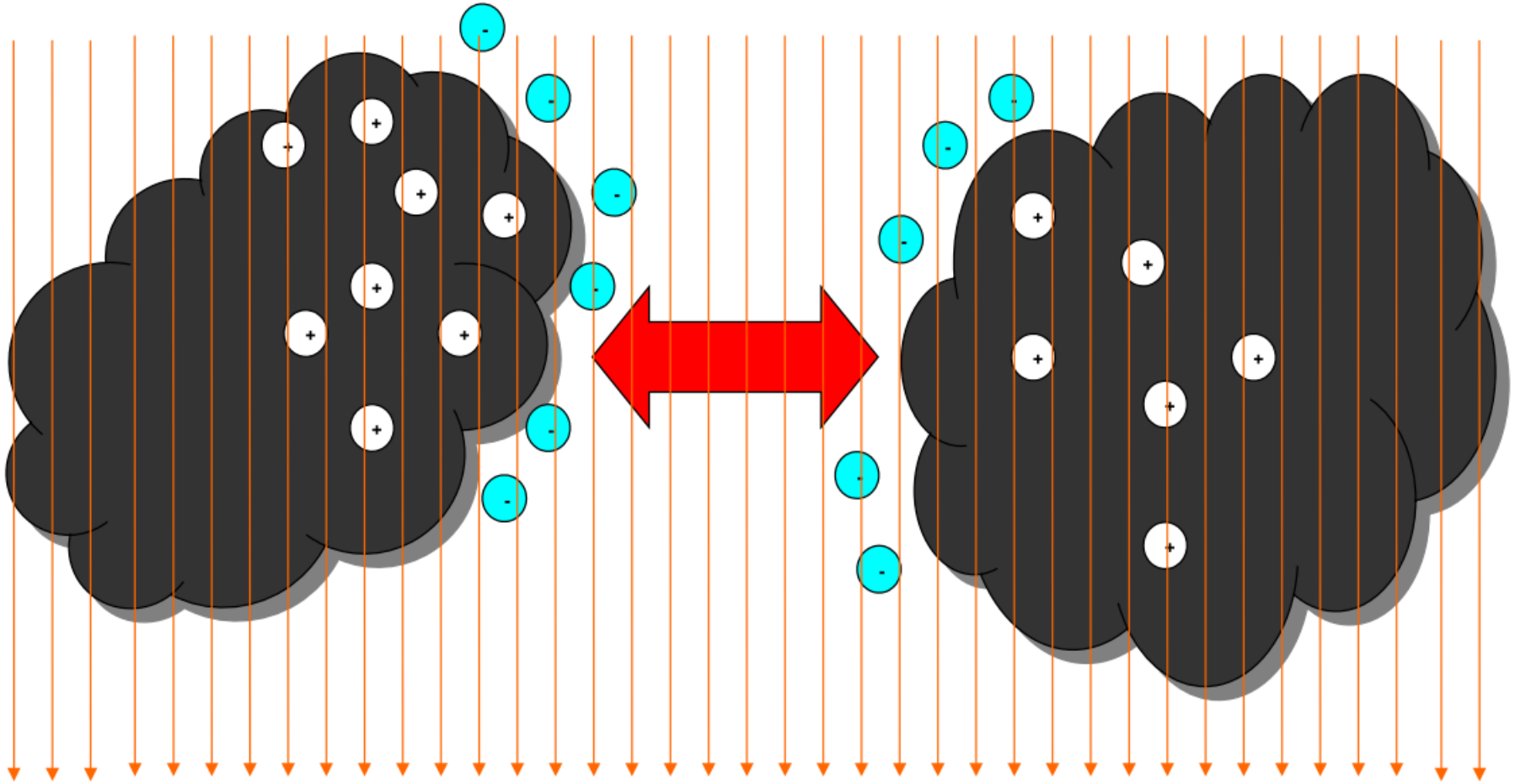


Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

ZetaOptimizer

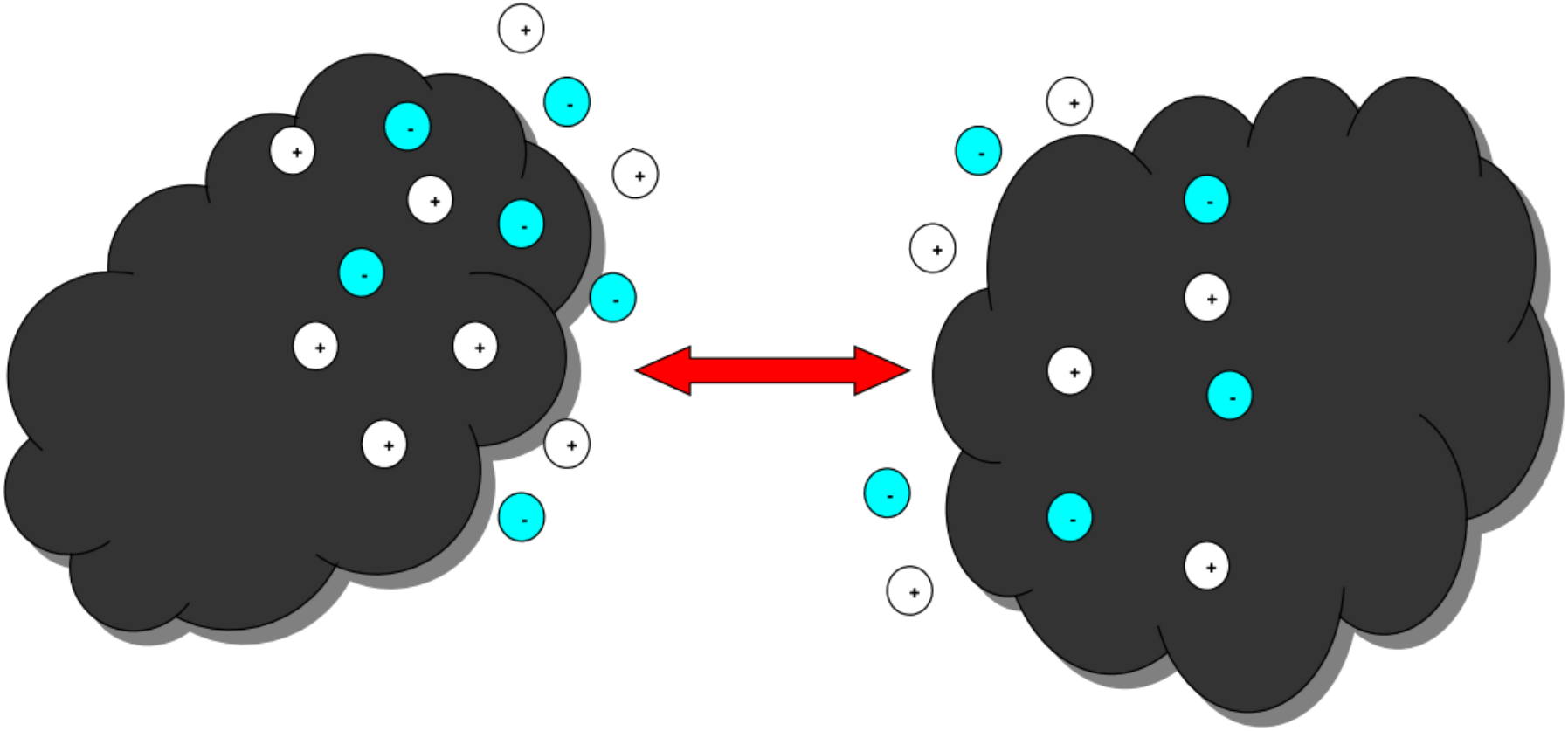


Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

ZetaOptimizer



Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

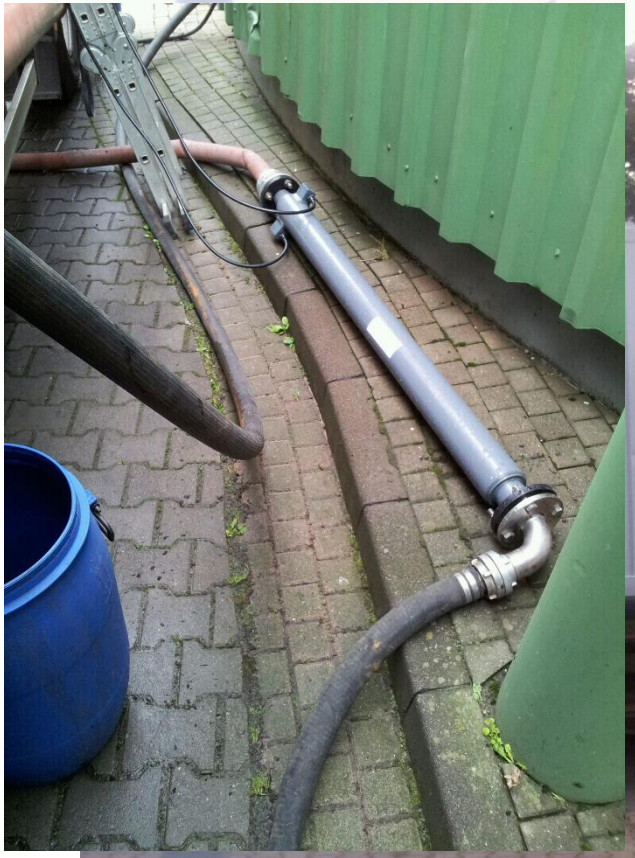
POLL
Umwelt- und Verfahrenstechnik

ZetaOptimizer

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik



Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Solid-liquid-separation of digestate by decanter / centrifuge

	without pre-treatment	with pre-treatment
$TS_{digestate}$ (wt.-%)	3.68	3.68
$TS_{centrate}$ (wt.-%)	1.23	0.41
$TS_{centrate}$ (wt.-%)	16.46	18.80
Separation efficiency (%)	66.58	88.85

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Solid-liquid-separation of digestate by decanter / centrifuge

	without pre-treatment	with pre-treatment
$TS_{digestate}$ (wt.-%)	11	11
$TS_{centrate}$ (wt.-%)	2.849	0.176
Separation efficiency (%)	74.1	98.4

Poznań, 23.08.2017

Retentates from ultra filtration (decanter / centrifuge)

	without pre-treatment	with pre-treatment
$TS_{Retentat}$ (wt.-%)	2.96	4.50
$TS_{centrate}$ (wt.-%)	1.48	1.21
TS_{solids} (wt.-%)	16.25	21.69
Separation efficiency (%)	54.82	77.43

Poznán, 23.08.2017

Examples of dewatering of digested sludge

by decanter / centrifuge (municipal waste water treatment plant)

Increasing of dry matter in dewatered sludge

Digested sludge 20 m^3/h

High voltage system **ZetaOptimizer**	without /	with
$DM_{dewatered\ sludge}$ (wt.-%) Increasing of dry matter 10 %	20.6	22.9
$DM_{dewatered\ sludge}$ (wt.-%) Increasing of dry matter 11 %	20.2	22.5
$DM_{dewatered\ sludge}$ (wt.-%) Increasing of dry matter 14 %	20.3	23.6

Poznán, 23.08.2017

Examples of dewatering of digested sludge

by decanter / centrifuge (municipal waste water treatment plant)

Saving feeding of flocculant (centrifuge)

$dm_{dewatered\ sludge}$	centrate (% dm)*	flocculant (kg/t dm)	ZetaOptimizer
26.35	0.31	8.9	off
28.31	0.33	8.9	on
26.82	0.32	6.0	on

Saving flocculant 32.6 %

* Including salts

Poznán, 23.08.2017

GNS Gesellschaft für Nachhaltige Entwicklung mbH

www.gns-halle.de

Treatment of digestates System GNS

Laboratory equipment
0,2 - 5 L

Large-scale strip system (BENAS) operating since 2008 ,
15 m^3/h flow capacity, testing of the FaserPlus-Technology,
suitable for further technical experiments

Gipsum from flue gas
desulphurisation (5 t/d)

Lime (3 t/d)

Ammonia sulfate
liquid fertilizer (13 t/d)

- ✓ **Modified technology for stripping of ammonia**
  - Chemical fixation of CO_2 and NH_3 with Gipsum from flue gas desulphurisation to mineralic fertilizer
  - Halving of salinity (no alkaline digestate)
  - Sanitizing effects and additional cell disruption (> 70 °C)
- ✓ **FaserPlus technology**
  - applicable for not separated or roughly separated digestate
  - Sturdy construction, reliable mastering of foam behavior

GNS Gesellschaft für Nachhaltige Entwicklung mbH

www.gns-halle.de

Factory data of FaserPlus plant

Input		Output	
Feed [m³/h]	8 to 10	Effluent [m³/h]	7,5 to 9,5
NH_4-N [g/l]	3 to 4,5	NH_4-N [g/l]	0,5 to 0,9
TS [%]	11 to 12	TS [%]	11,5 to 12,5
pH	8,0 to 8,5	pH	8,5 to 9,3
Conductivity [mS/cm]	27 to 30	Conductivity [mS/cm]	15 to 17
Gipsum from flue gas desulphurisation [t/d]	4 to 5	Lime (fertilizer) , 76 % TS [t/d]	2,9 to 3,4
Heat consumption [kW]	800 to 960	Ammonia sulphate, liquid (5 % N, 6 % S) [t/d]	10,5 to 13
Wattage [kW]	ca. 50	Biogas fibres* [t/batch], ca. 30% TS	20

* Test produktion in 2017

GNS Gesellschaft für Nachhaltige Entwicklung mbH

www.gns-halle.de

Additional effects of FaserPlus technology

→ unique utilisation caskade possible:

straw containing substrates → biogas plant → biogas fibres without NH_3 → wood-based materials, insulation materials… → recycling, reutilization

→ Indexing of new value creative potential for biogas plants

→ Improvement of raw material supply and cost situation e.g. for wood-based material industry

→ Higher yield of biogas and mineralic N-fertilizer

→ Lower emissions during the separation with advantages for the total treatment

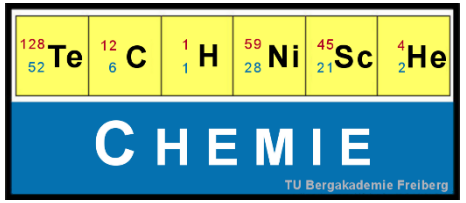
- ✓ 5 to 30 % biogas fibers in chipboards, MDF, and HDF-boards possible
- ✓ Statistical and emission values conforming to standards

- ✓ Large-scale production of laminate boards with 1 - 3% purified biogas fibers
- ✓ Test mode in two different large-scale firms (in the south-west and the east of Germany)
- ✓ Utillization examinations for insulating materials

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

New research project in Germany in co-operation with



Gesellschaft für
Nachhaltige
Stoffnutzung mbH

GNS

Fraunhofer
ISC
PROJEKTGRUPPE IWKS

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

New research project in Germany

- **degradation of drug residues (antibiotics, hormones)**
- **degradation of humics**
- **recovery of potassium**

Poznań, 23.08.2017

IBBA
INTER BALTIC BIOGAS ARENA

POLL
Umwelt- und Verfahrenstechnik

Thank you for your attention.

Poznań, 23.08.2017