


Landustrie 

DeSaR-project

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Introduction

- DeSaR: Decentral Sanitation and Reuse

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- DeSaR: Decentral Sanitation and Reuse
- Demonstration DeSaR-project

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Partners

- Landustrie Sneek BV
- Wageningen Universiteit
- Roediger VHT GmbH
- Woningstichting De Wieren
- Woningstichting Patrimonium
- Gemeente Sneek

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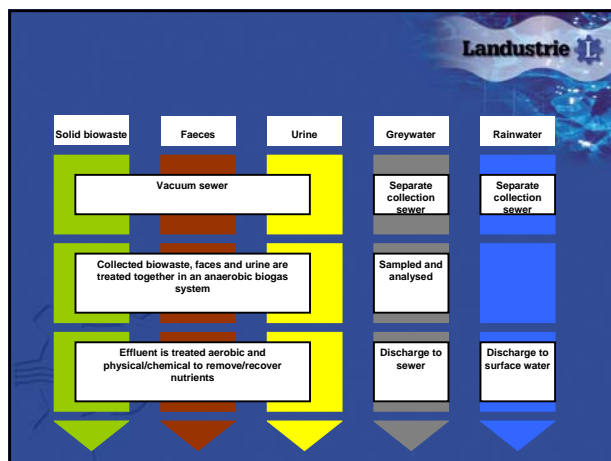
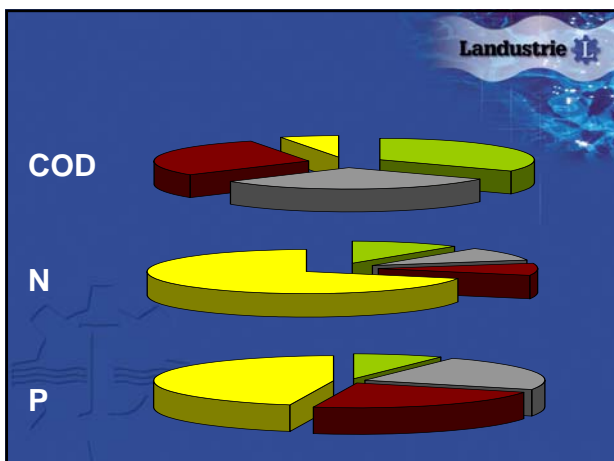
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Separation at source

- **Black water (toilet water):**
 - Difficult degradable organic material
 - High nutrient concentration
 - Hormones and medicine traces
- **Grey water**
 - Easily degradable organic material
 - High temperature
 - Heavy metals (below irrigation standards)
 - Low salt concentration (irrigation)



How to get a concentrated organic fraction?

- Vacuum toilets are used, they flush with 1L water and 100L of air. Reduction of 36L* ρ *p*d water, is 25% of total water consumption

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- 7 L* p * p * d of concentrated toilet water is produced (theory)
- 5 L* p * p * d of concentrated toilet water is produced (practice)

Concentrated toilet water characteristics Landustrie

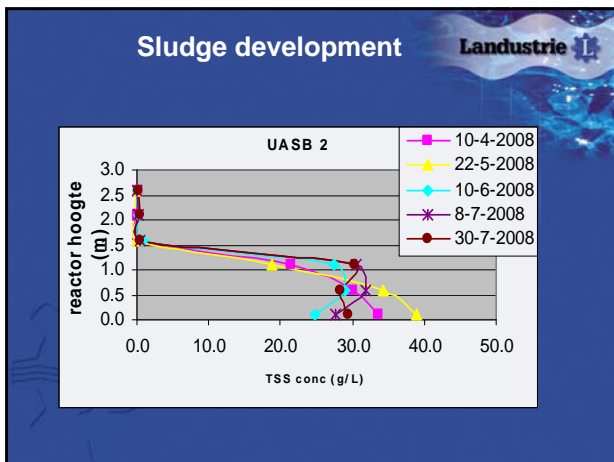
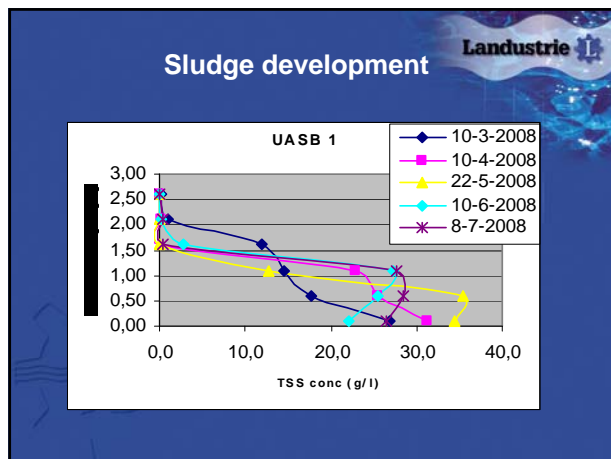
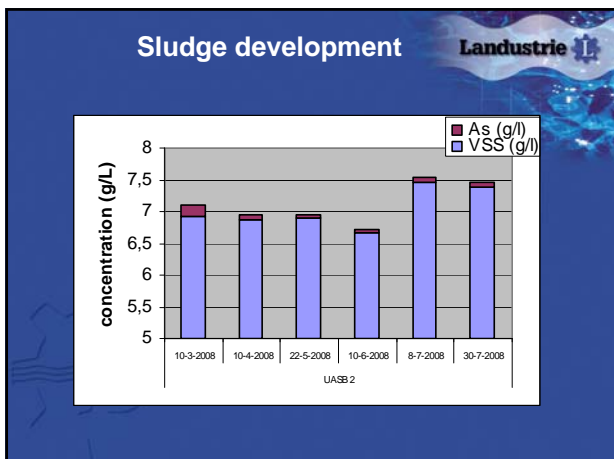
Parameter (g * L ⁻¹)	Influent UASB _{st}
COD _{tot}	16,1
COD _r	4,1
COD _p	12,0
VEA	1,4
TN	1,8
NH ₄ -N	1,2
P _{total}	0,24
PO ₄ -P	0,085

UASB-septic tank Landustrie

	Black water (HRT = 15 days)	Conc Black water (HRT = 30 days)	Conc Black water (HRT = 30 days)	Concentrated Black Water (HRT=30 days)	
COD _{infl}	5,5	12,8	12,8	16,1	16,1
COD (%)	90 - 93	61	78	87	93
COD _{ss} (%)	-	88	94	95	98
COD _{sol + sol} (%)		n.d	n.d	67	71
Temp (°C)	tropical	15	25	20±2	35
Methanisation rate	n.d	n.d	n.d	60%	76%
CH ₄ -prod (L/day/cap)	12 - 15	6,4	14,5	13	19,5

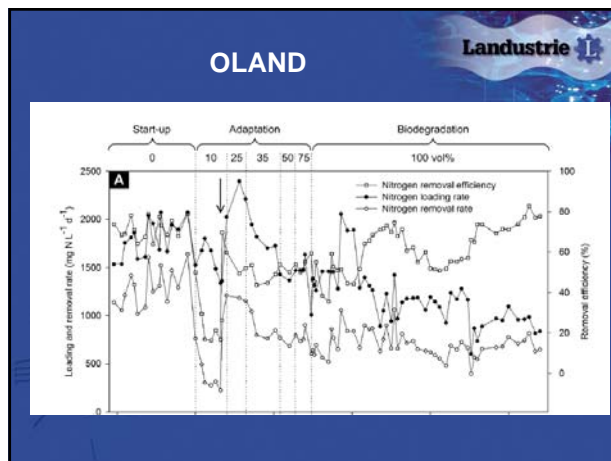
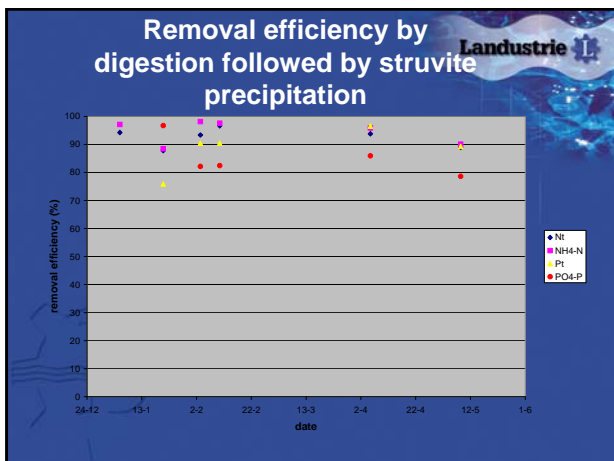
COD mass balance Landustrie

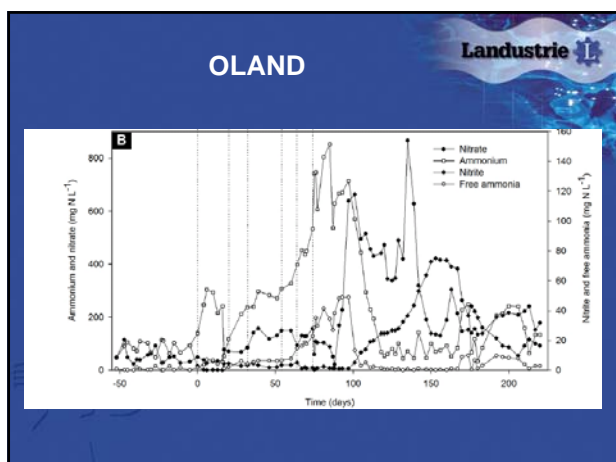
Sludge development Landustrie



Struvite precipitation

	Mg ²⁺ (mg * L ⁻¹)	PO ₄ ³⁻ -P (mg P * L ⁻¹)	NH ₄ -N (mg N * L ⁻¹)
Influent	7,5	112	1100
Added	2290	2579	0
Molar ratio	1.2	1.0	1.0
Effluent	n.d	17,5	75





Benefits of Decentral Sanitation

- Energy production

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- Flexibel

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Other benefits of Decentral Sanitation

- If it would be necessary in the future to apply more treatment steps in order to remove more or other hazardous compounds, it is cheaper to do this with separate waste streams than with a combined stream.

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