Sludge incineration and phosphorus recovery by AshDec process

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3rd EUROPEAN NUTRIENT EVENT @ ECOMONDO 2018
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Facts and numbers in canton Zürich

• 100,000 t/a sludge formation with 20-40% DM in more than 70 waste water treatment plants

• 70,000 t/a sludge needs to be transported

• Approx. 1.3 Mio ton kilometers per year
Sewage sludge utilization plant in Zürich

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P-Recycling – AshDec Process

Na-, K-compound

HM

As, Cd, Pb, (Zn)

CaNaPO₄

1000°C

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# Field test (P-REX 2014) - crop yield

<table>
<thead>
<tr>
<th>Variant</th>
<th>Germany</th>
<th></th>
<th></th>
<th>Chech Republic</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Sugar</td>
<td>Maize</td>
<td></td>
<td>Sugar</td>
<td>Maize</td>
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</tr>
<tr>
<td>Control</td>
<td>100 %</td>
<td>100 %</td>
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<td>100 %</td>
<td>100 %</td>
<td></td>
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<tr>
<td>TSP</td>
<td>93 %</td>
<td>111 %</td>
<td></td>
<td>80 %</td>
<td>118 %</td>
<td></td>
</tr>
<tr>
<td>AshDec</td>
<td>102 %</td>
<td>111 %</td>
<td></td>
<td>102 %</td>
<td>120 %</td>
<td></td>
</tr>
<tr>
<td>AirPrex</td>
<td>102 %</td>
<td>127 %</td>
<td></td>
<td>98 %</td>
<td>128 %</td>
<td></td>
</tr>
<tr>
<td>Leachphos</td>
<td>102 %</td>
<td>117 %</td>
<td></td>
<td>98 %</td>
<td>139 %</td>
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<tr>
<td>Stuttgart</td>
<td>103 %</td>
<td>111 %</td>
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</tbody>
</table>

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Pilot test work October 2018 (Outotec/BAM)

In the framework of funded project CLOOP*

• Batch test work for process parameter optimizing
• Production of 1,5 t AshDec product
• Temperature: 850 – 1000 °C
• Additive: Natrium-Carbonate
• $P_{\text{NAC}}$ extraction + P-Analysis during the test work (3-4 hours between sampling and $P_{\text{NAC}}$ result) → fast possibility to adjust process parameters

* CLOOP - Closing the Global Nutrient Loop

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**Target**

- $P_{\text{NAC}} \sim 80\%$
- Stable conditions during the continuously running

**Results**

- $P_{\text{NAC}}$ - very low variation even with process parameter variation
- PNAC solubility significantly above 80 %

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Sludge incineration Zürich

• Successful in operation since 2015

AshDec

• Thermochemical process with alkaline compound
• Low residue amount
• Possible integration to incineration plant

• $P$ recovery > 95 %
• $P_{\text{NAC}}$ > 80 %

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