Agenda – Moving REnescience forward

1. A little bit of history
2. The REnescience process
3. The Market
From the laboratory to Northwich…

<table>
<thead>
<tr>
<th>Year</th>
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![Images of laboratory and demonstration plants](image-url)
From the laboratory to Northwich…

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![Image of laboratory equipment]

![Image of Northwich equipment]
From the laboratory to Northwich…

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From the laboratory to Northwich…

![Diagram showing the timeline from laboratory to Northwich with specific years and stages: Laboratory 2005, Demonstration plant 1 2009, Demonstration plant 2 2012, Mobile unit 2016, Northwich 2017.]
From the laboratory to Northwich…

- 120,000 tons of mixed waste processed per year
Agenda

1. A little bit of history
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Waste contains many useful materials…

- Food waste
- Paper
- Plastics
- Metals
- Gravel, glass and ceramics
- Combustibles

* Municipal solid waste
... The challenge is to separate them
REnescience skaber værdi af restaffald
- Separerer blandet dagrenovation i bionedbrydelige-, genanvendelses- og RDF-fraktioner

**Eksempel: Yoghurtkarton**

- **Bionedbrydeligt materiale** bliver opløst i varmt enzymvandbad ved 50°C, hvorved det bliver til en biovæske
- Enzymer er i stand til at opløse madaffald og cellulosemateriale i papir og karton

**VARMT ENZYMBAD**

**BIOVÆSKE**
(YOGHURTREST + KARTON)

**Biogas**

**DIGESTAT** (fiberfraktion og rejektvand)
(REST FRA BIOGASPRODUKTIONEN)

**RDF/SRF til genanvendelse eller forbrænding**

**2D-FRAKTIONER**
(PLASTFOLIE)

**3D-FRAKTIONER**
(PLASTLÅG)

Det ikke-bionedbrydelige materiale separeres i en 2D- og 3D-fraktion til videre forarbejdning og genanvendelse

**Til hel eller delvis genanvendelse eller miljørigtig bortskaffelse**
REnescience achieves separation by liquefying the organics in the waste.
REnescence Process
A bag opener opens trash bags before the process
REnescience Process
Biodegradable waste components are liquefied in the bioreactor
REnescience Process
Ballistic separation separates waste in three streams
REnescience Process
Ferrous metals are recovered by magnetism
REnescience Process
Ferrous metals are recovered by magnetism
REnescience Process
Non-ferrous metals are recovered by eddy-current
REnescience Process
Non-ferrous metals are recovered by eddy-current
REnescience Process
Soft plastics are (sometimes) recovered using windshifters
REnescience Process
Soft plastics are (sometimes) recovered using windshifters
Renescience Process
Liquefied biodegradables are transformed into biogas in the AD

1. Waste In
2. Preparation
3. Renescience Reactor
4. Separation
5. Outputs

High Quality Bio Liquefied
Biogas Plant

- Green Gas
- Transport Fuel
- Green Power
- Solids for recycling are taken for reprocessing
- Solid RDF is taken to a power generator
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REnescience: A growth opportunity in the global waste market

Global MSW\(^1\) disposal\(^2\), %
- Landfill/dumped: 69%
- Recycled: 17%
- Compost: 8%
- Incineration: 6%
- Other: 15%

Global MSW\(^1\) generation\(^2\), billion tons
- 2014: 1.3 billion tons
- 2025: 2.2 billion tons

Waste management - a growing global mega-trend

01. Global population growth (7bn \(\rightarrow\) 9bn people over next two decades)

02. Rapidly growing middle-class in emerging markets

03. Migration to cities from rural areas

04. Scarcity of resources and increased awareness on environmental and health benefits from responsible waste handling

05. Regulatory push for enhanced recycling and landfill avoidance in many regions, countries and cities

1. Municipal Solid Waste
2. World Bank: A Global Review of Solid Waste Management
Traditional waste management systems have reached their limits
But REnescience can do more

<table>
<thead>
<tr>
<th>Traditional waste management systems</th>
<th>Recycling rates *)</th>
<th>Organics to biogas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Source separation + incineration</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>2. Source separation + mechanical biological treatment</td>
<td>22-39%</td>
<td>20%</td>
</tr>
</tbody>
</table>

The future waste management system

<table>
<thead>
<tr>
<th>3. REnescience®</th>
<th>Target</th>
<th>Organics to biogas</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>value from waste</em></td>
<td>&gt;70%</td>
<td>&gt;80%</td>
</tr>
</tbody>
</table>

*) All numbers are net of mandatory presorting of metals, plastics and glass
Comparison of costs for different waste processing technologies in UK

**Gate fees in the UK waste market (2015) – for complete waste disposal**
Short / medium term contracts

<table>
<thead>
<tr>
<th>Technology</th>
<th>Cost / ton gate fee range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source separation benchmark¹</td>
<td></td>
</tr>
<tr>
<td>Landfill²</td>
<td></td>
</tr>
<tr>
<td>Incineration</td>
<td></td>
</tr>
<tr>
<td>Recycling facility + export of residual</td>
<td></td>
</tr>
<tr>
<td>Mechanical biological treatment³</td>
<td></td>
</tr>
<tr>
<td>Gasification</td>
<td></td>
</tr>
<tr>
<td>Current REnescience level</td>
<td></td>
</tr>
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</table>

1. Based on costs to councils of achieving target 35% recycling rate
2. Including landfill tax
3. Based on a single data-point for a short-term contract

SOURCE: Ricardo / DONG Energy
## NBS Strategy built on four fundamental pillars

<table>
<thead>
<tr>
<th>We own &amp; develop game-changing waste treatment technology</th>
<th>Our business model spans the full value chain</th>
<th>We foster a partnership approach</th>
<th>We have a selective &amp; focused market approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop</td>
<td>Develop</td>
<td>We strive to build long-term <strong>collaborations</strong> with clients and suppliers for multiple projects</td>
<td>We assess gate fees, green focus, market maturity, waste type &amp; market size</td>
</tr>
<tr>
<td>Build</td>
<td>Build</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Operate</td>
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Thanks for your attention !