MORE THAN 8,000 KM DISTANCE ...

... BUT A LOT OF SIMILARITIES!
**SPECIAL TASKS**

**WINDHOEK**

- Preparedness for rainfall events:
  - Use of buffer tanks to retain and temporarily store the stormwater to relieve the wastewater treatment plants from extreme hydraulic overloads.
  - Incorporation of the Namibia meteorological services for better preparations.
- Implementation of a better repair and maintenance management plan.
- Setting up of a sewer training facility.
- Awareness education of the public (e.g., pre-school kids).
- General benchmarking (staffing structures).
- Increase the direct portable reclamation capacity.

**SPECIAL TASKS**

**BREMEN**

- Climate change adaption within the city of Bremen is needed in future to manage heavy rainfall events or extreme urban heat island effects. Thus, establishing a sponge city by decoupling of large sealed areas or roof greening, for instance. [www.klimanpassung.bremen.de](http://www.klimanpassung.bremen.de)

- Climate change will have a negative impact on the waterbodies of Bremen. Hence, the release of treated wastewater into the river Weser may have to be reconsidered.

- Possible options for the future:
  - Use of treated wastewater for industrial purposes (further treatment needed).
  - Groundwater recharge with treated wastewater.
  - Producing drinking water from wastewater through establishing new treatment steps.
- Currently, we are looking into further treatment processes to achieve higher WWTP effluent qualities (i.e., removal of micropollutants).

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**SIMILAR TASKS**

**Table**

<table>
<thead>
<tr>
<th>Year 2020</th>
<th>WWTP Bremen-Seehausen</th>
<th>WWTP Cammams Watercare Works</th>
<th>WWTP Bremen-Farge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of operation</td>
<td>1966</td>
<td>1983</td>
<td>1972</td>
</tr>
<tr>
<td>Inflow COD [g/m³]</td>
<td>903</td>
<td>980</td>
<td>893</td>
</tr>
<tr>
<td>Inflow [m³/d]</td>
<td>118,645</td>
<td>26,000</td>
<td>15,595</td>
</tr>
<tr>
<td>Industrial sewage [%]</td>
<td>35</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Effluent COD [g/m³]</td>
<td>50</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>COD removal [%]</td>
<td>94.2</td>
<td>95.8</td>
<td>96.4</td>
</tr>
</tbody>
</table>

**WWTP = waste water treatment plant**
ASK THE EXPERTS vol. 6
Valorising the end-products of domestic and industrial wastewater treatment
25.04.2023

The way of WWTP Bremen-Seehausen to an energy neutral plant
Sewer system  
(Mixed- and separated Systems)  
→ 2,200 km Sewer  
→ 130 km pressure pipes  
→ 200 pumping stations, Stormwater basins  
→ Storage Volume for Stormwater events  
  270,000 m³  
→ 230 km Sewer-CCTV-Inspection per year  
→ Sewer information system  
→ 700 km sewer cleaning per year  
→ Operational sewer information system  

Treatment  
WWTP Seehausen  
1,000,000 Inh  
WWTP Farge  
160,000 Inh
The way of WWTP Bremen-Seehausen to an energy neutral plant

Development of energy self-production
(on site – gas, wind and sun)

51% 55% 76% 77% 91% 114% 114% 110% 114% 119% 111% 118% 123% 130%
## Valorising the end-products of domestic and industrial wastewater treatment

### Development of energy demand WWTP Seehausen

<table>
<thead>
<tr>
<th>Year</th>
<th>Absolute kWh</th>
<th>Specific kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>26.62 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2010</td>
<td>27.26 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2011</td>
<td>25.89 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2012</td>
<td>25.57 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2013</td>
<td>25.97 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2014</td>
<td>22.92 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2015</td>
<td>23.21 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2016</td>
<td>23.62 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2017</td>
<td>22.49 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2018</td>
<td>22.69 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2019</td>
<td>23.50 Mio. kWh</td>
<td>-</td>
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<tr>
<td>2020</td>
<td>20.54 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2021</td>
<td>22.89 Mio. kWh</td>
<td>-</td>
</tr>
<tr>
<td>2022</td>
<td>19.93 Mio. kWh</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: hanseWasser*
Way to energy neutrality

More efficient in energy-

**Repowering**
3 combined heat and power unit (1.4 MW el/unit) and a wind turbine (2 MW). Higher gas production.

**Reinvestment**
New (economically viable) aggregates with a lower specific demand (compressors, pumps, ...)

**Optimization**
Digital twin of WWTP and focus on processes with high demand (aeration).

<table>
<thead>
<tr>
<th>production</th>
<th>demand (technical)</th>
<th>demand (process)</th>
</tr>
</thead>
</table>
Set of rules DWA A-216

What is the DWA Set of Rules?

Technical standards are an important factor in efficaciously and economically protecting the environment and material goods and in promoting quality assurance. The DWA therefore incorporates into its standards the most recent findings on time-tested procedures. The DWA Set of Rules consists of Standards and Guidelines and is prepared by more than 2400 specialists, who are engaged in the association in an honorary capacity and work in more than 340 specialist committees and working groups.

The DWA Set of Rules is viewed in Germany as the general basis for planning, construction and operation of plants in water, wastewater and waste management, as well as in soil conservation. It makes a considerable contribution to keeping the cost of environmental protection at a reasonable level. With this Set of Rules, the associations assume individual responsibility for their specific areas of expertise and unburden the state to a considerable extent: it should be noted that the DIN standards and the rules and standards of the DWA are of equal importance.
Energy Check

Figures 1 and 2: Specific total power consumption depending on the cleaning process

64% frequency of lower deviation
Energy Check

Specific Energy demand (based on monthly values) for WWTP Bremen-Farge

Specific Energy demand (based on monthly values) for WWTP Bremen-Seehausen

Ideal value for WWTP Bremen-Seehausen

Ideal value for WWTP Bremen-Farge

- Anlagenspez. Idealwert KAF
- Kennwert Stromverbrauch KAF
- Anlagenspezifischer Idealwert KAS 2016
- Kennwert Stromverbrauch KAS
- Benchmarking 2017 (große Anlagen)
Summary

- We started at a good point because the main aggregates for energy production and demand had to be renewed.

- Energy neutrality was a main goal of the whole company and not a one-man-show.

- We reduced the specific demand of aggregates and the process and raised the efficiency of production.
Thank you for your attention!

Any Question?

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