Increasing Wastewater Treatment Plant Capacity with Small Footprint Technology

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The Real “R” in the World Today

- Recycle
- Recovery
- Removal
3 Current Technology & Market Drivers for India

- Price Sensitive
- Compact systems and less footprint
- Increasing current capacity of existing treatment plants in big cities
Companies from Norway
Evolution of Norwegian technologies – to Meet National Needs and expanding its value internationally

- Expensive country (labour cost)
  - Low maintenance and operation cost
- Cold climate
  - Compact solution
- Rocks and mountainous country
  - Small footprint
- Solution for small communities and rural areas
  - Small decentralised systems
- Surface water used as drinking water
  - Need of hygienic protection
  - Eutrophication – toxins from algae
- Tourism and outdoor recreation
  - Fishing
  - Bathing
- Industry
  - Fish-farming (aquaculture)
Where is our technology at the wwtp?
What if there is no wwtp?
Why remove solids from wastewater?

- Reduces carbon load to the biological system of a wastewater treatment plant (WWTP) OR to the receiving water bodies

- Solids captured
  - can be used for production of bioenergy which is a value added product
  - Reduces downstream aeration costs
About Salsnes Filter

- Company background
- Product and technology know-how
- R&D&I Activities
Company Profile

- Located in Norway
- Company activity:
  - Manufacturing
  - R&D
  - Marketing - sale
  - Engineering
  - Operation

- 41 employees
- Exports 60% of production
- World wide representation
- >900 machines operating
- Municipal and Industrial market
- From 5 – 15 000 L/s
Trojan – Salsnes Geographic Footprint

Global reach and presence, sales and support
Mission

• Change the global understanding of Primary treatment (NB ! Not pre-treatment)
  – From sedimentation → Salsnes Filter
  – Increase solids removal by filtration
  – Integration of solids separation and thickening of sludge
  – Optional integration of dewatering

• Separation, thickening and dewatering in one step
In One Step:
- Separation 40-80% TSS
- Thickening 4-8% DM
- Dewatering 20-30% DM

Dewatered sludge for stabilization

Water Treatment
- Coarse Screen
- Sand & Grit
- Sedimentation / Clarifier
- Thickening
- Dewatering

Sludge Treatment
- To secondary or discharge
Municipal Wastewater
- Primary treatment (AS, MBBRs, CFIC)
- CEPT
- Reject water
- Energy
- Resource Recovery

Aquaculture

Cruise Ships

Cruise Ships

INDUSTRY

- Paper and Pulp
- Dairy & Food
- Gummy
- Biofuels (algae)

Aquaculture

Salsnes Filter

A TROYAN TECHNOLOGIES COMPANY

• Primary treatment (AS, MBBRs, CFIC)
• CEPT
• Reject water
• Energy
• Resource Recovery

Aquaculture

Cruise Ships

INDUSTRY

- Paper and Pulp
- Dairy & Food
- Gummy
- Biofuels (algae)
Product Specifications & Technology know-how & Installations
Product Overview

**Enclosed Units**

- **SF:1000**
  - 0 – 0.34 MGD/Filter
  - 0 - 54 m³/h
- **SF:2000**
  - 0.25 - 3.2 MGD/Filter
  - 40 - 500 m³/h
- **SF:4000**
- **SF:6000**

**Open Units**

- **SFK:200**
- **SFK:400**
- **SFK:600**
  - Up to 3.2 MGD/Filter
  - Upto 500 m³/h
Let the particles do the job!

- Influent TSS form a filter mat on mesh
- Filter mat itself enables high TSS and BOD removal
Integrated Thickening & Dewatering

- Screw-press dewatering, evacuates odors
- 4-6% DM after thickening, 20-30% after dewatering
## Features

<table>
<thead>
<tr>
<th>Features</th>
<th>Sedimentation</th>
<th>Filtration (Salsnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footprint</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>% TSS removal</td>
<td>50-70</td>
<td>25-40</td>
</tr>
<tr>
<td>% COD or BOD&lt;sub&gt;5&lt;/sub&gt; removal</td>
<td>25-40</td>
<td>25-50</td>
</tr>
<tr>
<td>% Phosphorus removal</td>
<td>5-10</td>
<td>na</td>
</tr>
<tr>
<td>% TS</td>
<td>0.5-3%</td>
<td>3-8%</td>
</tr>
<tr>
<td>Energy input (kWh/m&lt;sup&gt;3&lt;/sup&gt;)</td>
<td>0.1</td>
<td>3.1-6.1</td>
</tr>
<tr>
<td>Loading rates (kg/m&lt;sup&gt;2&lt;/sup&gt;-h)</td>
<td>2.0</td>
<td>15-20</td>
</tr>
<tr>
<td>Dewatering</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Architecture</td>
<td>Fixed</td>
<td>Modular</td>
</tr>
</tbody>
</table>
Salsnes used today at

- Primary treatment only
- SBR (Sequential batch reactors)
- BAF (Biological aerated filter)
- MBR (Membrane Bioreactors)
- MBBR (Moving Bed Biofilm Reactors)
- Conventional WAS plants
Tromsø wwp, Norway

- Above the Arctic circle
- 70% TSS removal
- 150 m² (1600 ft²) footprint
- 1800 m³/h
Beemster wwtp, Netherlands

- 45 min from Schiphol Airport, Amsterdam
- 170 000 PE
- 3600 m$^3$/h
- 10 SFK600 filters
- Plant has Activated Sludge + Sedimentation
Aarle-Rixtel, Netherlands

- 270 000 PE
  - 50% with Salsnes
  - 50% conventional
- 2800 m³/h
- 8 SFK600 filters
- Plant has Activated Sludge + Sedimentation
Research & Development & Innovation Activities
Initiatives & Activities

• Collaboration with Universities, Research Institutes and Consultancies

• Active in Regional, National, European and International research funded projects

• Dissemination of results (peer reviewed publications, conference proceedings, etc)
Salsnes Filter bench scale apparatus

Top

110 mm outer Ø

550 mm

Bottom

O-ring or silicone gasket

Sieve cloth

Transparent PVC

Screw coupling to securely hold top and bottom together during testing

50 - 60 mm ball valve
Pilot scale Salsnes Filter
Example Publications


Addressing The Key Market Drivers
Technology Benefits of Using Salsnes as Primary Treatment

- 20 - 40 % BOD removal
- 50-60 % TSS removal
- Reduced size of primary treatment (80-95%)
- Less downstream treatment
  - Energy consumption for aeration
  - Chemicals
  - Secondary sludge
- Higher energy output for biogas
Footprint Savings

Two clarifiers vs Eight SF:6000 Salsnes Filters
Sludge Volume Comparison

95,100 gallons/day (360,000 liters/day) of wet sludge (1-2% DM) vs 8,240 gallons/day (31,200 liters/day) of sludge (20-25% DM)
Relative Benefit / Impact Ratio

<table>
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<th>Salsnes Filtration</th>
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<tr>
<td>Construction Costs (material)</td>
<td>📈</td>
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<tr>
<td>Land Usage (footprint)</td>
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<tr>
<td>Time for installation</td>
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<td>🎯</td>
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<tr>
<td>Flexibility</td>
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<tr>
<td>Electricity Costs</td>
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</tr>
</tbody>
</table>

Most favourable 🟢 Moderate 🟠 Least favourable 🟥

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**Sedimentation**
- Construction Costs (material): Moderate
- Land Usage (footprint): Most favourable
- Time for installation: Moderate
- Flexibility: Moderate
- Electricity Costs: Least favourable

**Salsnes Filtration**
- Construction Costs (material): Least favourable
- Land Usage (footprint): Moderate
- Time for installation: Least favourable
- Flexibility: Moderate
- Electricity Costs: Moderate
Thank you for your kind attention

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