

Renseanlæg

Hvordan virker de?

Og hvad med overløb hvad er det?

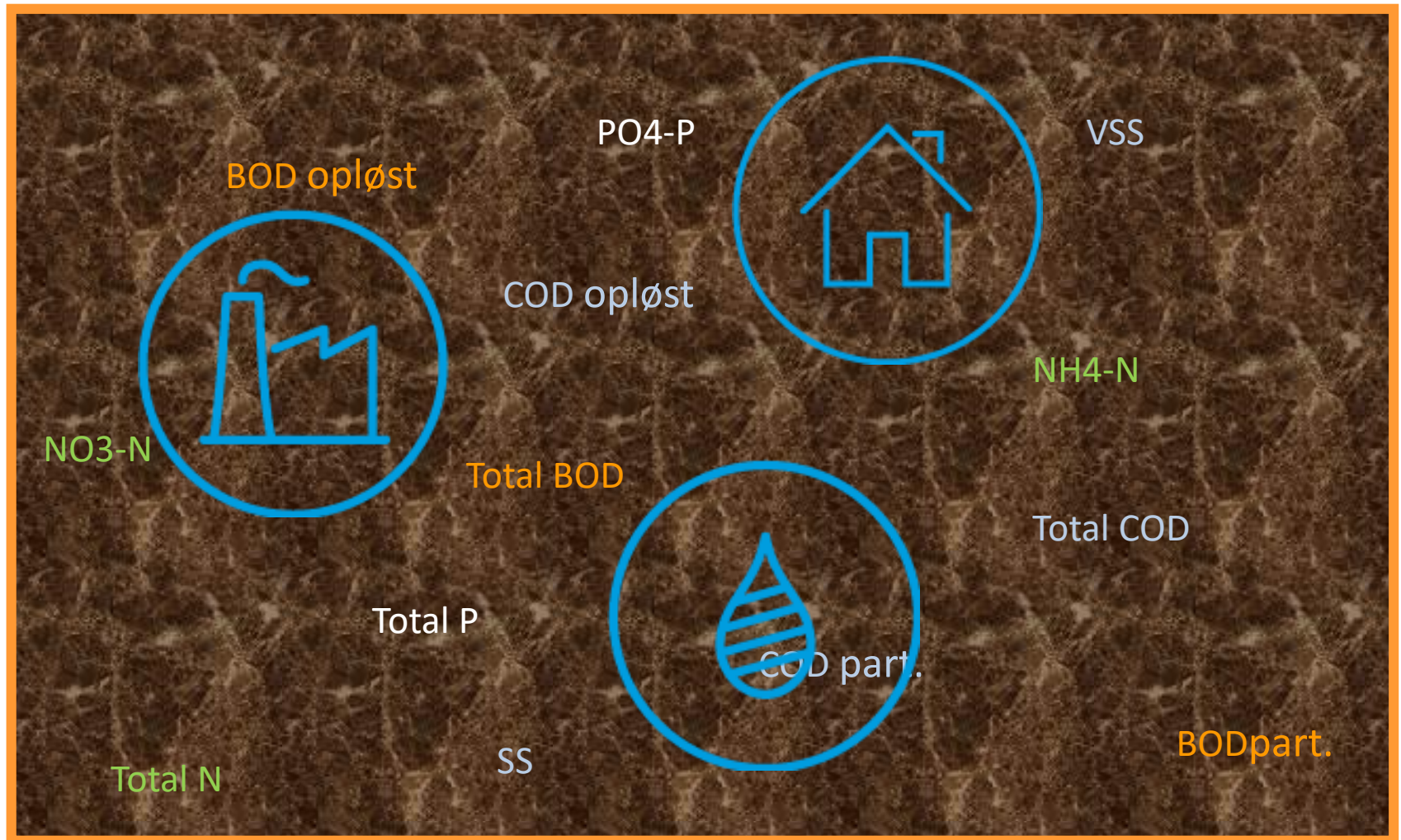


Vidensaften i Plastfri Roskilde Fjord
Procesingeniør
Stine Lundbøl Vestergaard



- Hvad er spildevand?
- Spildevandssammensætning og belastning
- Hvordan fungerer et renseanlæg?
- Hvordan fungerer Renseanlæg Bjergmarken?
- Hvorfor er MP svært at håndtere på et Renseanlæg?
- Forsøg på Bjergmarken med filtrering

Spildevand ???

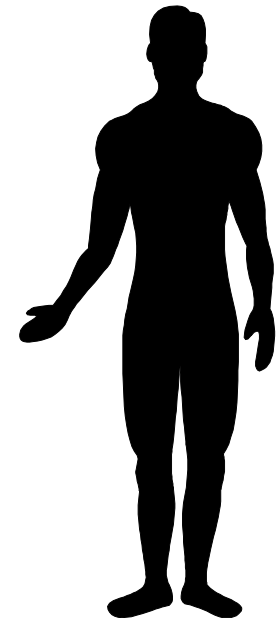


Fælleskloakeret eller separatkloakeret??? Hvad med mikroplast??

Personækvivalent

1 personækvivalent = 1 PE

Parameter	1 PE (Danmark)
COD	125 g/d
BOD	60 g/d
SS	72 g/d
T-N	12 g/d
T-P	2,5 g/d
Flow	250 l/d



*1 PE angiver den mængde af stof og vand, som
1 person bidrager med i spildevand på en dag.*

Eksempel på belastning

Indhold i spildevand til et renseanlæg beskrevet ved standardparametre

Driftsår 2015	Kg/d	PE
COD	4.944	39.556
BOD	1.666	27.768
Total-N	317	26.429
Total-P	43,6	17.744
COD/BOD	2,96	-
COD/N	15,59	-
COD/P	113	-

FLOW DIAGRAM WWTP AVEDØRE

The diagram illustrates the wastewater treatment process at the Koge Bucht plant, showing the flow from influent wastewater to the final treated effluent and the handling of sludge and gas.

Wastewater Treatment Process:

- Influent wastewater** enters the **Screen**, where **Screenings** are removed and sent **To external incineration** via a **Vacuum truck**.
- The water then passes through a **Pumping station** and a **Grit- and grease chamber**, where **Grit** is separated and sent **To external industrial use** via a **Grit separator**.
- The water then flows into a **Primary settling tank**, where **Grease** and **Primary sludge** are separated. **Primary sludge** is sent to a **Concentration tank** and then to a **Digester**.
- Excess sludge** from the **Bio-P tank** is also sent to the **Digester**.
- The **Digester** produces **Digested sludge**, which is sent to an **Equalization tank** and then to **Final dewatering**.
- Final dewatering** involves the **Addition of polymer** and sends **Heat to digester** and **Sludge from RL, RD and other utilities** to a **Pre-dryer**.
- The **Pre-dryer** sends **Heat to digester** and **District heating** to an **Oven and boiler**.
- The **Oven and boiler** sends **Heat to digester** and **Ash to external reuse or internal landfill site** to an **Electrostatic Precipitator**.
- The **Electrostatic Precipitator** sends **Flue gas waste to internal landfill site** and **Heat to digester** to a **Baghouse filter**.
- The **Baghouse filter** sends **Heat to digester** to a **Scrubber**.
- The **Scrubber** sends **Heat to digester** to a **Stack**, which releases **Treated flue gas**.

Sludge and Gas Handling:

- Primary sludge** from the **Primary settling tank** is sent to a **Concentration tank** and then to a **Digester**.
- Excess sludge** from the **Bio-P tank** is sent to the **Digester**.
- The **Digester** produces **Digested sludge**, which is sent to an **Equalization tank** and then to **Final dewatering**.
- Final dewatering** involves the **Addition of polymer** and sends **Heat to digester** and **Sludge from RL, RD and other utilities** to a **Pre-dryer**.
- The **Pre-dryer** sends **Heat to digester** and **District heating** to an **Oven and boiler**.
- The **Oven and boiler** sends **Heat to digester** and **Ash to external reuse or internal landfill site** to an **Electrostatic Precipitator**.
- The **Electrostatic Precipitator** sends **Flue gas waste to internal landfill site** and **Heat to digester** to a **Baghouse filter**.
- The **Baghouse filter** sends **Heat to digester** to a **Scrubber**.
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Gas and Energy Recovery:

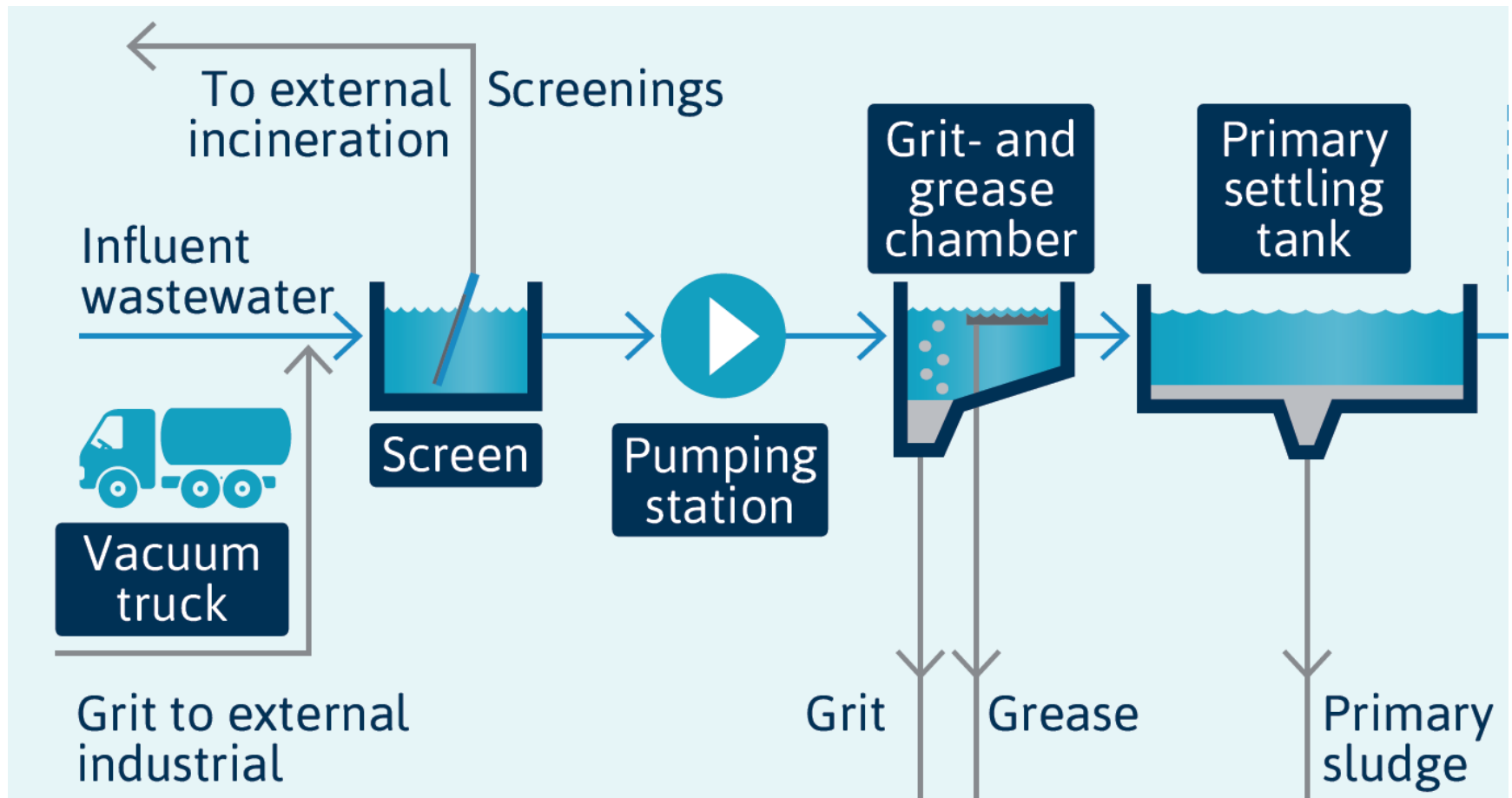
- The **Digester** produces **Gas**, which is sent to a **Gas holder**.
- The **Gas holder** sends gas to a **Gas engine**, which produces **Electricity to the network**.
- The **Gas holder** also sends gas **To the natural gas network**.

Final Disposal:

- The **Screenings** are sent **To external incineration** via a **Vacuum truck**.
- The **Grit** is sent **To external industrial use** via a **Grit separator**.
- The **Ash** from the **Oven and boiler** is sent **To external reuse or internal landfill site**.
- The **Flue gas waste** from the **Electrostatic Precipitator** is sent **To internal landfill site**.

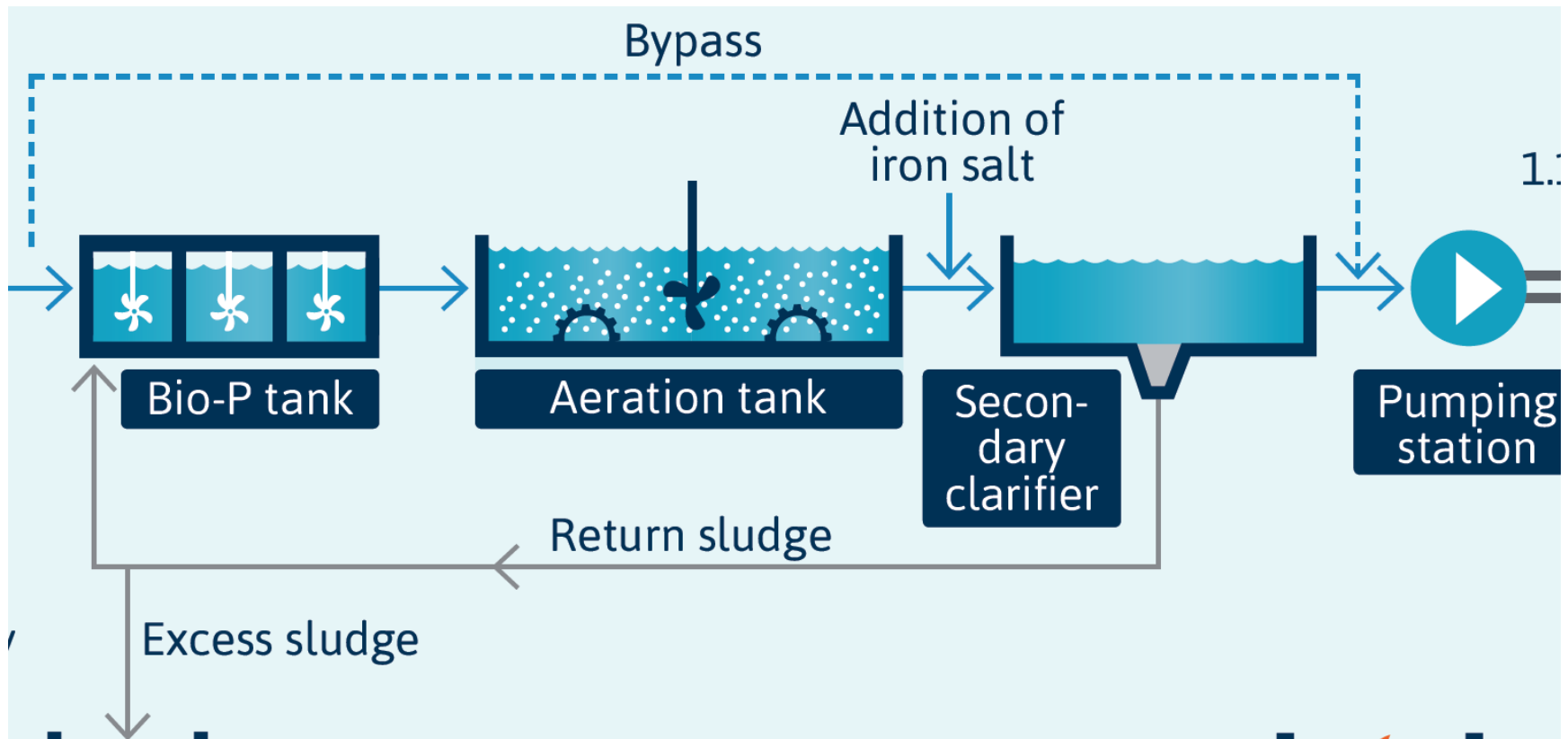
Forrensning

Rist/sand- og Fedtfang/Forklaring



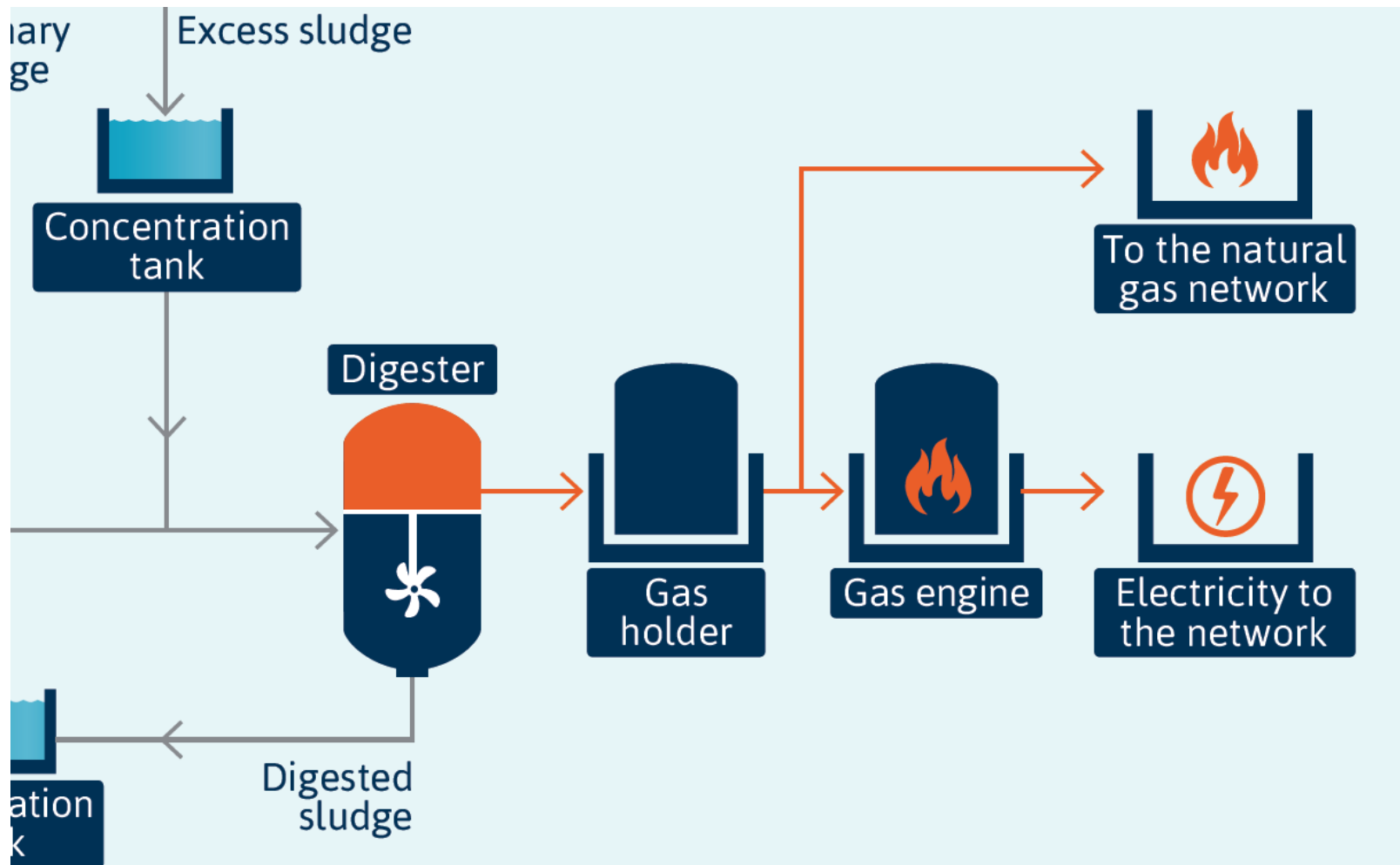
Biologisk behandling/efterklaring

Biologisk fosforjernelse / Beluftningstank / Efterklaringstank



Slambehandling

Rådnetank / Gasbeholder / Gasmotor



Den sejlåge Bjørnemarken har udløb til Øst- og de Fjorde

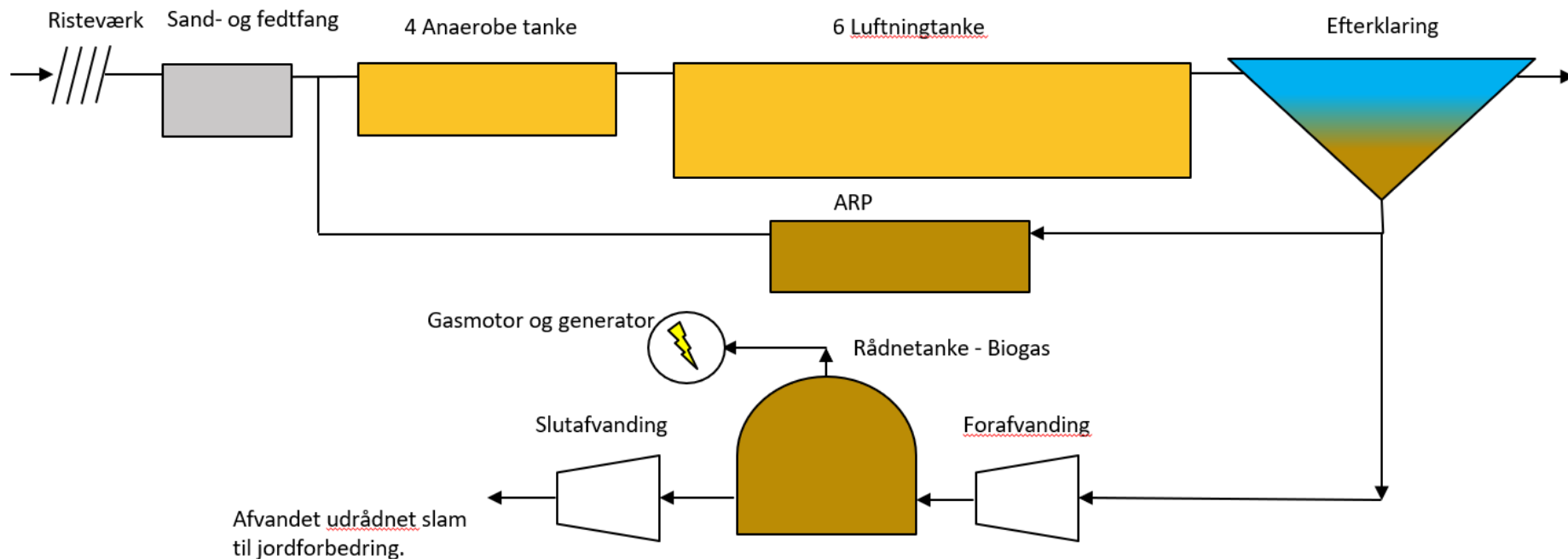


Bjergmarken Renseanlæg

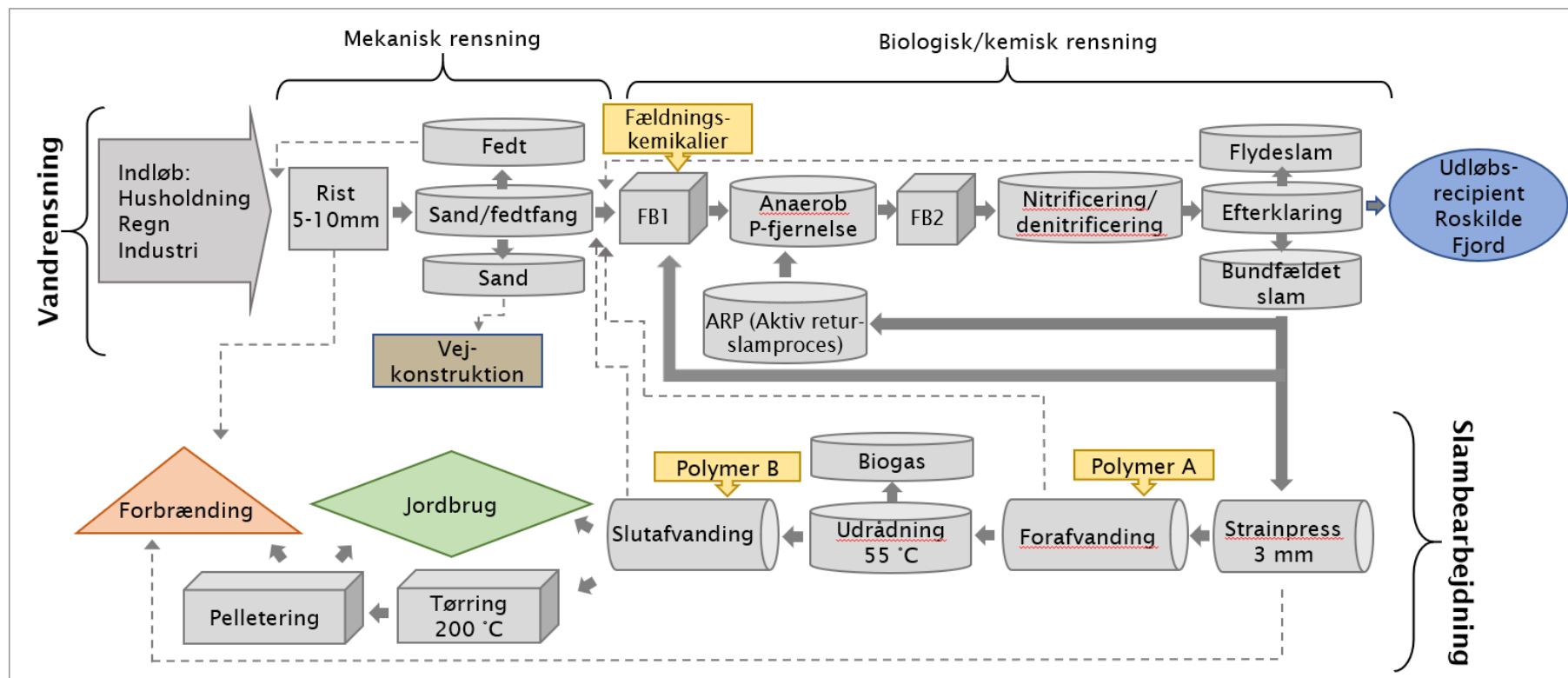


Renseanlæg Bjergmarken

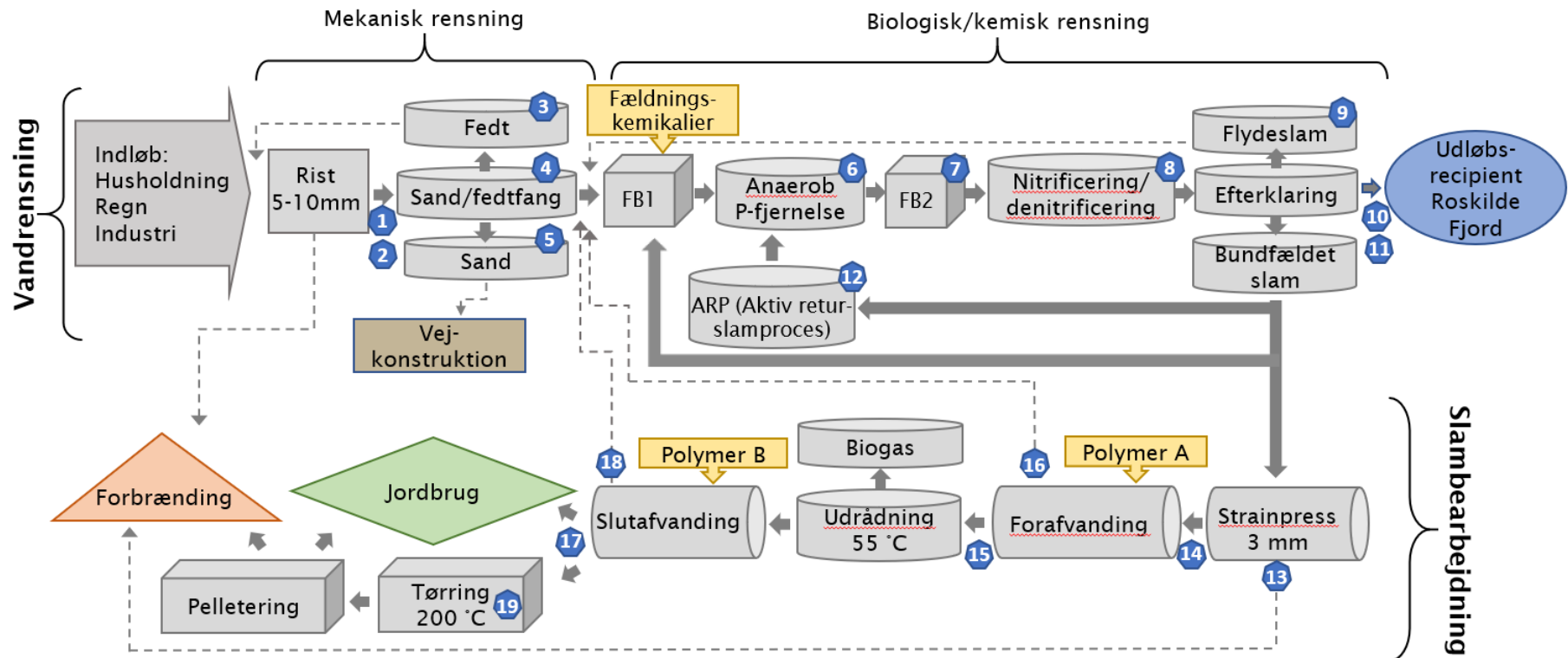
R/A Bjergmarken procestrin



Skematisk opbygning



Vandrensning

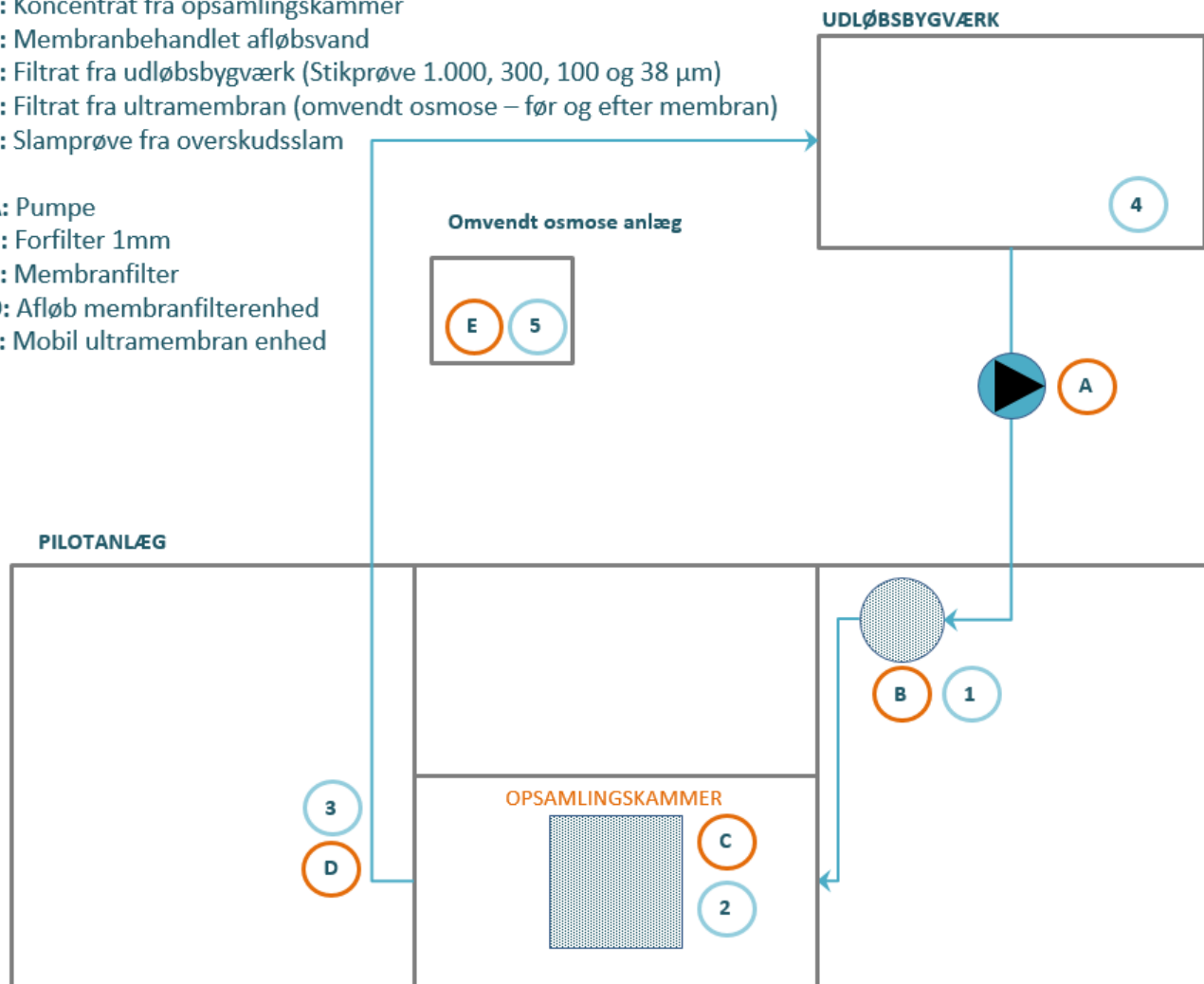


Pilotanlægget

Prøvetagningspunkter

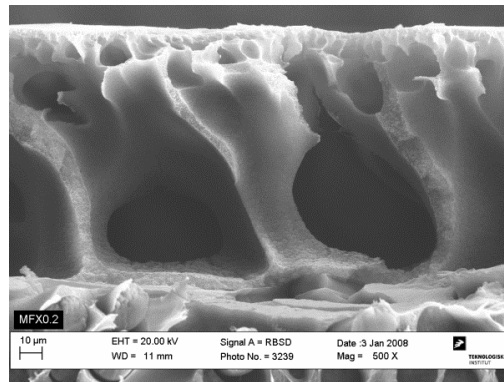
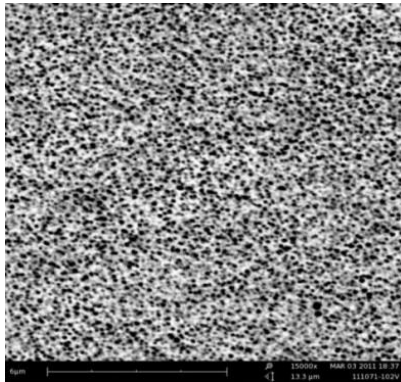
- 1: Filtrat fra filterenhed
- 2: Koncentrat fra opsamlingskammer
- 3: Membranbehandlet afløbsvand
- 4: Filtrat fra udløbsbygværk (Stikprøve 1.000, 300, 100 og 38 μm)
- 5: Filtrat fra ultramembran (omvendt osmose – før og efter membran)
- 6: Slamprøve fra overskudsslam

- A: Pumpe
B: Forfilter 1mm
C: Membranfilter
D: Afløb membranfilterenhed
E: Mobil ultramembran enhed

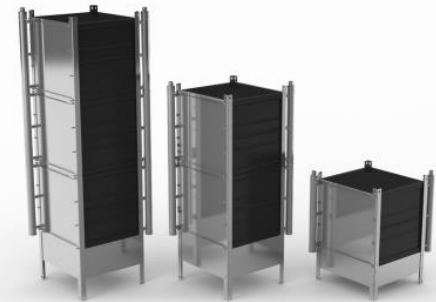


Membranen

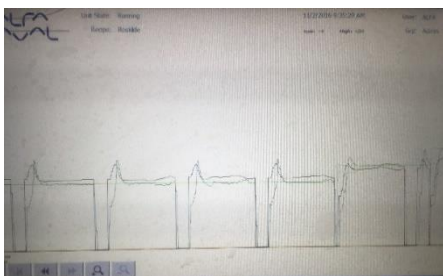
- Membran produceret af Alfa Laval
- Gennemsnitlig porestørrelse $0,2\text{ }\mu\text{m}$ ($0,2$ tusinddel af en mm, bakterier $>1\text{ }\mu\text{m}$).
- MFP2 - membran
- Plademembran type MFM100-100 anvendes på Bjergmarken Renseanlæg (Hollow Sheet).
- Kørte fra oktober 2016 til december 2016



Three configurations



Test og prøveudtagning



- Ugens prøveudtagning af:
 - Rensningsanlæggets udløb
 - Opkoncentreret vand fra membrantank
 - Filtreret vand
- Automatisk beregning af koncentrationsfaktor

date		flow through m3	Chamber m3	Concentration factor	Bemærkninger
19-okt	week 0				Opstart af anlæg
26-okt	Week 1	69	4	17.3	
02-nov	Week 2	51	4	12.8	piloten ikke har produceret vand for 2 dage
10-nov	Week 3	148	4	37.0	
16-nov	Week 4	118	4	29.5	
23-nov	Week 5	99	4	24.8	næsten 2 dage uden flow
29-nov	Week 6	69	4	17,3	

Spørgsmål

