CIE4485
Wastewater Treatment

Excursion WWTP Dokhaven

TU Delft

Energy Factory case – WWTP Dokhaven

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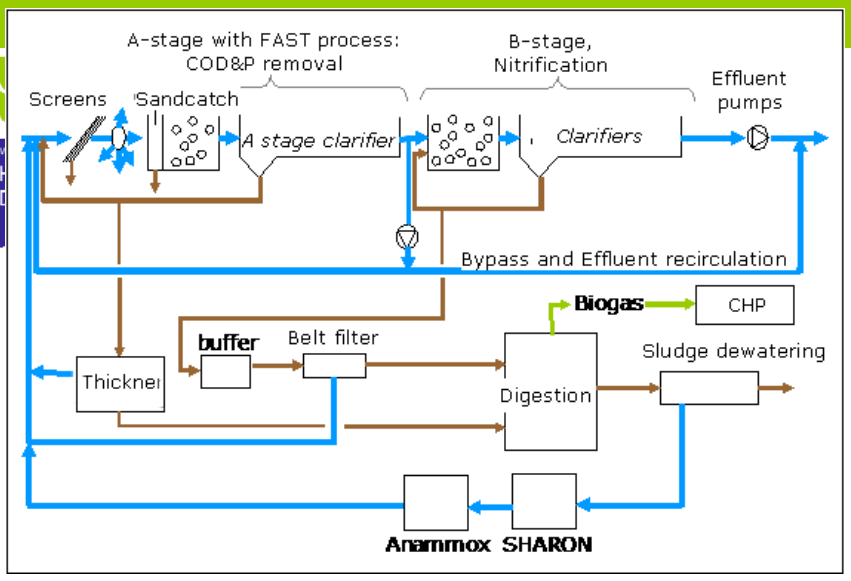
- Design in 1985, Rotterdam
  - Absorption-Belebung (A/B) technology
  - BOD removal
  - Nitrification in summer
  - B-stage for only 75% Storm Water Flow



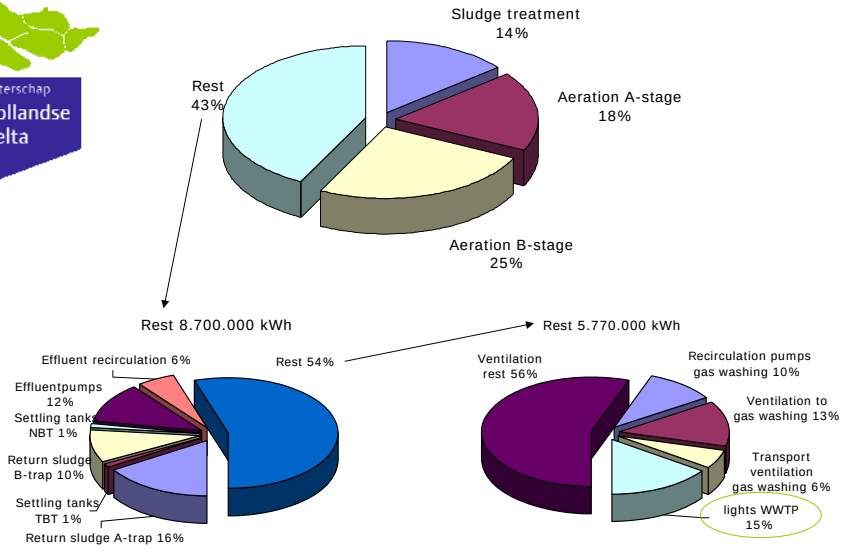
Figures

- Capacity 560.000 p.e.$_{150}$
- A-stage influent N/COD = 0.12
- Flow:
  - A-stage maximum 19.000 m^3/hr (storm water)
  - B-stage maximum 14.250 m^3/hr (storm water)
  - dry weather flow app. 100.000 m^3/day
- Sludge production app. 20.000 ton/year (6.000 ton d.m./year)
- Own Energy production: 7 million kWh/year (app. 1/3 of the total energy use)

Specialties:

- Construction underground
- Living in direct neighborhood
- No extra space for extra treatment as denitrification tanks
- Ventilation: 180.000 m3/hr

Energy Consumption Dokhaven (2008) 20,5 M kWh



Improved N-removal

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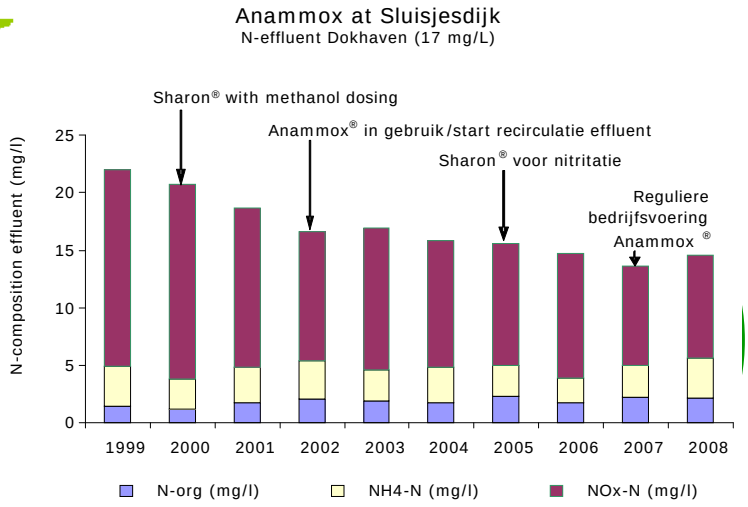

Dokhaven in the future

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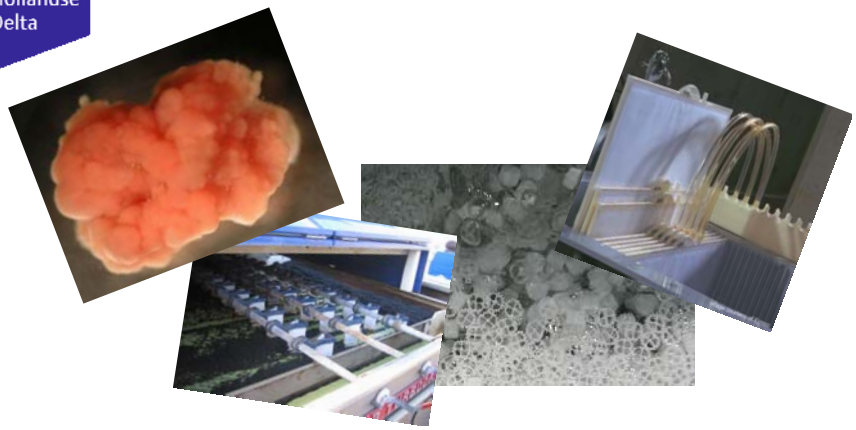
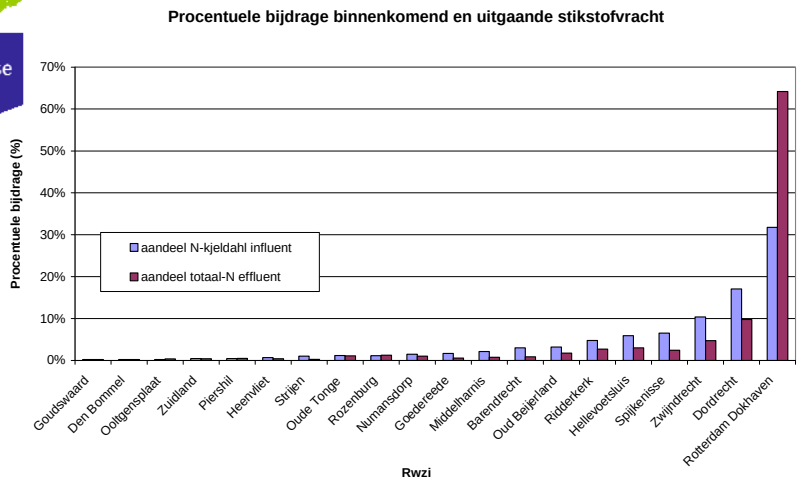
Possibilities to improve the N-removal



Contributions of the WWTP effluent to the total effluent N in the WSHD area



Anammox

- Anammox helped reducing nitrogen problems at WWTP Dokhaven;
- Can it solve Energy problems as well?

Rejection Water
"Anammox brings WWTP closer to energy autarky due to increased biogas production and reduced aeration energy for N-removal"
Siegrist et al., 2008

Sewage
"Sewage treatment with Anammox"
Kartal et al., 2010 - Science

Based on:
Lower COD for N-removal (denitrification)
→ more COD for biogas production

Expected advantages

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Costs:

It will fit in current WWTP's with advanced pre-settling or A/B technology, so expected investment costs relatively low;

Sustainable:

Less aeration needed for nitrification;

Good improvement N-removal;

New treatment concept:

Concept could be translated to other treatment plants and it fits perfectly in the Energy neutral WWT concept.

→ No experience, except clues in the laboratory, but results are improving in pilot

→ Application needs to be proven

Cold Anammox

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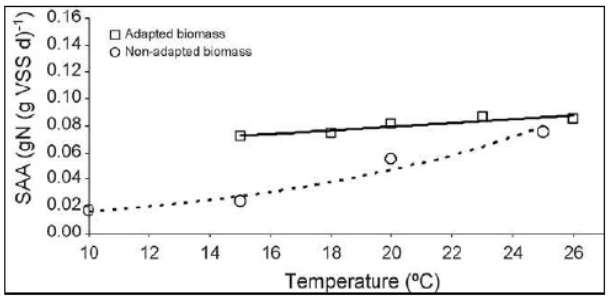
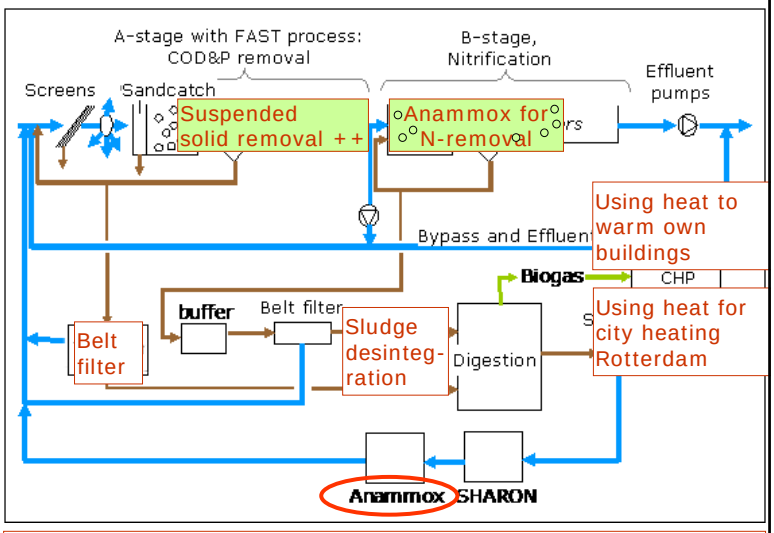
Different temperature dependency for "adapted" and "non adapted" Anammox biomass



Specific Anammox Activity (SAA) at different temperatures (from Dosta et al., 2008)

Energy saving at Dokhaven



Other savings: turn off lights and optimizing aeration, ventilation, etc.