



Fotograaf: Ben Vulkers

Ben & Jerry's ice cream production

BIOPAQ®AFR and THIOPAQ®

An all-in-one anaerobic system which converts industrial wastewater with fats, proteins and hydrocarbons into biogas.

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“The Chunkinator” represents the best environmental and commercial option for reducing the environmental impact of the site and the cost of effluent disposal. By creating renewable energy with BIOPAQ®AFR it perfectly fits in one of the many missions of the Ben & Jerry's brand”

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Mr Gerald-Jan Tijhof, Manager waste(water) treatment & recovery

The challenge

- Treating highly concentrated, fat containing wastewater
- Maximising biogas production by converting carbohydrates, proteins and fats
- Getting a reliable and stable process
- Limited plant space available

The solution

- Compact all-in-one-solution combining pre-, main- and post treatment
- Application of innovative BIOPAQ®AFR technology with integrated flotation unit, combined with THIOPAQ® technology.

The benefit

- Total COD removal efficiency of >90%
- Decreased costs for discharging wastewater
- Production of biogas for use in boilers to heat the process water.
- Biogas yield covers over 50% of the natural gas consumption, which means high reduction of CO₂ emission
- No odour problems
- No use of chemicals
- Short retention time

Facts and figures

Process

- 40 million litres of B&J ice-cream/year

Effluent

- Max 200 m³/day
- Max 4400 kg/day COD (avg 2900 kg/d)
- Ice, milk, cream, fruit
(organics: carbohydrates, proteins, fats)



The challenge

In 1953, a bakery named "De Valk", situated in Hellendoorn produced a very successful ice cream. The success forced them to replace the labor-intensive manual production by a mechanical system. After Unilever took over the company in 1985, the production of Ben&Jerry's ice cream started in Hellendoorn in 2002. Today,

130 employees produce Ben&Jerry ice cream for more than 20 countries in Europe. Following the slogan "Making the best possible ice cream in the n'icest possible way", B&J buys ingredients in a social-economical way (fair-trade products) and produces the ice cream in the most ecologically attractive manner. Next to that,

B&J decided to treat the waste in such a way that the CO₂ emissions could be reduced. Converting waste and wastewater into valuable biogas that can be used as fuel for boilers would be a perfect solution. This results in a lower consumption of natural gas, and therefore a lower CO₂ emission.

The solution

Initially B&J was advised to separate the solids of fats and proteins from the liquid waste and treat these streams separately. However, Paques brought up the solution of the all-in-one reactor, the BIOPAQ®AFR process. This system enables reduction of CO₂ emission and discharging costs. The BIOPAQ®AFR, built at a small footprint, has a short hydraulic retention time (in

less than 3.5 days the waste is converted into biogas), and has proven to be both an economically and ecologically attractive solution!

Essential results of BIOPAQ®AFR for B&J

- Efficiency of COD removal 90-95%
- COD effluent BIOPAQ®AFR: < 1000 mg/l
- Biogas production: avg 1750 m³/d (max 2640)
- Biogas quality after THIOPAQ®: 70% CH₄, H₂S < 25 ppm

The technologies

BIOPAQ®AFR

The BIOPAQ®AFR (Anaerobic Flotation Reactor) system converts fat and oil containing waste (water) effectively into energy-rich biogas. Pre treatment (pre acidification or fat separation) is not applied. With an integrated flotation unit, sludge is kept inside the reactor. In this unit, white water attaches to the biomass which makes it float; the biomass is separated from the water and is retained. BIOPAQ®AFR enables a discharging cost reduction of >90%. With a sludge retention time from 50-100 days, slow growing bacteria create a highly efficient organic compound removal and a maximum of biogas production. Except for incidental caustic dosing, the system hardly needs chemicals.

THIOPAQ®

In the THIOPAQ® the H₂S of the biogas is scrubbed and is biologically converted into elementary sulphur. The caustic consumption is low. The biogas quality meets the stringent requirements for use in boilers or CHP.