

FrieslandCampina: Energy reducing technologies in (membrane and FO-MD driven) separation and fractionation tasks for milk processing.

Problem description

In many of its processes FrieslandCampina uses membrane technology. Membrane technology has been applied at increasing pace to improve separation and fractionation processes over evaporation. One of the challenges FrieslandCampina is currently facing in membrane technology is reducing its energy use while increasing its operational excellence. Energy is especially necessary in cases where extra pumps are required to prevent clogging of the filter. The use of forward osmosis in combination with membrane distillation have been investigated but its low TRL is hampering adoption at an industrial scale.

Processes in which FrieslandCampina applies membrane technology are in:

- The separation of: microorganisms from casein micelles; fat from protein; casein micelles from serum proteins; minerals from lactose.
- The fractionation of: serum proteins.
- The purification of water from Bruden condensate or RO-permeate

FrieslandCampina is interested in getting an overview of available techniques minimize energy use in membrane processes.

Current known technique(s)

- Ultra, nano & micro filtration
- Reverse Osmosis (with energy recovery)
- Forward osmosis (with Membrane distillation or low energy use)
- Biofilter & UV

Objective(s)

- Payback time 3 years
- TRL > 6 (or approach to increase TRL)
- The technologies operate at large scale ($1 \cdot 10^6$ m³/year)
- The technology operate at high speeds (residence time is minutes)

Requirements

- Hygiene safe (measurable)
- Food safety
- Process temperature <15°C or > 50°C
- No cross-contamination