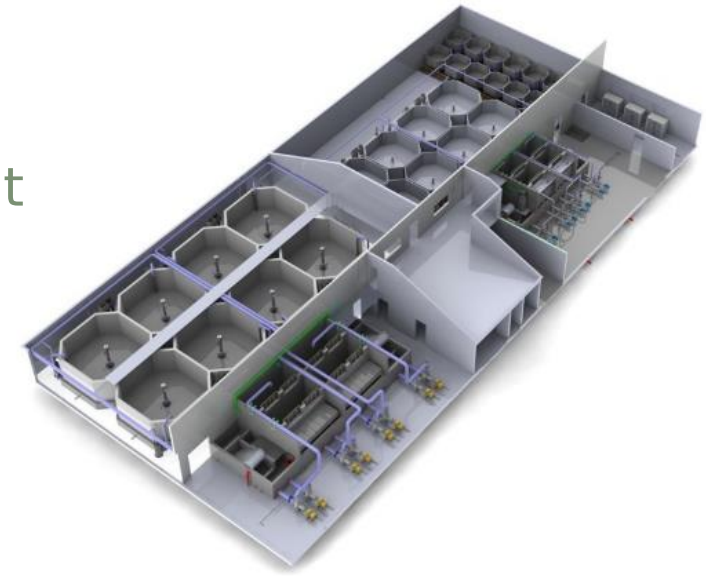

AQUAOPTIMA
Optimal water quality - ideal fish health

TROUT BREEDERS CONFERENCE

TECHNOLOGICAL AQUACULTURE FAIR

Annual Conference for Trout Breeders
Gdynia, October 11, 2018



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Recirculation aquaculture systems (RAS) for land based fish farming

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Trondheim, Norway

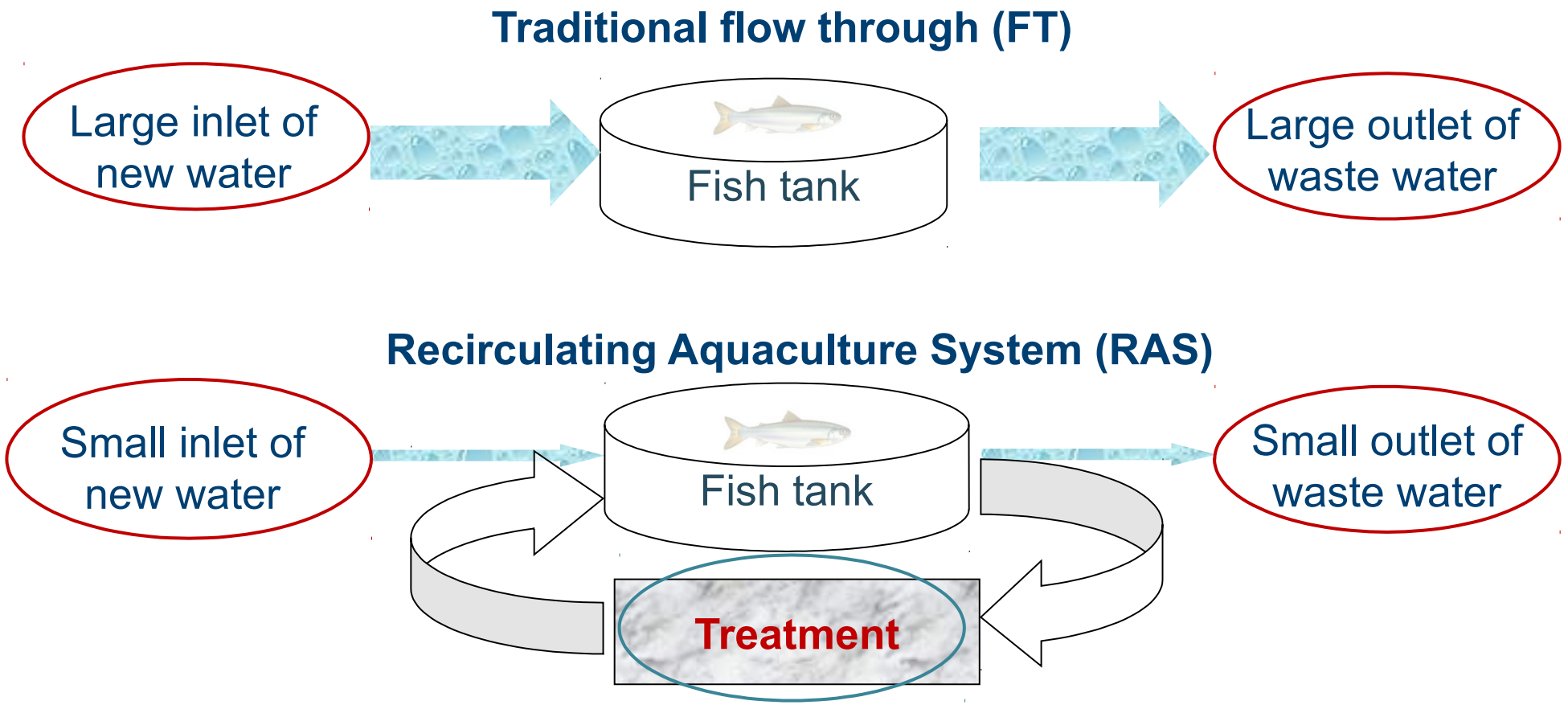
AquaOptima AS

- Localised in Trondheim, Central station
- Supplier of RAS since 1993 (spin-off of SINTEF)
  - Atlantic Salmon
  - Halibut
  - Atlantic Cod
  - Seabass
  - Seabream
  - Barramundi
  - Tiger puffer fish
  - Arctic Char
  - Rainbow trout
  - Tilapia
  - Eel
  - Sturgeon
  - Pollock
  - Pike Perch
  - Whitefish
  - Cobia
- Recently became a part of Steinsvik Group
- Sister company with **Aqualine** (cage supplier) and **Steinsvik** (water treatment, feeding systems, monitoring/ control systems, cameras, equipment for sea cages)
- Agents/cooperating partners in Iran, Indonesia, Bangladesh, Russia and Iceland

aqualine Styrken teller

STEINSVIK SEAPROOFED FOR LIFE

RAS


Traditional flow through (FT)
Large inlet of new water
Fish tank
Large outlet of waste water
Recirculating Aquaculture System (RAS)
Small inlet of new water
Fish tank
Small outlet of waste water
Treatment

Triggers for RAS

1. Not enough water for expanded production
2. Advantage of steady and optimal temperature for growth throughout the year
   - ➢ Reduced total production time
   - ➢ Better utilization of the concessions in sea
3. Minimal water discharge and collection of waste for further utilisation
4. Controlling the rearing environment and increasing the production
   - ➢ Independent of the surrounding environment

Water treatment steps in RAS -to create constant environment

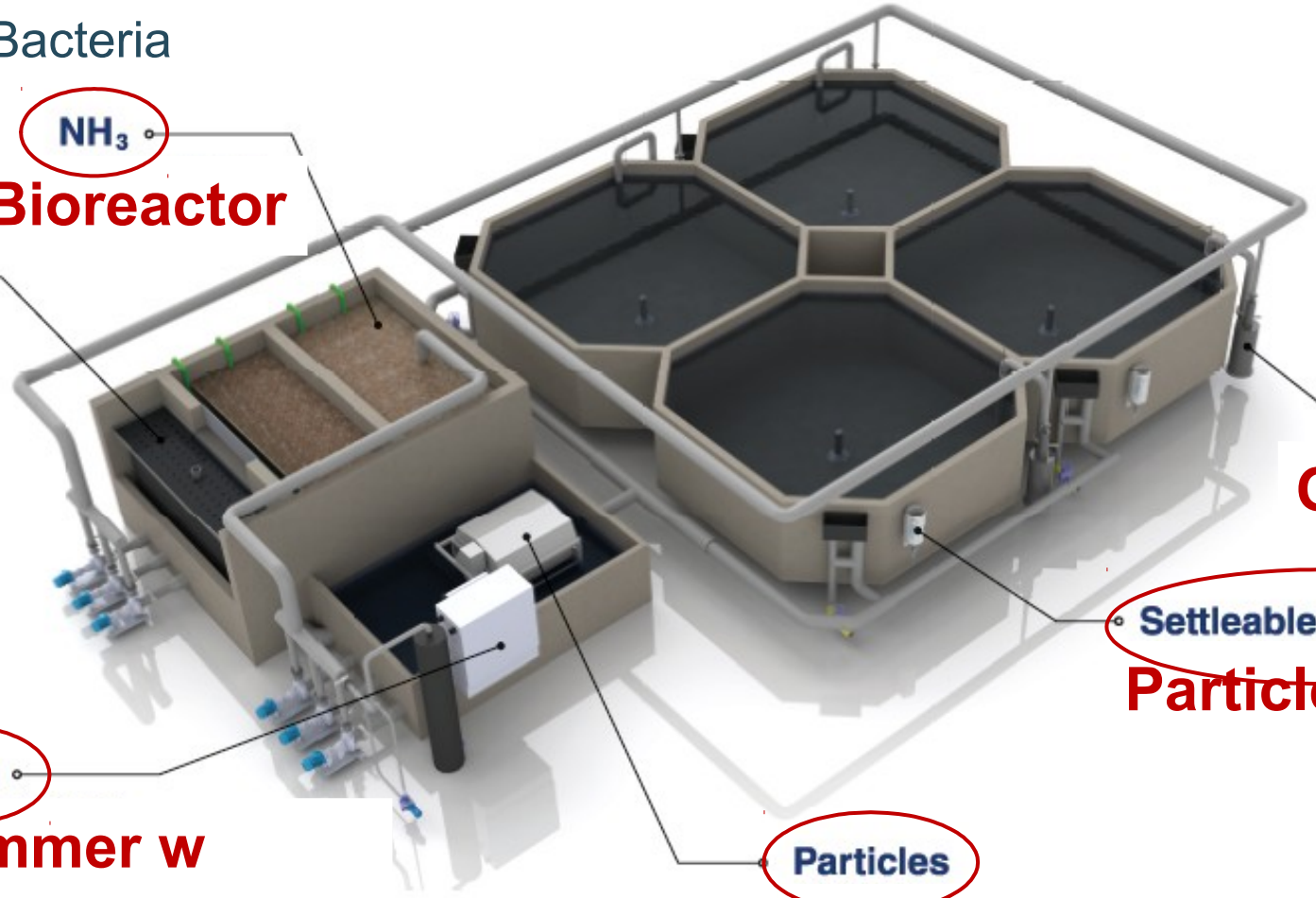
Bacteria

NH_3

Bioreactor

CO_2

Stripper



O_2

Oxygen addition

Settleable solids

Particle trap

Foam

Protein skimmer w ozone

Particles

Mechanical filter

Water quality requirements

Parameter	Safe levels (salmonids)
TSS	< 15 mg/L
TAN (NH_4^+-N plus NH_3-N)	< 2 mg/L
NH_3 – N	< 0.012 – 0.025 mg/L
NO_2^- - N	< 0.1 mg/L
NO_3^- - N	< 100 mg/L
Dissolved O_2	80 - 100% saturation
CO_2	< 15 mg/L
pH	7 – 7.5
Density	< 80 kg/m^3
Temperature	12-14 °C for Atlantic salmon, 15-17 °C for rainbow trout**

Ref: Timmons and Ebeling (2007), Thorarensen & Farrell (2011), *Terjesen et al. (2012), **Pers.com. DTU

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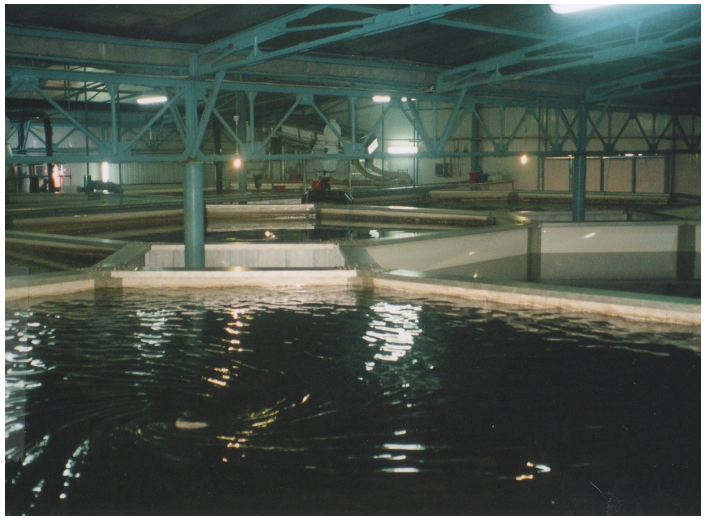
Intake water control

1. Pathogenic microorganisms
2. Particles and organic material
3. Humus

Waste

1. Further utilisation
2. Sludge dewatering/concentration
3. Wastewater disinfection



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