



# Benchmarking- RASforsk

Testbädd för storskaligt vattenbruk steg 2

Maj 2023

# General

**Name** RASforsk

**Location** Tromsø, Norway

**Website:** [Link](#)

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In operation since **January 2023**

The **purpose** of RASforsk is mainly to conduct research although there are thoughts to also try and mimic commercial conditions at an intermediate scale. The facility provides internationally unique facilities for experiments at semi-commercial scales. Other universities work with RAS but at smaller scale, (e.g. Wageningen) while others are currently building up (e.g. Bergen).

# Planning timeframe

- ca. 3 years back Nofima identified the market for the facility and initiated discussions with researchers and companies
- applied for regional funding to start, a specific project took care of the planning
- public procurement at EU level to develop the project specifications (a few months)
- Alpha aqua becomes the technical provider
- planning project specifications (ca. 1 year to plan properly, took in external competences)
- to build the building as national infrastructure had a lot of requirements for water & electricity used, etc. and persons involved

# Planning timeframe

- acquired local permission to use the building
- currently they are testing the water and the facility; this must be done within 1 year from start when the warrantee from the technical provider Alpha aqua expires
- the technology needs to also be approved for animal welfare
- ca. in autumn 2023 when all permissions are given and testing is finished they will start testing the system with fish (focus on salmon but eventually all kinds of species)
- when everything is finished other projects will use the facilities including plans for a system with algae to use the organic waste present in the water

# Ownership & organisation model

The RASforsk facility is close to and an integrated part (a department) within **Havbruksstasjonen i Tromsø AS** which was already up and running from before. The whole facility including RASforsk is jointly owned by Nofima and UiT-The Arctic University of Norway (**50/50**).

Ca. 40 people work at Havbruksstasjonen i Tromsø AS of which just ca. 5 persons are only working at RASforsk. When hiring people they also mention that they will be expected to work in the other systems too as they share projects and work loads.

Because of co-ownership there is a special organisation model of the board with owners representation and Havbruksstasjonen i Tromsø AS who are running, building up and doing all practical work as well as organizing the board but without the right to vote or make decisions. There are always two representatives though of which one is an employees' representative. The Board decides about new projects which are then organized with the same organisation that is also leading the project with support from people with special competences.

# Investments, funding & business model

The **total** investment was ca. **90 MNOK** whereof ca. **40 MNOK** just for the **RAS**, with ca. **13,5MNOK** contributed from the Troms and Finnmark county. For this investment funding was secured from regional funding bodies, internal funding and loans to be paid off over the years. Local companies also paid for some parts.

Nofima and UiT partly fund the whole Station every year which has a mixed funding scheme. Nofima and UiT receive stable basic funding from the State (ca. **20 MNOK/year** in total, decided in October each year) that covers the operational costs. On top of that projects pay a rental price for each unit when they rent. In Norway it is normal praxis that the government invests in such infrastructure.

Currently in a learning process to find an optimal model. As it will take several years to realize, they are working step by step. The Station has in general a good economy.

# Configuration & conditions

The facility is built on **1,350 m<sup>2</sup>**. There are **18 x 1m<sup>3</sup>** systems plus **6** semi-commercial systems consisting of **3 x 3 m<sup>3</sup>** tanks which are linked but each tank having a separate single-RAS system.

Recirculation systems and tanks can be interconnected as needed, and the moving bed system built is flexible for testing different conditions and technologies/units, e.g. in case an engineering company needs to test different units and equipment.

The systems can take in both fresh and seawater at a **temperature range** from **0-2 °C** with the possibility for heating up to **16-18 °C**.

# Configuration & conditions

Single-RAS was decided together by both the researchers and the owners in order to be able to publish and get accepted publications. For that purpose, and to facilitate experiments, the units should be statistically independent from each other. Researchers had requested for more tanks but that was not possible. However, **there is room and capacity for up to 9 and up to 24 more units of the large and the small systems**, respectively.

There is the possibility to conduct tests step-by-step, first in smaller tanks followed by intermediate tanks before testing in commercial facilities ( $> 100 \text{ m}^3$ ) at Sundalsöra, as it is too costly to do research at the bigger tanks.



# Circularity and sustainability

- almost 100% of the water is recycled
- they are also looking on energy efficiency
- they are looking on sludge utilization for different purposes, as well as on the quality of the sludge that comes from the feed and how different operations affect it
- in the future they will look on uses of effluent water to grow seaweed
- no particular plans for microalgae but it would be possible
- are also looking on everything related to fish welfare and improving survival of the fish, giving minimal losses in terms of growth and mortalities

# Collaborations and IPR

- when it comes to industrial collaboration, the facility prefers to have collaboration projects where the industry owns the topic
- in general, they try to compete as less as possible and collaborate as much as possible
- they have a waiting list for companies at Sundalsöra
- the station needs to have some roll in the project in order to let others use the facilities
- collaboration is organized in various projects with specific agreements regarding roles, finances, tasks, specific parts to be used, etc.
- normally it is the scientists coming either from Nofima or UiT that own the results and the data
- industrial partners paying for the project can also own IPR according to the contract but it is stated in the agreement that the scientists can eventually use the knowledge and publish the results, although sometimes with delay

# Education possibilities

- the facility is already part of an ongoing education program and they are building educational courses for both UiT and the industry where they will also use the facility as part of the course
- local industry has funded one professorship position to be part of this facility and build up competence on top of it
- the facility has been funded by the Norwegian research council for that, which started even before (ca. 2 years before) the start of the facility

# Links

[Tromsø Aquaculture Research Station - Nofima](#)

[Havbruksstasjonen i Tromsø | Unikt verktøy for forskning](#)

[Investing 90 million in the aquaculture industry of the future - Nofima](#)

[Ny forskningsinfrastruktur med RAS | Havbruksstasjonen](#)

[Nofima teams with Norwegian university for \\$8.9M RAS research facility - RASTECH Magazine](#)

[Investerer 90 millioner for fremtidens oppdrettsnæring | Havbruksstasjonen](#)

[Nofima and UiT open €8.3 million aquaculture research facility in Tromsø](#)

[28 millioner til kapasitetsløft for berekraftig fiskeoppdrett | UiT](#)

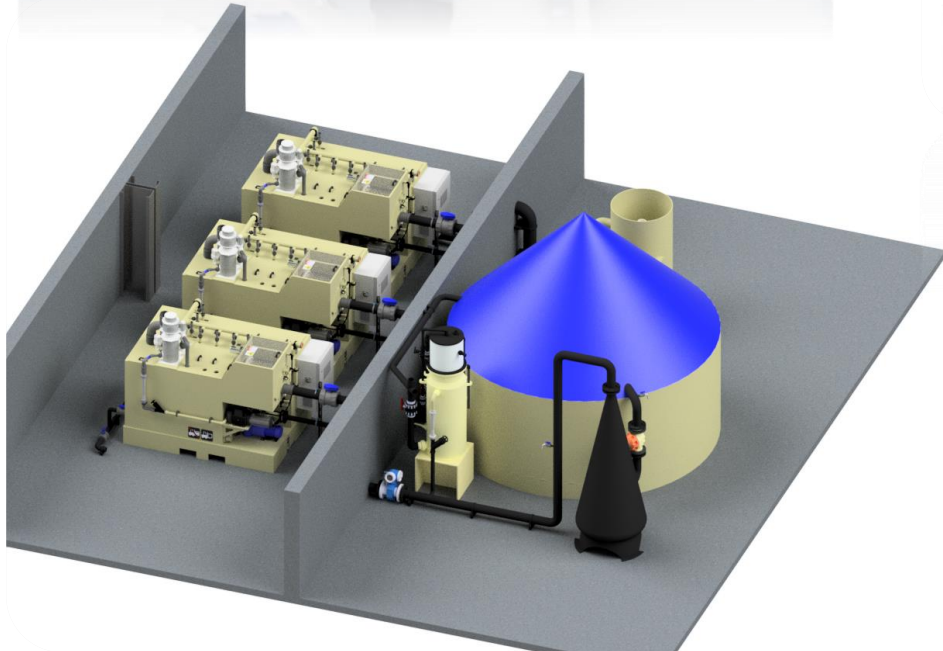
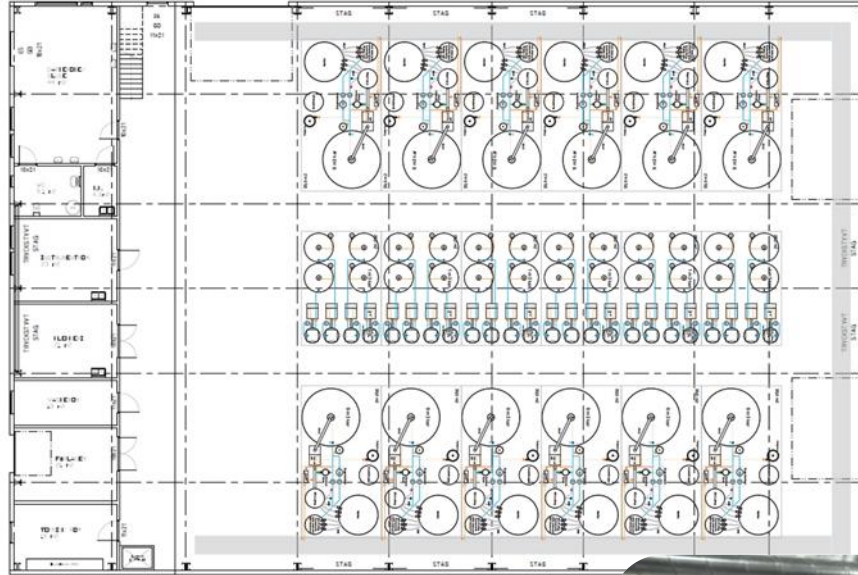
# Construction



[Source](#)



# NanoRAS modules (Alpha Aqua)



Source