

Case story | Enwa Group

Enwa uses **energy-efficient Danfoss technology** in SWRO solution to keep salmon sustainably healthy

50%less energy
consumption than
comparable SWRO
solutionshpp.danfoss.com

Innovative solution to ensure **sustainability** and **minimize environmental impact** in the Norwegian aquaculture industry

Norway's aquaculture industry is one of the world's largest. The country produces one million metric tons of farm-raised salmon per year for global consumers, who eat 14 million meals of Norwegian salmon per day. While blessed by naturally clean and cold fjords, the industry is also driven by a high level of technological innovation to ensure sustainability and minimize environmental impact.

Enwa has spearheaded many R&D projects to help the Norwegian aquaculture industry boost productivity and comply with some of the world's strictest environmental regulations – including an innovative way to remove sea lice from salmon gently, sustainably, and effectively. Danfoss pumps and energy recovery devices are at the heart of this pioneering solution.

The challenge:

Produce enough freshwater at sea to handle freshwater treatment of millions of salmon – and **reduce energy consumption by 50%**

Sea lice are a naturally occurring parasite, abundant in the ocean, that use salmon and trout as hosts. They also represent a tough challenge to Norway's salmon farms, where they easily penetrate the net pens where salmon grow and attach themselves to the fish. Large infestations can result in damage and mortality, and all sea lice on salmon must be removed prior to sale.

The various treatment methodologies, including chemicals, cleaner fish, and thermal treatments, all have their advantages and disadvantages. One new treatment to remove sea lice from salmon, developed in Norway, uses a technique adapted from Mother Nature: when salmon leave the oceans to spawn in freshwater rivers, sea lice, which cannot survive in low-salinity water, naturally detach.

"Temporarily moving farmed salmon into freshwater is a simple, natural way to remove sea lice," explains Bjørn Dörum, director at Enwa Water Technology. "What's not so simple is generating fresh water at sea in quantities large enough to treat millions of salmon efficiently. That's where we come into the picture."

Enwa worked with DESS Aquaculture Shipping (DESS Aqua), a leading provider of vessel operations for the aquaculture industry, shipbuilders at Artic Group, and ship designers at Seacon to develop a new type of live fish carrier equipped with SWRO technology to provide the freshwater to delouse salmon at sea. Capacity had to be large enough to treat tons of salmon at a time, and energy efficiency had to be good enough to pass Norway's strict environmental regulations.

The solution

Innovative new well boats equipped with **6000 m³/day SWRO plants** based on Danfoss **APP pumps** and **iSave ERDs**

DESS Aqua contracted two new large well boats from Norway's Arctic Group shipbuilders, each 76 m long and 15 m wide and with capacity for freshwater production of 6000 m³ per day. Enwa worked closely with DESS Aqua, Arctic Group and SEACON to develop an SWRO plant powerful enough to produce 6000 m³/day yet compact enough to fit into the ship's bow, and so energy efficient that it requires 50% less energy than comparable SWRO solutions.

Each SWRO plant contains 3 Danfoss APP 86 pumps and 6 iSave 70 energy recovery devices. According to Dörum, Enwa selected Danfoss pumps and ERDs for their reliability and energy efficiency, but also because the two companies' R&D departments share the same passion for innovation and energy efficiency. "Enwa has worked with Danfoss for many years on a variety of innovative projects, and our R&D teams know their R&D engineers quite well. If we have a challenge, they help us solve it," says Dörum.

The result:

Two massive **well boats** – one on each side of the Atlantic – and many tons of **sustainably treated salmon**

Aqua Kvaløy was built in 2019 and operates in Norway for Mowi Norway. Aqua Tromøy completed construction in 2018 and operates in British Columbia, Canada for Mowi Canada West.

Diane Morrison, Mowi Canada West's managing director, has called Aqua Tromøy a "game-changer". "This vessel is on the cutting edge of aquaculture technology and is a crucially important tool in our integrated best management strategy allowing treatment with both freshwater bath and hydrogen peroxide, two sea lice treatment methods encouraged by the Aquaculture Stewardship Council," Morrison has stated. "Aqua Tromøy dramatically enhances Mowi Canada West's ability to proactively manage our fish health in an environmentally friendly manner."



The Enwa Group delivers energy-efficient and environmentally friendly water treatment systems to customers around the world. For over 30 years, Enwa has supplied both bespoke and standard water treatment solutions to oil platforms, industrial plants, universities, hospitals, hotels, waterworks, public pools, small and large vessels, major airports, and more.

For more information, see www.enwa.com

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