

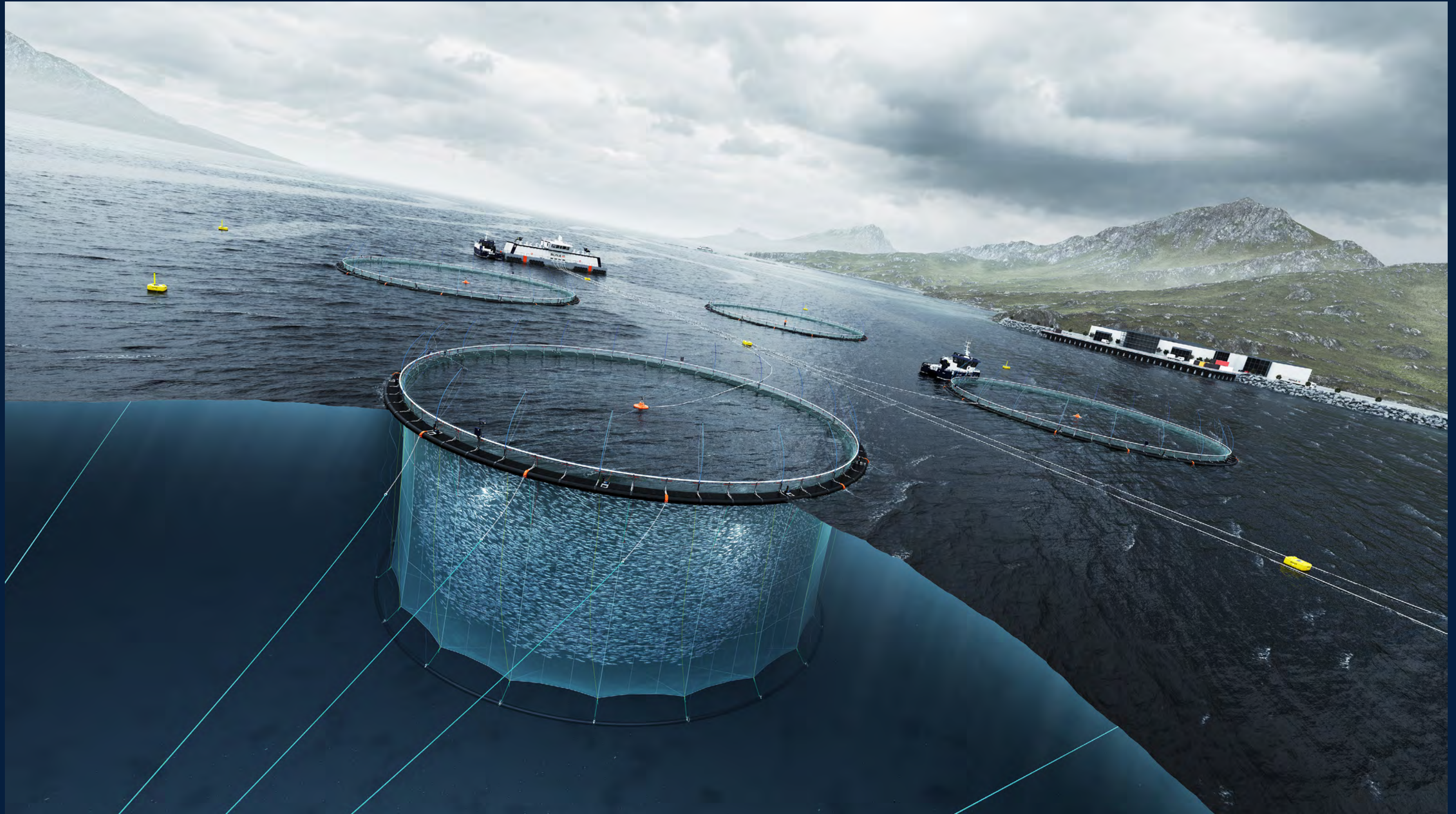
SCALE **AQ**

Midgard System



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ScaleAQ is a leading global technology provider that supplies and manufactures complete sites for aquaculture industry in more than 40 countries. The company has approximately 900 employees and offices in Norway, Scotland, Poland, Iceland, Chile, Canada, Tasmania and Vietnam. Through focus on sustainability and biology, ScaleAQ has taken a clear role in ensuring the development of technology on the terms of biology and the environment. We do this by producing and delivering technology, infrastructure and services in a solid, sustainable and innovative way.



Midgard® System

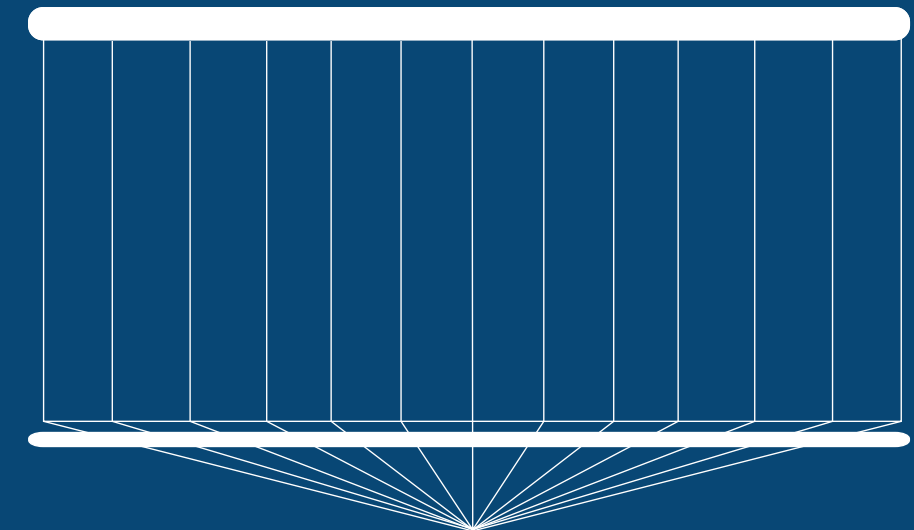
The Midgard pen system is built with a focus on optimal interaction between the main components floating collar, net and sinker tube. The system is the result of long-term experience and product development in collaboration with leading salmon farmers in the world. The focus areas for development have been pen environment and safety.

The Midgard system has been developed, tested and operated in collaboration with the largest salmon farmers in the world over several years, and is under continuous further development as we move the pens out into tougher waters.

Many of the most demanding sites in use today would not have been possible without the security that the Midgard system offers in terms of reliability and volume for the fish. The combination of a floating collar, net and sinker tube adapted to each other and designed as one unit with the flexibility this provides under the toughest conditions, is and will continue to be a success for ScaleAQ and our customers.

The Midgard system provides a stable and predictable net volume even under strong current conditions. The cylindrical shape allows the fish to go deeper in the net without the number of kg of fish per cubic meter of water increasing, which is a great advantage if you want the fish below the lice belt.

Several competitors have tried to copy our solution, without understanding that the extensive and costly work with analyzes, tests, customer cooperation and associated documentation is crucial for the system to be delivered, installed and operated as the safest solution for fish farming in open pens at sea.



Net and sinker tube

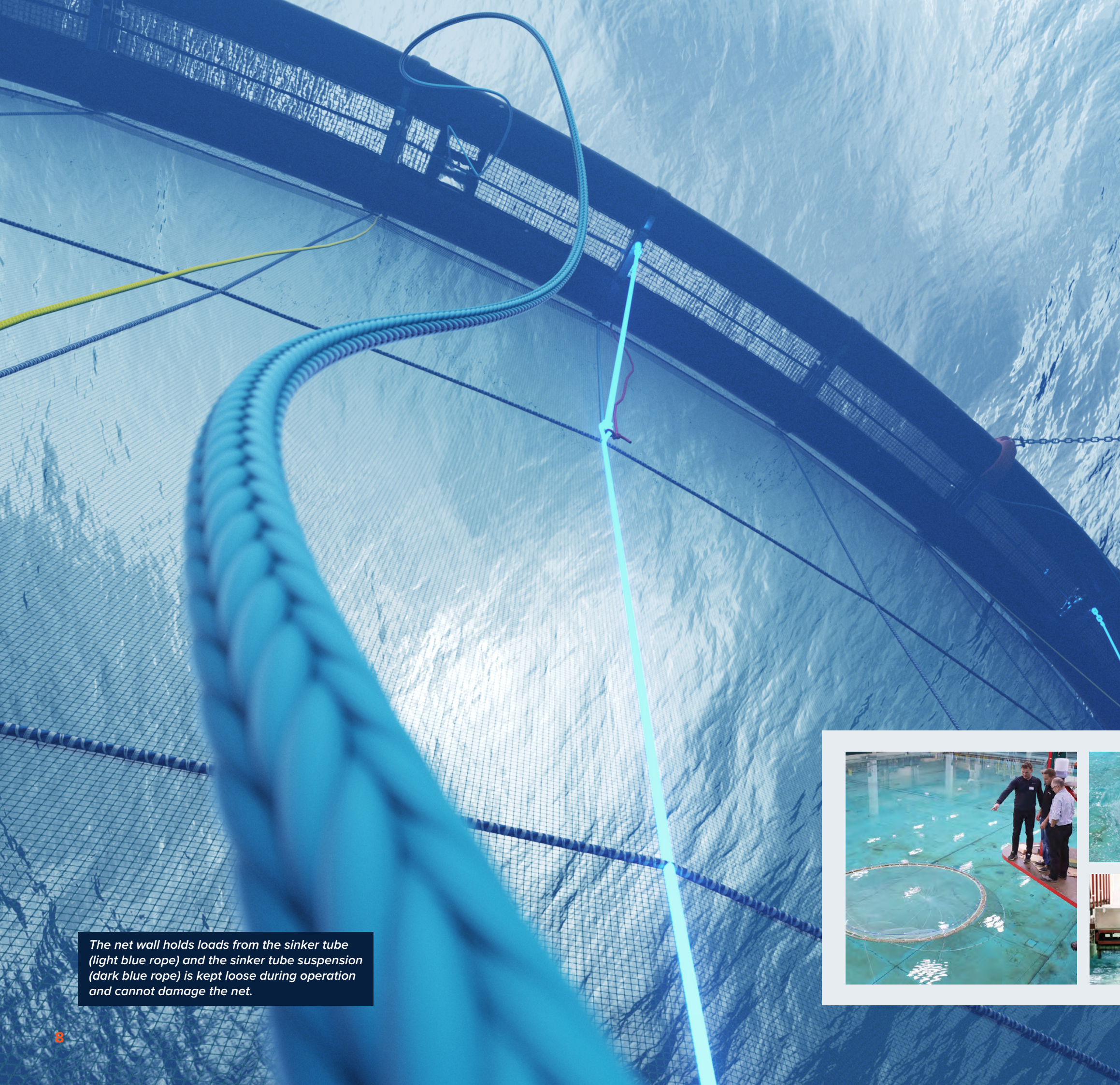
ScaleAQ Midgard® System is an integrated net and spooling system where the sinker tube hangs directly in the net rope. Provides a tight net, making it easier to keep it clean. This provides better conditions and greater well-being for the fish.

Winch

The winch raises and lowers the sinker tube synchronously in one operation without the need for more any other work boats with cranes.

Fastening

The raising/lowering rope hangs loosely and independent of the rest of the system during normal operation. It removes the risk of touch and damage to the net.



How does the Midgard® System work?

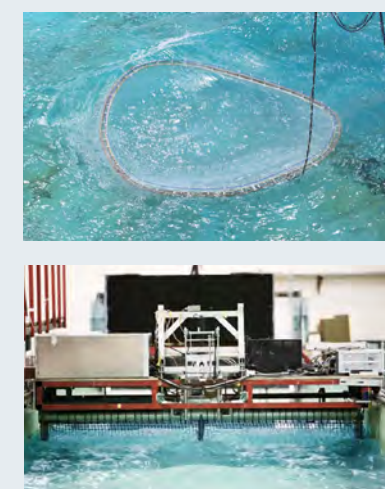
The Midgard system has a tailored net system that is dimensioned for our floating collar and sinker tube solution. We focus on the least possible excess in both ropes and net, with the aim of ensuring that contact between the floating collar and the stretching system is kept to a minimum.

The net is dimensioned and designed to be able to take the total weight of the sinker tube, through the suspension ropes. This is a significant load, which is often between 11-17 tons, depending on the circumference of the pen. The sinker tube is designed considerably stiffer than traditional sinker tubes, with a diameter of between 400mm or 500mm, depending on the circumference of the pen.

This contributes to optimal unfolding of the net and a predictable and volume for fish inside the net, even with high waves and strong sea currents.

In addition to ensuring a good pen environment, which is a fundamental property that must always be emphasized highly, this design achieves a greatly reduced risk of wear between the net and the expansion system. This is made visible in the illustration to the left.

The net wall holds loads from the sinker tube (light blue rope) and the sinker tube suspension (dark blue rope) is kept loose during operation and cannot damage the net.



Through several years of extensive analysis work, testing of the system in both the Marintek laboratory in Trondheim and full-scale solutions in addition to full operation of the system since 2013, our claim is that Midgard has been and continues to be the most well-documented pen system for open production of fish, and which takes care of the pen environment in the best way and has the lowest escape risk in the market.

Why choose the Midgard® System?

There have been and still are very many different net solutions for salmon farming in the market. These have been used for many years with success, but in recent years the challenges that traditional solutions face with higher exposure have become clearer.

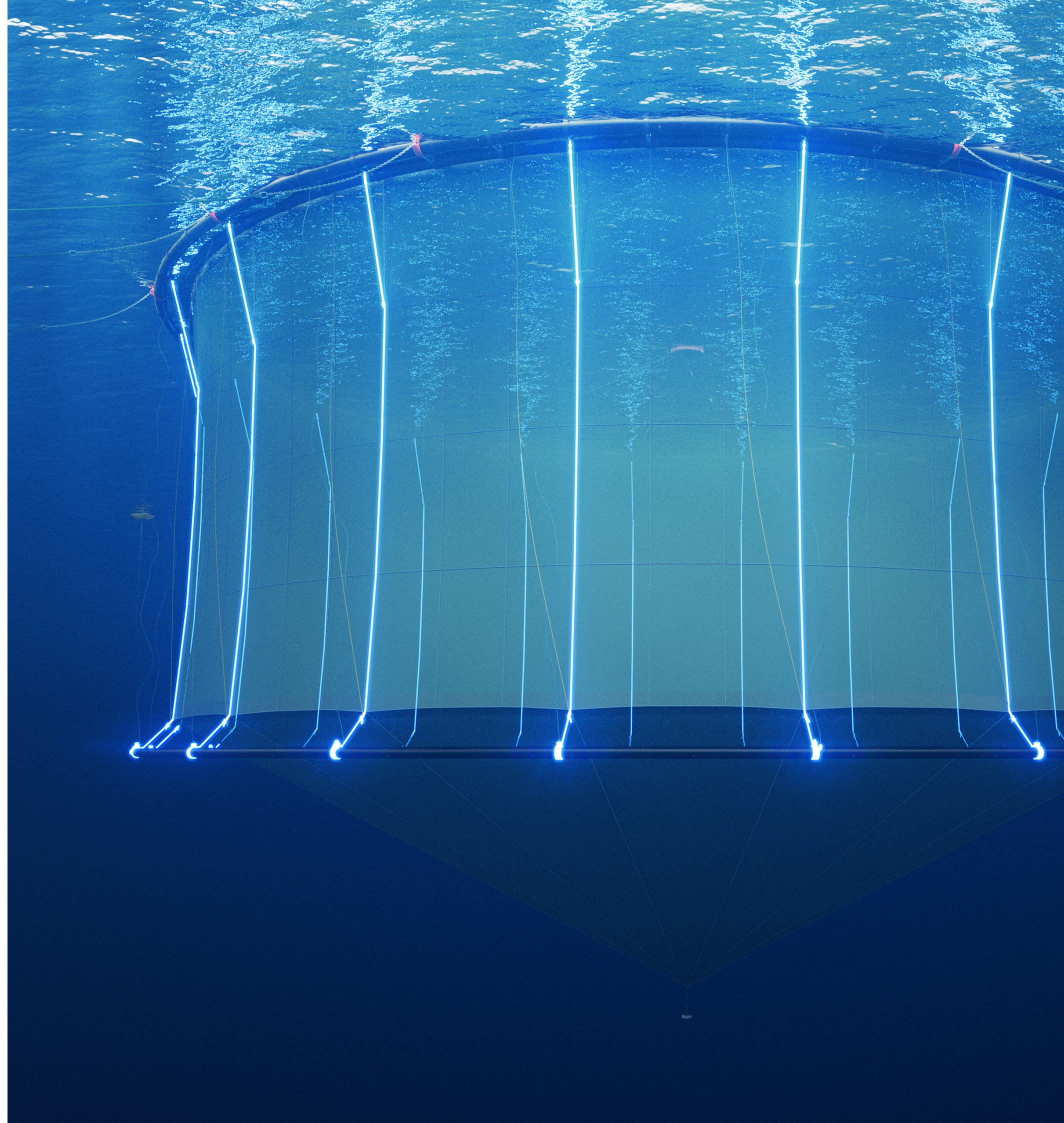
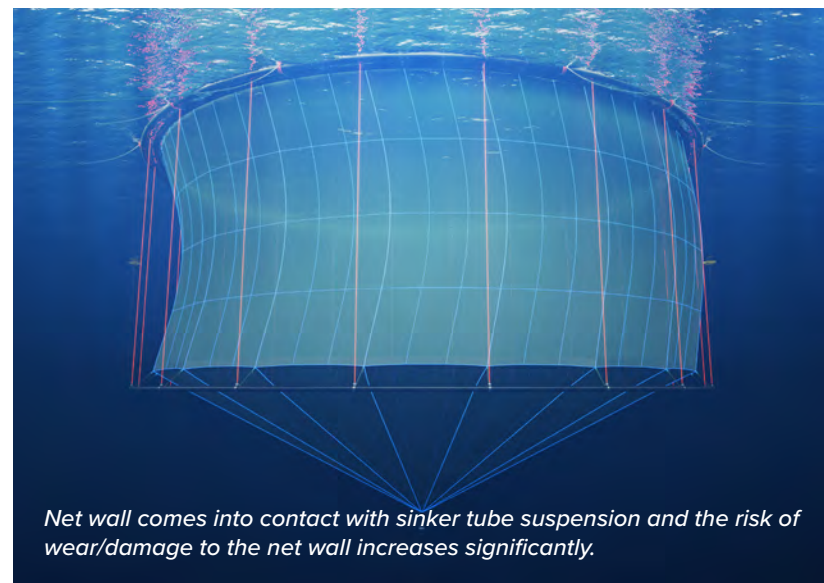
Our experience is that traditional net solutions have usually been the result of a focus on low investment costs and easy/efficient handling for personnel and boats on the pen, during operations such as de-liming and slaughter.

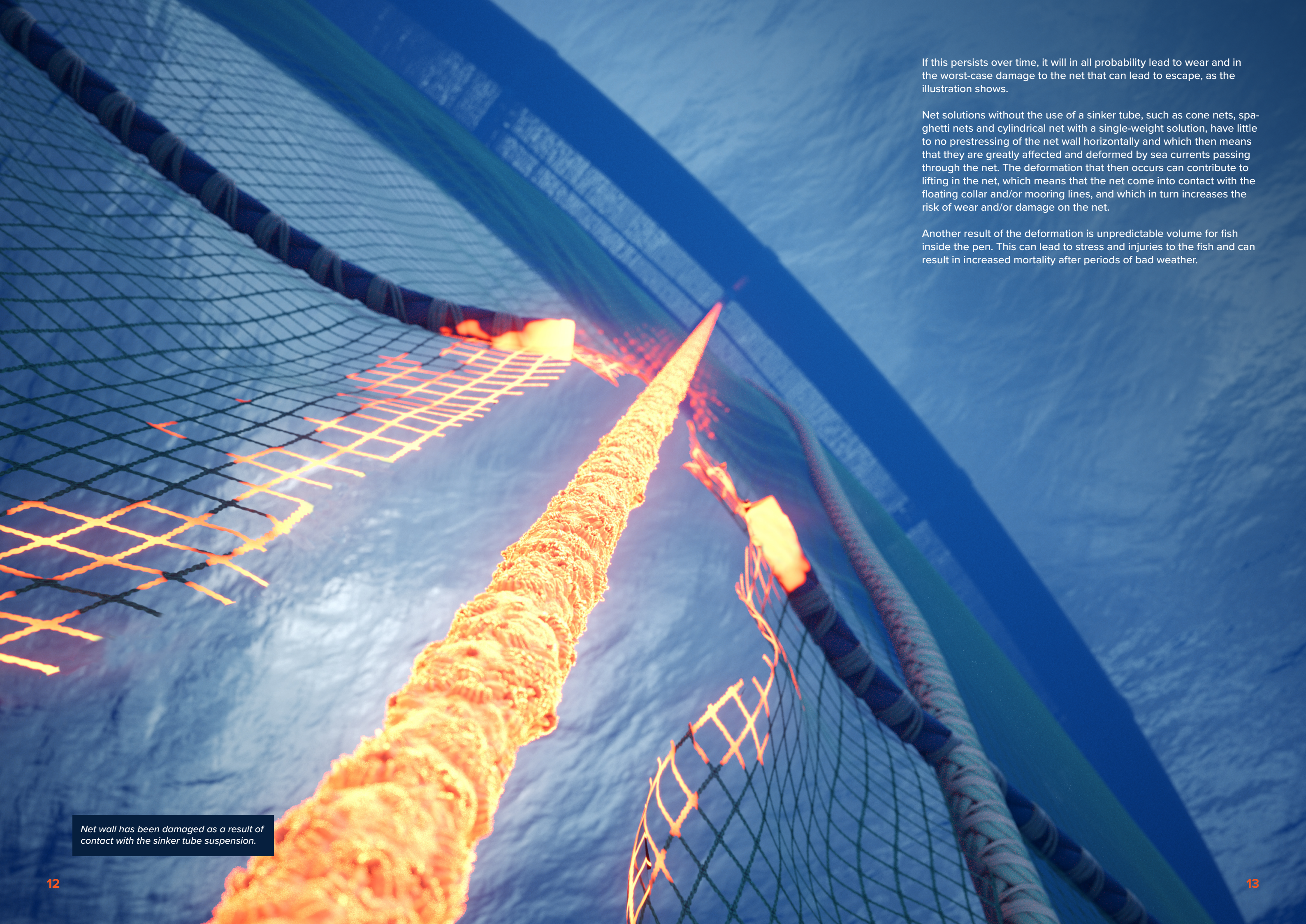
With the climate changes we experience in the form of increased numbers of storms and stormy days during the year, in addition to new sites being made available further out in more exposed waters in terms of wave heights and ocean currents, the inadequacy of traditional solutions in relation to interaction with floating collar and sinker tube, in addition to unpredictable and reduced net volume (cage environment/fish welfare) at strong currents and high waves has become more visible.

The Midgard system is based on a continuation of the use of the sinker tube to achieve maximum expansion of the net and to ensure significant volume for the fish inside the pen. This is also to be able to allow fish farming on sites located in shallow waters.

Other net solutions where the sinker tube is used, have challenges with contact between the net and the expansion system, either in the form of direct contact with the sinker tube suspension or the sinker tube itself.

This becomes visible with strong current, as the illustration below shows, where the net comes into contact with the sinker tube suspensions which run between the floating collar and the sinker tube, where the load from the sinker tube is connected to the floating collar.



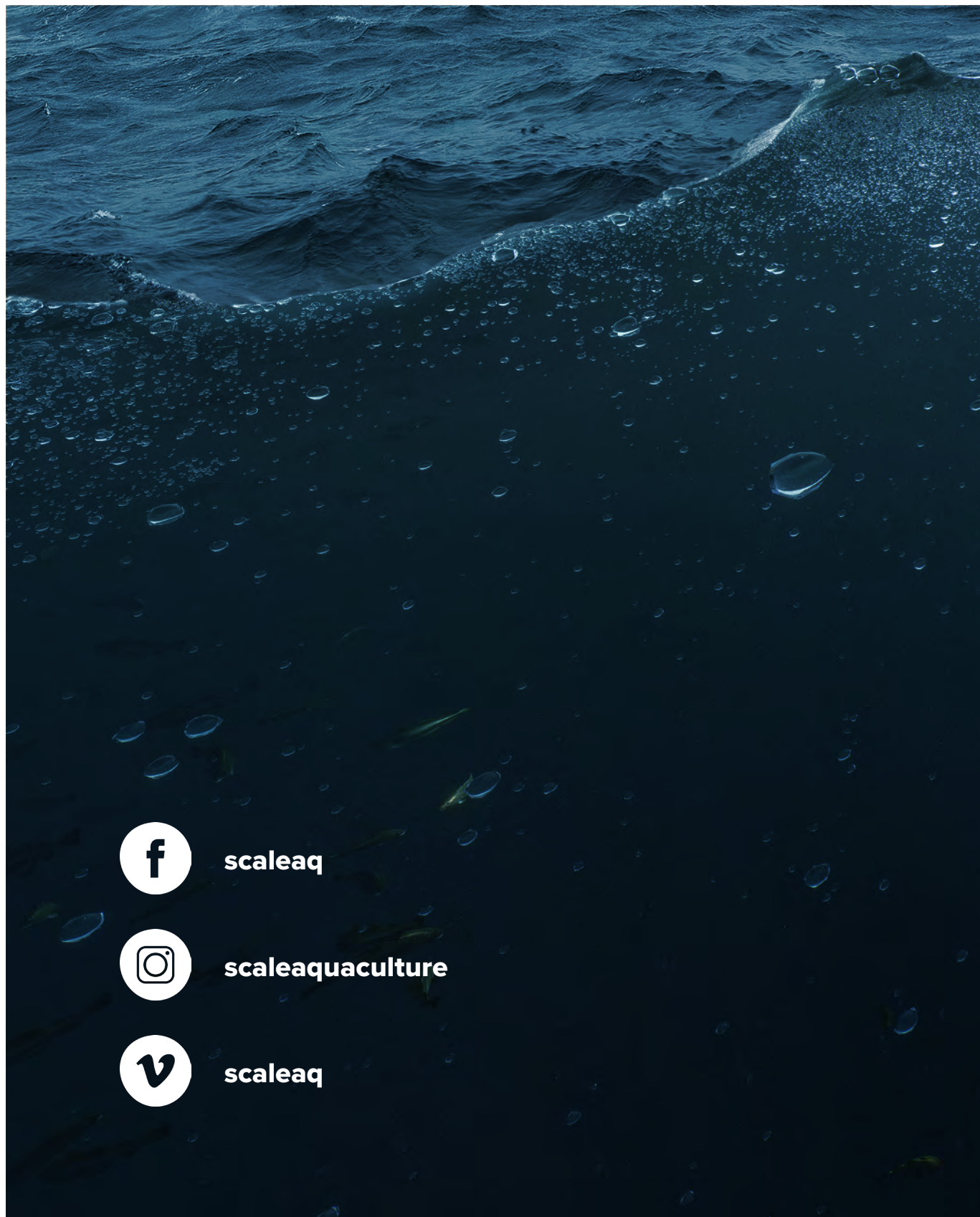


If this persists over time, it will in all probability lead to wear and in the worst-case damage to the net that can lead to escape, as the illustration shows.

Net solutions without the use of a sinker tube, such as cone nets, spaghetti nets and cylindrical net with a single-weight solution, have little to no prestressing of the net wall horizontally and which then means that they are greatly affected and deformed by sea currents passing through the net. The deformation that then occurs can contribute to lifting in the net, which means that the net come into contact with the floating collar and/or mooring lines, and which in turn increases the risk of wear and/or damage on the net.

Another result of the deformation is unpredictable volume for fish inside the pen. This can lead to stress and injuries to the fish and can result in increased mortality after periods of bad weather.

Net wall has been damaged as a result of contact with the sinker tube suspension.



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