



SUSTAINABILITY

Our approach



Langh

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MESSAGE FROM THE MANAGEMENT

Dear reader,

Shipping connects the world, nations, businesses and people. The maritime industry is a cornerstone of globalization and economic welfare. Shipping is the most efficient means of transport, but the industry still accounts for three percent of global emissions. That is a significant impact and requires action. Thus, decarbonization is on top of our agenda, but it is not our only challenge.

At Langh Group, we commit to sustainable business practices. From an environmental perspective this means reducing negative environmental impact, particularly the emissions within the Langh Ship fleet, and contributing to solutions for cleaner air and seas with innovative technology, made by Langh Tech. But we are not alone in this. Sustainability is a team effort, and we closely cooperate with all our stakeholders to solve common challenges. Our employees are the foundation of our success. Their health and safety are our highest priority, and we strive to provide a positive work environment, where people can be at their best.

This brochure aims to give an overview of our material sustainability challenges and priorities.

Enjoy reading and get in touch if you want to learn more or discuss.

Kind regards

Laura Langh-Lagerlöf

Managing Director Langh Group

ABOUT LANGH GROUP

Langh Group consists of the shipping company Langh Ship and the marine tech company Langh Tech. The Group is family-owned and forms part of the Langh companies, which also include the Alaskartano Farm, and the Industrial and Ship Cleaning Services Hans Langh (Pesupalvelu Hans Langh). The headquarters of the companies are in Pikis, a neighboring town of Turku, which is one of Finland's maritime hubs. We proudly live up to our heritage and the spirit of founder Hans Langh, which is characterized by innovation and the desire to find new solutions to practical problems.



LANGH SHIP

Langh Ship has been providing transportation services for steel, bulk and container goods since 1983. Our modern fleet is capable of operating in challenging Northern conditions. The ships operate under Finnish, Portuguese and Maltese flag. With Langh Cargo we also offer special containers for demanding transportation needs, such as transportation units for coils, sheets, bulk and liquids.



Langh Ships' business model is based on chartering vessels to customers under time-charter agreements. A significant part of Langh Ship's fleet carries steel products for our longstanding partner Outokumpu, one of the world's leading companies in the production of sustainable steel. We mainly transport steel coils and other products from the steel mill in Tornio, Finland, to Terneuzen in the Netherlands. From Terneuzen, we transport steel scrap back to Tornio, where it is recycled. We are proud to contribute to a more circular steel economy.

For steel transportation, we use the custom-made, innovative cassette solution invented by Hans Langh, and specialized containers from Langh Cargo Solutions. In comparison to common transportation solutions, Langh's solution for steel coil transport, is more economic, safe, and sustainable. Steel coils are better secured in tailored cassettes. Wooden supporting constructions, which prevent cargo from rolling, are no longer needed. The cassettes also benefit the ship's stability. In addition, Langh's cargo solution reduces load times and provides better safety for the crew and other workers who handle the steel goods at port.



Our container feeders play a pivotal role in ensuring a reliable supply of trading goods across Europe. This is particularly important for Finland, which heavily depends on shipping due to its geography. Around 95 percent of imports and exports leave and enter the country via commercial shipping through the Baltic Sea.

Langh Ship's fleet has witnessed significant growth within the last years. The latest addition to Langh Ship's fleet is a series of newbuilds, which were designed together with our internal experts and long-standing customers. The new vessels are highly energy efficient due to an innovative and new hull form, as well as tailor-made solutions to improve use of space, loading and operations, e.g. through open and flexible hedges. In addition, all ships are equipped with modern engines and technology from Langh Tech to reduce ship emissions, for example by exhaust gas cleaning, onboard carbon capture, and the use of alternative fuels. All vessels within our fleet also have Langh Tech's Ballast Water Management Systems on board.

LANGH TECH

The history of Langh Tech dates to the time when IMO announced new limits for the emission of sulfur oxides (SOx) for the Baltic Sea, where the Langh Ship fleet has been operating. One way to comply was using considerably more expensive low sulfur fuels. Hans Langh, a shipowner and expert in ship and industrial cleaning, and his daughter Laura took up the challenge to find a technological alternative. They developed a fully closed loop scrubber for eliminating the sulfur oxides (SOx) from the ship's exhaust gases, where water treatment played a key role. This allowed ship owners to comply with the stricter emission regime while keeping the costs at bay through the continued use of more affordable fuels. The strength in research and the practical know-how on scrubbing processes stems from decades of experience in industrial cleaning.

After successfully piloting the scrubbers onboard the Langh Ship fleet in 2013, the technology was commercialized and in 2015, Langh Tech was founded. The close cooperation between the two sister companies has been at the core of Langh Tech's research and development activities until today. It provides the perfect opportunity for testing new technology and to develop it further until it meets all criteria for commercialization.



Today, Langh Tech provides open-loop, closed-loop and hybrid scrubbers and water treatment units for closed loop scrubbers. The company has expanded its portfolio with a Ballast Water Management System (BWMS), which prevents unwanted spreading of microorganisms and invasive species. Latest developments include solutions for onboard carbon capture (OCC) and batteries, which support the decarbonization of shipping operations at sea and during berth.

Langh Tech's mission is to develop maritime technologies, which reduce the environmental impact of shipping operations and contribute to cleaner air and seas. Our goal is to develop innovative and cost-effective technical solutions which are tailored to our customers' needs, and which enable them to meet and exceed regulatory requirements.

LANGH GROUP MANAGEMENT AND BOARD

Langh Group Oy Ab is fully owned by Laura Langh-Lagerlöf, Linda Langh and Hans Langh. Laura Langh-Lagerlöf is the Managing Director of Langh Group and takes on full executive responsibility for the group's activities.

The board of Directors of Langh Group consists of the Chairman of the Board, Hans Langh, the board members Laura Langh-Lagerlöf and Linda Langh, and deputy member Aila Langh.



Hans Langh (far left), Laura Langh-Lagerlöf (2nd from right), Linda Langh (3rd from right) and family members at the naming ceremony of vessel Sofia.

GOVERNANCE

At Langh Group, we commit to following ethical standards and business practices in all that we do, upholding Human Rights and ensuring compliance with international laws, regulations and maritime industry standards.

Our Code of Conduct guides all business activities and requires all employees and business partners to always conduct themselves in line with our values, ethical standards and all applicable laws and regulations. The Code is complemented by several different policies, which aim at giving associates a good understanding of requirements and potential risks, e.g. our anti-corruption and anti-bribery policy, our anti-abuse & harassment policy, our health & safety policy and our data protection policy. Health and safety have high priority at Langh Group, and we strive to avoid incidents and to have zero fatalities across the whole business. Environmental responsibility is another core value, and we aim at reducing our environmental impact through improvements of energy efficiency, reducing emissions, protecting biodiversity and a mindful use of resources. We continuously work on improving our due diligence processes in line with acknowledged management systems and industry standards, for example ISO 14001, ISO 9001 or the ISM Code.

Any report of a breach or suspected breach of the Code of Conduct or of our other policies is taken seriously and will be investigated and followed up. Consequences will be taken as appropriate. All policies are regularly reviewed and updated as necessary. A grievance mechanism is available, and information can be found onboard all ships, within the office, and on the websites of all Langh Group companies.

Laura Langh-Lagerlöf as Managing Director of Langh Tech and Langh Ship is the highest company representative and oversees all processes to ensure good governance. She is supported by the board.

OUR APPROACH TO SUSTAINABILITY

At Langh Group, we are committed to ensuring that our business operations and decisions align with the principles of good governance, and that they reflect the responsibility for our employees, partners, customers, communities and the environment. We strive to adopt high standards to ensure the well-being, health and safety of our employees.

Shipping is the most energy-efficient way to transport goods around the globe. Nevertheless, the industry does have a significant environmental impact. We acknowledge the responsibility and challenges arising from this, and we continuously seek to reduce negative impacts on the environment. As Langh Group consists of both a shipping company and a maritime tech company, we strive to generate synergies and to innovate together, to reduce emissions and to protect the climate and our seas.

STAKEHOLDER DIALOGUE

Sustainability can only be achieved together. Having a transparent and open discussion about challenges and how to solve them is the best way forward. Knowledge sharing and discussing different points of view helps us to assess our risks and opportunities, to form collaborations and to identify priorities.

Below is an overview of our most important stakeholders, with whom we maintain a regular dialogue and engage via various channels. This also includes obtaining their input and discussing cooperation on various sustainability-related topics, such as decarbonization, regulatory frameworks, environmental protection, working rights and employee welfare, or health and safety.

OUR STAKEHOLDERS

- **Employees**
- **Customers**
- **Suppliers & business partners**
- **Flag states, regulators & other authorities**
- **Classification Societies**
- **Banks and insurances**
- **Industry Associations**

DOUBLE MATERIALITY ASSESSMENT (DMA)

Langh Group's due diligence process includes a double materiality assessment, which aims at identifying and mitigating sustainability-related risks, impacts and opportunities. The double materiality assessment is reassessed regularly to verify the results, and to prioritize our activities accordingly.

The material topics identified via the Double Materiality Assessment, including a detailed description, can be found at the end of this brochure.

ENVIRONMENT



CLIMATE CHANGE & DECARBONISATION

Climate change is a key topic for Langh Group. It provides challenges and opportunities for our businesses. Shipping is a major emitter of CO₂ and accounts for three percent of global carbon emissions. As part of the shipping industry, Langh Ship's most significant impact on environmental sustainability comes from the CO₂ emissions of its fleet. Our focus lies on mitigating risks and opportunities related to climate change for the whole Group and to decarbonize our own operations and our value chain.

While the shipping industry is a major emitter of greenhouse gases, and such a contributor to global warming, Langh Tech provides technical solutions to treat ship exhaust gases, and to reduce emissions and air pollution. A strong cooperation between our companies is vital to create synergies to reduce negative environmental impact. We are in the extraordinary position that we look at decarbonization challenges from a ship owner and technology provider perspective at the same time. This gives us the opportunity to develop and test new technologies onboard our own fleet before commercializing them. It also ensures that we meet shipowners' requirements for a pragmatic and economic solution.

Langh Group supports the Paris Agreement and is committed to reducing its greenhouse gas emissions in line with all applicable regulations. The pathway is clear, reaching net-zero by 2050. However, getting there comes with challenges and insecurities. Shipping is a truly globalized business. Climate change can only be tackled by the industry as a whole. Therefore, a robust regulatory framework is needed to create a fair level playing field and to provide the clarity and certainty, which are needed for decisions on decarbonization strategies and investments. At the same time, it needs to be ensured that all companies remain in a position to decarbonize consistently but economically, independently from their size and geography.

REGULATORY CONSIDERATIONS

Currently, different regulations apply for decarbonization. The aligned goal is to reach net-zero GHG emissions by or around 2050. Net-zero implies that companies reduce their emissions to the maximum by taking suitable reduction measures and only set off the emissions, which cannot be avoided, in accredited carbon offset projects.

IMO

IMO sets goals on a global level. The expected new IMO framework after MEPC 83 consists of a two-pillar approach for medium-term GHG reduction:

1. A global fuel standard which aims at progressively reducing the GHG intensity of shipping fuels on a well-to-wake basis, and
2. Creating a new IMO Net-Zero Fund, which will be built up by remedial units acquired by ships which are not compliant, while over-compliant ships can earn surplus units.



Net-zero shall be achieved in 2050. Until 2030, the GHG from ships shall be reduced by 20 to 30 percent, and by 2040 by 70 to 80 percent relative to 2008 as a baseline year.

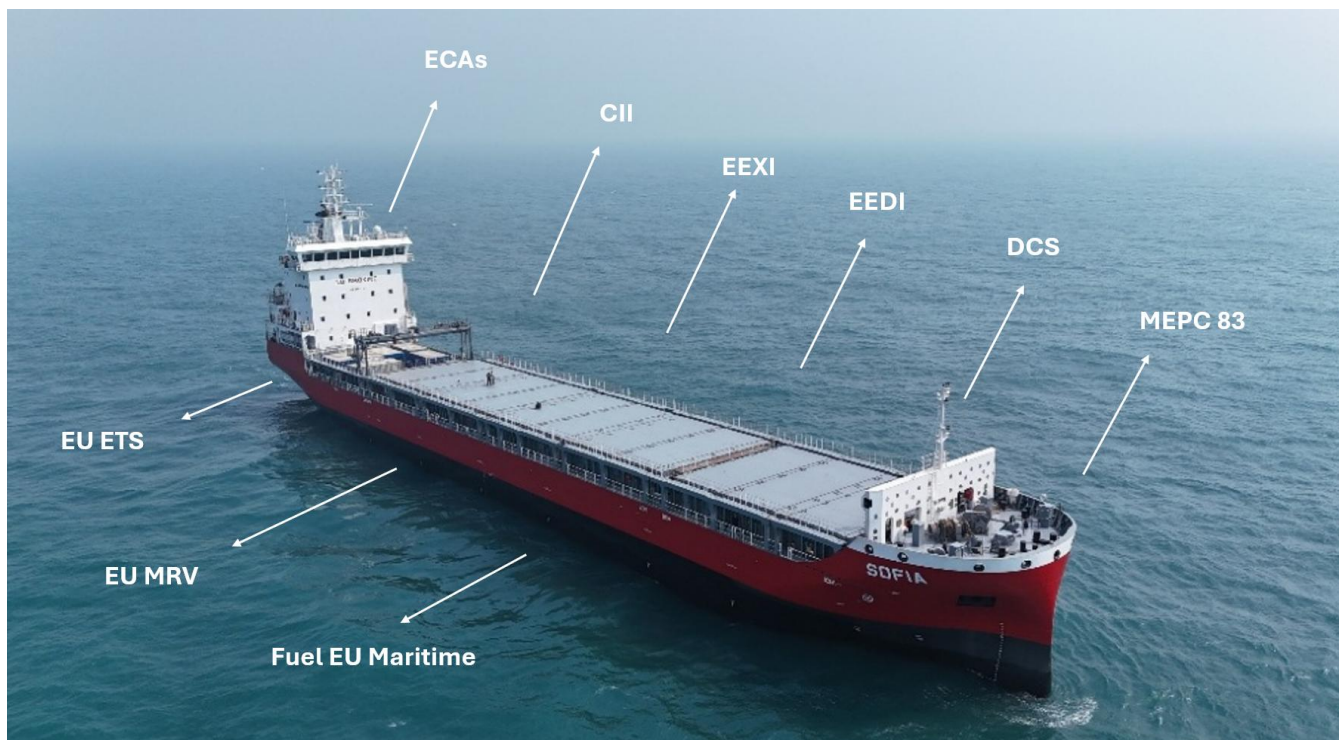
EU

In Europe, additional regulations apply, which are leading in ambition and which add significant complexity: EU ETS and FuelEU Maritime. Both have the goal to support the EU Green Deal, which targets climate neutrality by 2050.

EU ETS is the EU's emission trading system, which currently represents the strictest and most punitive carbon pricing mechanism worldwide. In a nutshell, emitting CO₂ and other greenhouse gases, is connected to a direct penalty, following a "polluter pays"- principle. The penalty or price per emitted ton of GHG is increasing over time. Fuel EU Maritime is a complementing regulation with a focus on the fuel transition. Its' target is to gradually reduce GHG-intensive fuels by low- or zero-carbon fuels and technologies. By 2050, the GHG intensity of fuels is to be reduced by 80 percent from well-to-wake. In addition, FuelEU mandates the use of onshore power supply or other zero-carbon technologies, e.g. batteries, in major EU ports from 2030 onwards. Both EU ETS and FuelEU Maritime stipulate that 100 percent of emissions of intra-EU-voyages and 50 percent from international voyages from or to the EU need to be accounted for GHG-emissions. This has significant implications for Langh Ship, as our ships trade almost solely within the EU. It is also of relevance for Finland, as 95 percent of imports and exports enter and leave the country via ship, mostly via feeder vessels from and to other European ports.

The raising number and stricter requirements of decarbonization regulations increase the costs of compliance. Compliance can only be achieved through major investments in energy efficiency and new technologies, as well as an increased uptake of low- and zero-carbon fuels. Those fuels are not only more expensive; it is also unclear which fuels will dominate in the future, and where and at what price those fuels will be available. In addition, regulatory clarity and alignment between different regulations is currently insufficient or still under development, for example when it comes to carbon capture and utilization. The same holds true for infrastructure developments and the supply chain. In addition, it needs to be ensured that companies have the expertise to understand and navigate the regulatory complexity. This goes hand in hand with extended investments into personal resources, such as additional training and education, reporting and administration, or digitalization. Navigating insecurities and assessing potential risks and opportunities together with all relevant partners across the own value chain gains more and more importance.

Langh Groups' approach to decarbonization is to keep a technology-open multi-fuel-approach, in close cooperation and alignment with all relevant stakeholders.



SUPPORTING THE GREEN TRANSITION

Maritime decarbonization is mainly driven by two factors: replacing fossil fuels with less GHG-intensive alternatives and by increasing the energy efficiency of ships. The fuel transition can be supported by complementing technologies, such as Onboard Carbon Capture and batteries.

Langh Ship takes several measures to reduce its fuel consumption, because the best ton of fuel is the one we don't burn. For example, we increase the energy efficiency of our fleet by innovative hull paints, more efficient engines, an energy-efficient design of our new buildings and the continuous optimization of operations. Langh Ship has grown its fleet with six newbuilds within the last three years, all of which were designed with energy efficiency in mind. Our latest vessels are about 40 percent more energy efficient than the former average of the fleet.

In addition, we prepare our fleet for different fuel-scenarios. The first generation of newbuildings runs on LNG as initial fuel, however, the ship tanks are also methanol- and ammonia-ready. As many questions remained open at the time of contracting, the ships were prepared for both shore power and battery installations. This gives us and our customers the flexibility to decide on the most suitable solution according to regulation, technology availability, port infrastructure and trading patterns, as soon as there is more clarity. One concern, when it comes to the use of LNG in shipping, is the possibility of methane slip. Methane is a greenhouse gas, which has four times higher impact on global warming than CO₂. Therefore, it is essential to mitigate and prevent the risks of methane slip. In recent years, technological advancements have substantially lowered the risks. Langh Ship has installed leading engine systems and is looking into possibilities to further reduce the risks of methane slip, e.g. via software solutions. The second generation of newbuildings has also been prepared for a multi-fuel approach. They can be operated by traditional fuels and are set to continuously increase the uptake of biofuels. In addition, they are prepared for carbon capture and battery installations.

SHARED RESPONSIBILITY

We as ship owners share the responsibility for the emission reduction together with our charterers. We invest in the renewal of our fleet and in technologies, which increase efficiency and reduce emissions. Our charterers decide and pay for the fuel under time-charter agreement. We cooperate closely and are committed to tackling decarbonization in a joint approach.

Strong partnerships and strategic alignment with our customers and partners play a pivotal role in Langh Group's decarbonization strategy.



Despite high commitment and cooperation from all parties, the ship charter business poses some challenges in putting reduction measures into practice. Cooperation is time-bound, and contracts cover periods of several months up to a couple of years. Investments into ships and technology, however, are of significant height and pay off rather in the long term. Regulations assign the ownership of emissions to different parties. As an example, Fuel EU focuses on fuel transition and fuel decisions are made by the charterer, while EU ETS compliance and reporting lies within the hands of the ship owner. These characteristics and legal provisions around ship chartering add significant complexity.

LANGH TECH PRODUCT SOLUTIONS

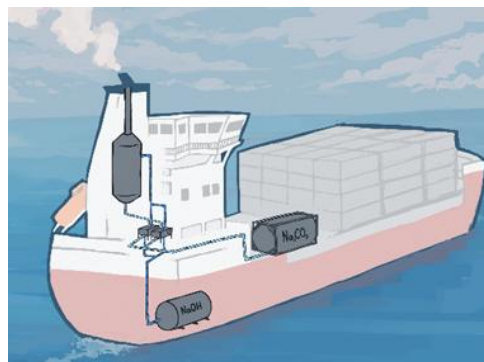
A major challenge for the transition from fossils to alternative fuels in maritime are the high prices, and insecure and insufficient availability. Shipping competes with various other industries for greener fuels, particularly aviation. From today's perspective, there will not be enough green fuel available for the green transition in line with IMO's and the EU's decarbonization targets.

This means that capture technologies will be needed to allow a successful fuel transition, decarbonizing while keeping costs in balance and adjusting to future developments of prices, fuels and technologies. Emission reduction during port stays can be reduced via shore power. From 2030 onwards, the EU mandates zero-emission technologies in major EU ports. As shore power connections are not yet widely available, batteries gain importance as another alternative. Langh Tech supports its customers on their decarbonization journey with innovative technologies.

ONBOARD CARBON CAPTURE

Onboard Carbon Capture (OCC) is emerging as a key technology in the transition of shipping towards net-zero. Langh Tech's onboard carbon capture system is based on long-standing experience of the company in exhaust gas treatment. What distinguishes the technology from competitors is the circular approach, which was considered throughout every step of the design phase.

Langh Tech's OCC technology applies a post combustion technology. Depending on the individual installation, CO₂ emissions can be reduced by 10 to 50 percent. In principle, the system can be used with every type of carbon-based fuel. The exhaust gases, which contain CO₂, are directed into a capture unit, where the CO₂ dissolves into the liquid phase through counter-currently flowing aqueous NaOH-solution. As a result of several consecutive reactions, CO₂ is chemically bound into the thermodynamically stable product of sodium carbonate.



This sodium carbonate, also known as soda ash, can be utilized in various land-based industry applications. Such, soda ash does not need to be sourced and produced through separate energy- and emission-intensive processes anymore. Instead, a “waste”-product from shipping operations is turned into value - value as a resource for production, but also value from a shipowner's perspective through the money gained from selling the sodium carbonate. This approach creates a win-win situation and contributes to a circular economy, efficiently reducing total emissions and creating value across industries. The technology has already proven its maturity in a pilot project, within a year of operations. We have partnered with WeSoda, a leading producer of sustainable soda ash, with whom we are currently taking the next steps to develop the business model further and to build up the value chain. The biggest benefit in our cooperation lies in the direct value chain and the simplicity, as the CO₂ is chemically bound. This makes the handling very easy and safe. The infrastructure needs are minimal. All we need to do is to lift a container with the soda ash from ship to shore, or to pump the solution out from the tank on the vessel and then transport it to a facility where the soda ash can be crystallized (ideally close-by). This gives us geographical flexibility, and we do not depend on complex infrastructure for handling liquid CO₂ and general port reception facilities to be built up.

As the CO₂ is permanently chemically bound in the soda ash, its storage or utilization in applications without CO₂ release into the atmosphere, is already considered under EU ETS. We are currently working together with our partners, verifiers and authorities, to develop a suitable methodology to enable the practical accounting of the captured CO₂ in MRV reporting.



Pictures show the ship funnel (left), the different samples from the captured sodium carbonate solution (middle), and the carbon capture technology (right).

Some critics claim that carbon capture would extend the use of fossil fuels and prevent the transition towards low-carbon fuels. We disagree and see carbon capture even as a potential accelerator of the green transition.

Our onboard carbon capture solution gives shipowners and operators the possibility to decarbonize and balance their costs while meeting regulatory requirements. The scarcity and significantly higher costs of carbon-neutral fuels are a substantial hurdle to the decarbonization of shipping. It will take time until those fuels can be widely used and afforded. We are here to bridge this gap and help companies to decarbonize efficiently and according to their abilities. Our onboard carbon capture technology can be applied with all carbon-based fuel types. In the near future, OCC is likely to be used with fossil fuels. For ship owners, this is important, as it allows them to keep fuel costs and/or ETS costs low and to now make equally important investments in energy efficiency improvements. "

However, to meet regulatory compliance, the use of low-carbon fuels will need to continuously increase over time. Adding OCC on top can bring the overall costs down, through minimizing penalty costs and gaining money from soda ash sales. Taking this into consideration, Langh Tech's onboard carbon capture technology gives ship owners full flexibility to complement their fuel strategy and to adapt it as needed to efficiently mitigate costs and benefits.

In addition, it is important to see sustainability not only from a compliance perspective. What if we could make exceeding regulations and applying the most sustainable approach a good business case? Can we achieve even better results, by thinking outside of the maritime bubble?

Langh Tech's onboard carbon capture offers also the possibility to use OCC with biofuels to create biogenic soda ash. The demand for biogenic soda ash in onshore industries is likely to rise in line with net-zero targets. Consequently, the benefits of using OCC in combination with biofuels will also increase over time. This would allow the shipping industry to reduce its own emissions to zero while significantly contributing to emission reduction onshore, which is a double benefit for the climate.

Given the benefits of utilization, we strongly advocate for carbon capture technologies in combination with utilization scenarios (OCCU). Carbon Capture and storage (CCS), from our perspective, should be limited to cases where utilization is not feasible.

BATTERIES

From 2030 onwards, FuelEU Maritime requires ships to use shore power or another zero-carbon technology during berth at major EU ports. In 2023, Langh Tech started to develop a battery system as a reliable and affordable solution to meet the upcoming regulatory requirements.

Langh Tech's battery system is designed to provide the vessel with reliable electrical power for shore-side operations. In contrast to shore power connection, batteries offer flexibility and have the additional benefit, that they can assist or fully provide propulsion during cast-off. This ensures seamless, efficient, and environmentally conscious maneuvering. The batterie system can be tailored to the ship's specific needs. A battery string consists of up to twenty connected battery packs. The number of strings is flexible up to sixteen units per battery room, providing an energy storage capacity of 5 MWh.



Langh Tech's batterie system was designed to meet the highest standards for safety. Each battery pack includes a dedicated off-gas duct, which safely channels gases out of the battery space to maintain a non-toxic and non-flammable environment. Fire protection is additionally ensured through an early-stage threat detection, which proactively mitigates fire risks before ignition occurs. Cell-to-cell isolation prevents the spread of thermal runaway, which significantly enhances onboard safety and system resilience. The pack enclosure has IP68 rated protection, which offers full protection against dust and water. The high ingress protection also acts as a safeguard against fire risks in the event of off-gassing. An integrated liquid cooling feature provides a stable and convenient environment for the cells, which provides higher accuracy and efficiency than air cooling. LFP chemistry offers superior thermal resistance and eliminates risk of thermal runaway, outperforming both traditional lithium-ion (e.g. NMC) and lead-acid batteries in safety, longevity, and environmental impact.

The system is engineered for easy installation and maintenance with minimized operational disruption. An active balancing software optimizes performance and extends battery life, with constant health check on cell and pack level. In the unlikely event of a pack failure, manual string cut-off will ensure continued operation.

Langh Tech's sister company Langh Ship's three 1200 TEU newbuildings have been designed with a battery room, and battery system installations are in progress for these vessels

AIR POLLUTION

The most significant air emissions in shipping apart from the greenhouse gases CO₂ and methane are nitrogen oxides (NOx), sulfur oxides (SOx) and particulate matter. Those emissions cause air pollution and can have negative health impacts. Lanh Ship is committed to reducing its emissions. The advanced emission treatment technologies of Lanh Tech play an important role in this.

TREATMENT OF SULPHUR OXIDES IN SCRUBBERS

Scrubbers are an effective and well-established technology to reduce the emission of sulfur oxides (SOx) from the exhaust gas of burnt fuel. The general working principle of a scrubber is spraying seawater or fresh water mixed with a caustic chemical into the exhaust gas stream in several stages. The sulphur oxides react with the alkaline water and form sulphuric acid.

Current scrubbers on the market can be differentiated into three different types: open-loop, closed-loop and hybrid scrubbers.

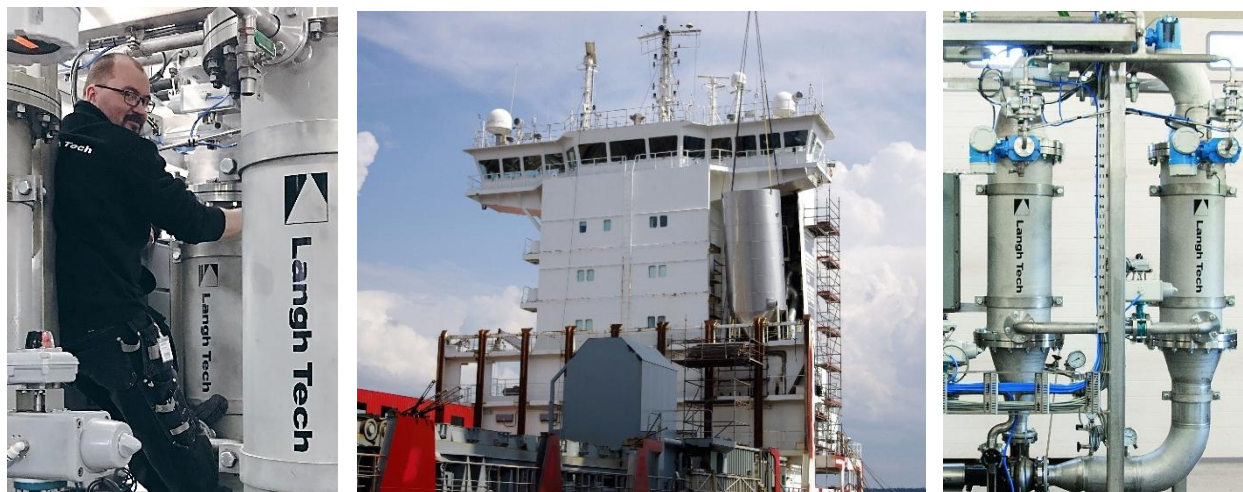
1. Open-loop systems suck in seawater, which is alkaline by nature, and spray it into the exhaust to wash out the SOx. The resulting wash water is treated in accordance with MARPOL requirements and then discharged back into the sea.
2. Closed-loop systems add chemicals, such as caustic soda, to the wash water to boost its alkalinity. The wash water is filtered to remove solid particles and then recirculated, with a small amount of “bleed-off” water, which is discharged overboard.
3. Hybrid scrubbers can be operated both in open and closed loop. Thus, they offer a high grade of flexibility and independence.



LANGH TECH EXHAUST GAS TREATMENT

Langh Tech's comprehensive exhaust gas treatment solutions reduce sulfur oxides (SOx) and nitrogen oxides (NOx). As a base for installation of onboard carbon capture, they can also play a role in decarbonization.

Langh Tech offers the full range of open-loop, hybrid and closed-loop scrubbers to meet the requirements of a diversified customer base. Depending on geography, regulations and local laws differ. This also impacts our customers' strategies and product choices. For us as a manufacturer, it is essential to consider those differences and to develop our technologies in line with regulatory developments and market demand. We strive to offer high-performing technologies in all segments.



From an environmental standpoint, a closed loop scrubber has least impact on ocean health, as there is only a marginal amount of bleed-off water discharged to sea. The collected sludge can be discharged at port.

Langh Tech's hybrid scrubber combines the environmental benefits of closed-loop operations, while offering the flexibility to change to open-loop mode. It can be operated nonstop in closed-loop mode, without any time limits or big holding tanks. The efficient water treatment system continuously cleans the closed-loop process water, and the cleaned water can either be let out to the sea or fed back to the closed loop process.

The scrubber is equipped with a packing bed which enables better performance than multi-level water sprays only. The required amount of wash water is less, which requires smaller pumping capacity and smaller pipe dimensions as well as a lower electrical consumption. The amount of waste that is left over after the closed loop process is marginal compared to other wet-scrubber solutions. Langh Tech manages to extract almost all water from the scrubber sludge and the result is a dry black waste. The highly concentrated dry sludge is unitized in IBC containers or barrels. Thus, the waste can be disposed effortless and cost-effective at ports.

For comprehensive exhaust gas treatment, Langh Tech's hybrid scrubber solution is combined with a Water Treatment System for Exhaust Gas Recirculation (EGR), which simultaneously reduces NOx emissions to meet Tier III requirements. The unique combined system saves space onboard. Another advantage is that it uses only one chemical component, caustic soda, to capture SOx and NOx emissions. Caustic soda also builds the base for Langh Tech's onboard carbon capture solution.

Langh Tech's Water Treatment Solution does not require urea, which is used in selective catalytic reduction. This is an environmental benefit, as high concentrations of urea can indirectly impact ocean health by eutrophication, which is an over-enrichment of water with nutrients, leading to algal blooms and oxygen depletion, which harm marine life.

SCRUBBER CRITICISM AND OUR POSITION

According to data from IMO, about 80 percent of currently installed scrubbers are open loop scrubbers, about 2 percent are closed-loop scrubbers and the rest are hybrid models. The number of scrubber installations worldwide has grown steadily since 2011. About eight percent of today's global fleet is equipped with scrubbers. While scrubbers effectively reduce sulphur oxide emissions, they are also subject to criticism and tightening regulations, which prohibit the disposal of wash waters in coastal areas or even the use of all scrubbers in general, for example in Sweden from 2029 onwards.

In the public discourse, scrubbers are criticized on a general level. Activists argue for a complete scrubber ban, claiming that wash waters have negative impact on ocean health and that scrubbers would hinder the transition away from fossil fuels. However, not all scrubbers are the same. This should be reflected in discussions and policies by a differentiation of scrubber types and their actual benefits and impacts.

Wash waters from open-loop scrubbers are discharged into the ocean in line with IMO regulation. The wash water already has a high level of purity. However, some studies in recent years have concluded that the accumulation of wash water in oceans has a negative impact on ecosystems and marine life. This is mainly reflected in a drop of pH-values, which accelerates the acidification of oceans. These studies have been widely shared, but they are not undisputed, and several voices have raised, that an actual correlation between scrubber wash waters and a drop of pH values could not be sufficiently proven. Protecting ocean health and particularly sensitive eco-systems, like the Baltic Sea, is critical. We commit to this.

Changing from open-loop to closed loop-operation is a solution for this, as it cuts back wash water entries to a minimum. The effects of the so-called "bleed-off" have not been studied, yet. Therefore, we are currently aiming at conducting a joint assessment of scrubber impacts from closed-loop scrubber operations, together with scientists, industry peers and authorities. Our goal is to collect data on actual impacts, anticipating that the results will show that the operation of modern closed-loop scrubbers is environmentally safe.

We support a shift from open-loop to closed-loop operation. However, we hold calls for complete scrubber bans for inappropriate and misleading. Hybrid and closed-loop scrubbers present an effective way to reduce sulphur oxides. In addition, scrubbers are usually part of an exhaust gas cleaning system, which also reduces nitrogen oxides (NOx) and particulate matter. Therefore, using high sulphur fuels with scrubbers is overall more environmentally friendly than using low sulphur fuels only.

In addition, scrubbers build an ideal base for putting carbon capture technologies on top, to additionally reduce CO₂ emissions. The combination of those two technologies helps to enable an economical green transition, particularly as scalable alternative low-carbon fuels could still be decades away. This would allow the continued use of fossil fuels in the short term, while limiting negative impact and freeing financial resources to prepare for low-carbon fuels and investing into technologies which increase energy efficiency.



PROTECTING BIODIVERSITY

Ships produce several kinds of so-called wastewaters during their operation. They stem from living onboard, such as grey water, which is the water from taps and showers, or black water, which is sewage from the toilets. Grey water is partly discharged ashore and partly overboard, depending on the arrangements onboard a vessel and the reception facilities at port. Black water is either discharged to shore or discharged at sea after going through a sewage treatment system. Langh Ship discharges waste waters strictly in line with laws and regulations.

Ballast water is used to provide stability to the ship and to optimise its trim and usually stems from seawater intakes. When ballast water is released in a different ecosystem, it bears the risk of spreading microorganisms, which could cause harm in their new environment. All ships within Langh Tech's fleet are equipped with Langh Tech Ballast Water Management Systems.



BALLAST WATER MANAGEMENT SYSTEM (BWMS)

Langh Tech's Ballast Water Management System uses UV-C technology, which first filtrates the ballast water and then treats it in an UV-reactor with highly intensive UV-C irradiation. It is the first UV-based system in the world which received US Coast Guard type approval for one-way treatment.

This feature is especially impactful when operating in turbid waters where systems often need to restrict flowrate and treatment can take a long time both during ballasting and deballasting. With one-way treatment there are none of the restrictions typical for UV systems when deballasting, allowing even deballasting by gravity.



While one-way treatment provides the most significant reduction in operating costs by directly cutting the energy consumption of the system, it also increases the lifetime of the main consumable, the UV lamps, since they do not need to be ignited for deballasting operations.

SOCIAL



CODE OF CONDUCT & HUMAN RIGHTS

At Langh Group, we aim to promote a safe, respectful, and environmentally responsible working environment, where people can thrive and be at their best. We commit to following ethical standards and business practices in all that we do, upholding Human Rights and ensuring compliance with international laws, regulations and maritime industry standards.



Our Code of Conduct is a testimony to this. It acts as a mandatory guideline and defines the personal and professional behavior we commit to, and which we expect from our employees and partners. Several policies complement and further specify the provisions within our Code of Conduct, such as our anti-bribery and anti-corruption policy, our policy for the prevention of abuse and harassment, our environmental policy, and our health & safety policy.

At Langh Group, we aim to always act with integrity, honesty, and respect. Hundreds of employees of many different nationalities and backgrounds work for Langh Group, and we want to provide a positive and inclusive workplace, where everyone feels valued and safe. We respect human rights and promote equality, diversity, inclusion and non-discriminatory behavior. Langh Group does not tolerate any form of harassment, bullying, or discrimination based on race, gender, religion, nationality, age, sexual orientation, or disability. We communicate openly and honestly. When there is disagreement or a conflict, we always try to find mutually satisfactory and amicable solutions.

Langh Group does not allow child labor or forced labor in any form and expects its suppliers and subcontractors to abide by the same code. We commit to transparency and good governance. We do not accept or engage in any kind of bribery, corruption or fraud. As we mainly do business in the EU, and particularly Northern Europe, we consider our risks for getting involved in critical situations low. However, we raise awareness among our employees about spotting potentially critical situations and how to navigate them correctly.

Health and safety have the highest priority at Langh Group, and we strive to avoid incidents and to have zero fatalities across the whole business. Environmental responsibility is another core value, and we aim at reducing our environmental impact through improvements of energy efficiency, reducing emissions, protecting biodiversity and a mindful use of resources. We continuously work on improving our due diligence processes in line with acknowledged management systems and industry standards, for example ISO 14001 and the ISM Code.

All reported breaches or suspected breaches of our Code of Conduct and associated policies will be thoroughly investigated and followed up. Concerns can always be directed to HR, superiors, management, or anonymously through dedicated whistleblower channels. The information on how to report via whistleblower channels is available at our offices, onboard every ship and on our website.

HEALTH & SAFETY

At Lanh Group, we want all employees to return home safe and sound. Seafaring involves high occupational risks. Our goal is to prevent, detect and efficiently mitigate potential and actual risks. This is a process of continuous improvement, where ultimate success would equal an incident rate of zero.

Our safety culture builds on the responsibility of each individual and encourages employees to address and report risks as soon as they become aware of them. This is enshrined in our internal health & safety policy, which also stipulates that employees must always wear suitable protective equipment for their tasks and adhere to a strict no-alcohol-onboard-policy. We track, report and follow-up on all safety-related incidents. All incidents or near-incidents are also discussed in regular meetings between ship senior management and shore-based executives. The goal is to raise awareness and to learn from each other to minimize safety risks in the future.

All vessels within Lanh Ship's fleet are operated in accordance with regulation and certified in accordance with the International Safety Management (ISM) Code. The ISM Code represents the international standard from the International Maritime Organization (IMO) for the safe management and operation of ships and the prevention of pollution. It forms part of the International Convention of the Safety of Life at Sea (SOLAS). The ISM Manual on board contains all safety-related information and procedures. It is regularly re-assessed and revised to keep up with new developments. We put emphasis on ensuring that the ISM manual has the right balance between comprehensiveness and being easy to understand and use by the crew.

All ships hold a Document of Compliance, which is verified annually under the authority of the respective flag states. The ships of our fleet operate under Finnish, Portuguese and Maltese flag. In addition, all vessels hold a Safety Management Certificate (SMC), which is verified every two and a half years.

Safety audits are performed regularly on all vessels within Lanh Ship's fleet. Internal audits are performed once a year and an external audit takes place approximately every two and a half years. The number of our vessel findings within our fleet lies well below the global average according to data from DNV. Since 2024 we have seen a continuous downward trend of vessel findings. While this shows that our efforts pay off, we won't sit back but work even harder to further improve our safety culture and processes.

All employees within Lanh Group are covered by occupational healthcare, which exceeds legal requirements and supports prevention. Onboard our ships and at the office in Pikis, our employees have the opportunity to exercise. Many employees make use of walking pads, or throw in some TRX strength and stretch exercises, which actively prevent negative impacts from sitting all day long.



WORKING HOURS & WORK-LIFE-BALANCE

Being well-rested is essential for maintaining our crew's health and wellbeing, and it is also vital for safe ship operations. Lanh Group and its charterers adhere to the Maritime Labour Convention (MLC) stipulations, which regulate work and rest times for seafarers. We carefully consider this in our crewing processes and work schedules. However, unforeseen events and operational reasons can require immediate attention of our crew, which is why violations cannot always be fully prevented. These exceptions remain at a low level and if necessary, compensatory rest time is arranged.



Our commitment to supporting our seafarer wellbeing and a healthy work-life balance is also reflected in shorter working circles. Most commonly, our crew on the multi-purpose vessels spend 4 weeks on board, followed by 4 weeks at home. Onboard the container vessels 6-week-circles are the norm, but we also offer individual contract agreements.

We strive to find models that work well for our seafarers and their families, including parental leave and special holiday provisions. This increases performance and contributes to a high retention rate. If possible, we also take wishes into consideration for working together on the same ship as a family member or a specific co-worker. Onboard, our seafarers have access to internet, games, media and tv. All ships provide various opportunities to unwind, such as exercising facilities, sauna, play station and karaoke.

Our employees onshore usually work within the agreed working times. Overtime is compensated by time off. We don't have a policy for remote work. However, we offer the flexibility to work from home in agreement with the supervisor if personal or professional reasons require it.



EDUCATION & TRAINING

At Langh Group, we seek to recruit the best talents, who support us in our mission to develop technologies for reducing the environmental impact of shipping operations and to provide our shipping customers with reliable, sustainable and tailor-made transport solutions.

LANGH SHIP

Langh Ship has a small but constantly growing fleet of multi-purpose and feeder vessels, which meet our customers' challenging transportation demands, and are capable of operating in arctic conditions. Sustainability matters to us, and we constantly work on increasing efficiency and reducing emissions.

We are looking for experienced seafarers and the best talents to ensure that our fleet will operate in a safe, reliable and efficient manner, now and in the future. Langh Ship provides interesting careers on various levels and puts a strong focus on bringing in new talent into the industry.

According to data from the International Shipping Council, the shipping industry is about to face an increasing shortage of seafarers. Attracting and maintaining qualified seafarers in an increasingly competitive market is a top priority for us. Therefore, we closely cooperate with universities and maritime education centers in Finland.

Langh Ship offers deck and engine students the opportunity to get to know different kinds of vessels, gain hands-on experience, and put their knowledge and skills into practice. One possibility for students to work with us is participating in supervised onboard training in cooperation with universities (1 deck and 1 engine trainee per ship).

Another option is working together with Langh Ship and/or Langh Tech within the framework of a thesis project. This provides an excellent opportunity for both sides to get to know each other and to establish a good work relationship.

While we cannot guarantee employment, a significant number of former students joined Langh Group as young professionals after their graduation. We also provide interesting careers for professionals of all levels and support the continuous development of our seafarers with dedicated career plans.

Onboard our vessels, Langh Ship provides the opportunity to sign up for a variety of different online training courses for seafarers who want to improve their knowledge and skill sets. The possibility of a (temporary) transition from ship to shore and vice versa, depending on personal interests and company needs, improves our internal knowledge transfer.

LANGH TECH

Langh Tech is all about innovation and custom-made technologies for cleaner air and seas. Our goal is to support shipping companies and operators in their green transition.

Working at Langh Tech means being a full member of the team from day one. We have flat hierarchies, and our team members are given a lot of responsibility. At the same time, they enjoy the necessary freedom to innovate. What unites all of us is a hands-on attitude to find the best solution for our customers.





Interested in joining us?

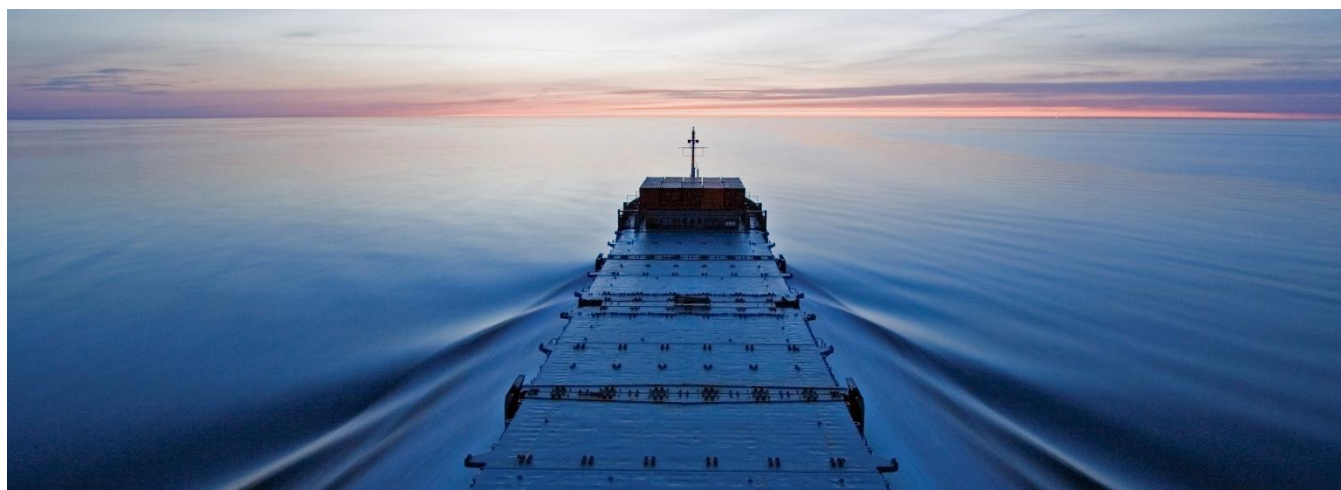
Please visit our websites langhtech.fi and langhship.fi for more info.



MATERIAL TOPICS & PRIORITIES

Below is an overview of the sustainability impacts, risks and opportunities (IRO), which we identified as material in our latest Double Materiality Assessment (DMA).

Environment	Impact	Risks	Opportunities
Climate change	CO₂ emissions, mainly from shipping operations (Langh Ship) and the use of steel (Langh Tech). Other CO₂ emission sources are energy consumption, business travel and waste.	Costs: - Decarbonisation and maritime fuel transition require significant investments into new technologies and alternative fuels - Increased costs of compliance High level of uncertainty about - Dominance, availability and prices of different fuels - Technology developments - Regulation - Infrastructure and value chain considerations Compliance: - Managing increasing amount and complexity of different regulations and mitigating costs of compliance	Business opportunities for Langh Tech technologies, particularly Onboard Carbon Capture.



Environment	Impact	Risks	Opportunities
Energy	Emissions from energy consumption onboard are defined by the type of fuel and the energy efficiency of the ship. Fleet renewal and newbuilds increase overall energy efficiency of the fleet. Older ships in the fleet have lower energy efficiency. The majority of fuels being used are still fossil fuels. The responsibility for emissions is shared between Langh Ship as ship owner and our customers. Shipowners make long-term investments into efficiency, while charter parties make fuel decisions and pay for the fuel.	Insecurity: - Regulations are not aligned on a global level, increasing, developing and changing regulations - Advancement of technologies and availability and prices of alternative fuels are unpredictable Shared responsibility and managing complexity: - Efficient CO₂ reduction can only be achieved by a combination of efficiency improvement and increasing the use of low and zero-carbon fuels. - Within time-charter, decarbonisation requires strong cooperation between contract partners, aligning strategies and setting priorities for the long- and short-term, and finding mutual agreements for sharing costs and benefits. - The financial risk is tied closely to failing to manage the increased complexity and preparing for different scenarios.	The shared responsibility between shipowner and charterer can be as well an opportunity, combining efforts and tackling challenges together by a common approach. Reducing energy consumption also reduces costs.
Air emissions	Shipping is a significant emitter of air emissions, which contribute to climate change and can have negative health impacts. The most significant air emissions apart from GHG (especially CO₂ and methane), are NOx, SOx, and particulate matter.	A potential business risk for Langh Tech lies in regulatory scrubber bans and a replacement of scrubbers due to increased use of LNG and alternative fuels.	Langh Tech's innovative onboard carbon capture technology, which can be used on top of scrubbers, captures CO₂. The combination of scrubbers and OCC can reduce overall emissions significantly and help to mitigate fuel transition costs.

Environment	Impact	Risks	Opportunities
Biodiversity & Ocean Health	Ballast water discharge of ships at sea poses a risk to biodiversity through spreading of micro-organisms. Langh Tech Ballast Water Management Systems efficiently treat those organisms. All ships of the Langh Ship fleet are equipped with Langh Tech BWMS, which reaches excellent treatment results, and which is certified by the US Coast Guard. Discharge of black water and other waste- and wash waters can negatively impact ocean health, especially in sensitive eco systems and areas of high marine traffic. Langh Ship discharges only in strict compliance with laws and regulation.	Potential compliance and financial risks in case of technical failures or incidents	Business Opportunity for Langh Tech's Ballast Water Management System
Social	Impact	Risks	Opportunities
Health & Safety	According to ILO, seafaring belongs to the professions with the highest risk for work-related health and safety issues. The health and the safety of our employees have highest priority. We strive to detect and mitigate occupational health & safety risks, and we aim at zero fatalities. Implementing a good safety culture and allowing for a good work-life-balance are key to risk mitigation. We offer high quality occupational healthcare for all employees.	Potential risk of accidents and incidents. The risks for severe impacts are very low, however smaller incidents occur.	

Social	Impact	Risks	Opportunities
Working conditions	Langh Group aims at providing good working conditions and a positive work climate. We promote and protect human rights and comply with or exceed regulation and labour laws. Our minimum guideline at sea is the Maritime Labour Convention (MLC). Our Code of Conduct and supplementing internal policies apply to all employees and partners and promote the values and standards we live by.	Unforeseen events can lead to situations, which need to be taken care of without delay. Potential risk of overtime and insufficient rest at sea: - Legal and financial risks in case of potential MLC violations. - Overtime, lack of rest and poor sleep quality can cause concentration problems and exhaustion, which increases the risk for mistakes and pose health and safety risks	Good working conditions create high motivation, loyalty and support retainment.
Work-life-balance	A good work-life-balance is important to maintain good health and it increases motivation and retention. Keeping a good work-life-balance at sea can be challenging. Seafarers, who spend long times away from home and work in teams of different cultures and nationalities, can feel lonely or isolated, which is a risk for developing mental health issues. Langh Group supports crew wellbeing, e.g. with shorter times on board, considering wishes for working with certain colleagues whenever feasible, and providing leisure, entertainment and education possibilities onboard. Langh Group provides parental and family leave in line with the applicable regulations and law	Potential recruiting and retention challenges in the future as work-life-balance increasingly affects career decisions. Risk for mental and physical health issues, including operational and financial consequences, if corporate culture fails to detect and mitigate potential struggles of crew members. Financial and safety risks related to mistakes made by crew members who were not physically and mentally fit.	A good work-life-balance maintains mental health and supports retainment

Social	Impact	Risks	Opportunities
Recruitment & Training	Langh Group aims at recruiting highly skilled professionals and the best talents. We offer interesting careers at sea and onshore and put a strong focus on talent development, e.g. via onboard trainings or thesis projects.	Failing to implement a solid recruitment and training strategy, which ensures sufficient and excellent staffing of our ships could potentially lead to operational challenges.	Giving young talents hands-on experience provides cooperation opportunities for employer and students, and it helps us to discover and develop promising talents within Langh Group.
Governance	Impact	Risks	Opportunities
Good governance	At Langh Group, we aim to promote a safe, respectful, and environmentally responsible working environment, where people can thrive and be at their best. We commit to following ethical standards and business practices, upholding Human Rights and ensuring compliance with international laws, regulations and maritime industry standards. Our Code of Conduct serves as mandatory guideline and it is supplemented by diverse policies, e.g. our anti-bribery and anti-corruption policy, our policy for the prevention of abuse and harassment, our environmental policy, and our health & safety policy. We ensure data privacy of employee and customer data in line with regulation and local laws. Grievance mechanisms and whistleblower channels are in place and published internally and externally.	Potential risks of violations and associated negative financial, legal and reputational consequences. Potential risk of negative impact on employees and company culture in case of violations and/or non-reported or non-detected violations.	Being perceived as employer with a good working culture and being employer of choice

JOIN US IN OUR JOURNEY TOWARDS SUSTAINABLE SEAFARING!

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