CEO review

The year 2019 was characterised by a difficult demand environment and weaker than anticipated financial performance. Despite the increase in marine equipment sales and service volumes, energy equipment deliveries declined due to external factors affecting the energy market. While this did impact our operating result, the primary setback was the cost overruns we experienced in a handful of complex marine and energy projects, which were caused by inaccurate assumptions in cost estimates, insufficient risk identification, and supplier related challenges.

I am convinced that our project management capabilities will soon be re-established at their previous level of excellence. To achieve this, and to prevent a re-occurrence in future projects of the issues we have faced in 2019, we have undertaken a number of actions to improve the quality of our project execution and to ensure better upfront identification of risks and opportunities. I am confident that this will enable us to live up to our reputation for providing high quality and value enhancing solutions, coupled with superior project management capabilities.

Order intake affected by difficult market conditions

Vessel contracting fell short of initial forecasts, largely due to concerns related to the implications of geopolitical developments on seaborne trade. Furthermore, there was a decline in scrubber orders from the exceptionally high levels of the previous year. This was a result of uncertainty related to the price and availability of bunker fuels. Considering these factors, we can be pleased with the level of equipment orders received in the Marine Business. Our extensive market exposure and broad offering of solutions have once again allowed us to capture opportunities in those segments where activity has been more robust, such as cruise ships and gas carriers.

Energy policies are being revised to promote sustainable development and to combat climate change. In order to achieve ambitious decarbonisation targets, utilities globally are updating their investment strategies. This, in combination with an unfavourable macroeconomic environment, has caused customers to defer investment decisions. Because of this, the demand for new gas and liquid fuelled power generation capacity declined significantly during the year, creating a background of uncertainty for our Energy Business. Although equipment orders in the Energy Business failed to meet our expectations, energy service orders developed well, as did the orders for energy storage and optimisation solutions.

Strengthening the focus on lifecycle solutions

While 2019 did not prove to be an easy year for Wärtsilä, the operational challenges we experienced masked positive developments on many fronts; most notably, the return to growth in services following two years of stable development. I am particularly pleased to highlight the increased order intake for service agreements, which included the Energy Business’ largest ever long-term operation and maintenance agreement. This was signed with Energia del Pacifico for a power plant under construction in El Salvador.

The importance of these agreements to our strategy is emphasised by the fact that we renewed our organisational structure at the beginning of 2019, forming it around two businesses integrating both equipment and services. A central aim of this change is to better enable the tailoring of our lifecycle solutions to specific market needs. I am pleased to note that we have realised certain benefits of this reorganisation, for example through improved cooperation internally with regards to developing and executing our full lifecycle offering. I strongly believe that this provides a foundation for strengthening lifecycle partnerships with our customers, which in turn will support progression towards our long-term target of profitable growth.

Putting our Smart Marine and Smart Energy visions into action

As a result of the need to significantly raise efficiency levels and comply with tightening environmental legislation, there is a rapid transformation taking place in both the marine and energy sectors. Wärtsilä has taken a leading position in enabling this transformation process through its Smart Marine and Smart Energy visions, where the latest technologies are being developed and employed to meet the evolving needs in both these end markets.

Several key orders were received during the year that validate the commercial feasibility of our Smart Marine vision. The order to supply Anglo-Eastern’s fleet of more than 600 vessels with Wärtsilä’s Fleet Optimisation Solution (FOS)
illustrates that the shipping industry is increasingly looking at leveraging the latest digital solutions to maximise efficiency and performance. FOS enables voyage planning, speed management, weather routing, ship-to-shore reporting, and fleet performance management to reduce fuel consumption. Furthermore, in the field of autonomous vessels, following last year’s successful testing, we received our first order for SmartDock during 2019, making it the world’s first commercially available auto-docking solution.

In the energy market, an order we received from Cambodia is an excellent example of the role we can play in providing fast-starting, flexible solutions that enable the integration of increasing levels of power from renewable sources, while simultaneously securing power system reliability. In addition to adding much needed capacity to the grid, the plant will provide the balancing flexibility that is essential when adding fluctuating supplies of solar and wind to the power system. Another example of how our solutions can support the transition to carbon-free resources is the 100 MW/100 MWh total capacity energy storage project awarded to us in South East Asia. The energy storage system, which includes our advanced energy management software platform GEMS, will support the region in reducing its reliance on fossil fuels. These orders represent a clear indication of the steps we have taken in realising our vision to lead the industry’s transformation towards a 100% renewable future.

New technologies based on innovations and collaboration

Investing in technological leadership is vital for ensuring the competitiveness of Wärtsilä’s product portfolio and for securing a leading position in sustainable innovation. The focus of our R&D activities, the cost of which amounted to 3.2% of sales in 2019, is on areas such as efficiency improvement, fuel flexibility, and the reduction of environmental impacts. While we remain dedicated to developing the core technologies within our portfolio, as illustrated by the two new engine additions to the Wärtsilä 31 family, our research and development activities have increasingly turned to developing new digital solutions, with the emphasis on optimising performance through data insights. Examples of some of the advances made during the year include a new online platform that allows our customers to manage their installations more efficiently, and the introduction of Expert Insight, which leverages artificial intelligence and advanced diagnostics to remotely monitor equipment and systems in real time.

Collaboration with industry stakeholders is an essential element in the development of technologies needed to meet the changing market requirements. Among the year’s partnership projects were agreements aimed at accelerating the development and commercialisation of renewable fuels in the energy markets. In the marine sector, our project to develop an autonomous harbour tug, IntelliTug, is an excellent example of the role collaboration plays within our innovation activities. Developed in collaboration with PSA Marine, the project took a decisive leap from drawing board to practical application during the year. Following the successful installation of a first-of-its-kind dynamic positioning system onboard the harbour tug ‘PSA Polaris’, trials are now being carried out in the Port of Singapore under real-world conditions.

In the field of energy, an important example of our partnership agreements are those focusing on exploring the role that Power-to-X, namely the generation of synthetic fuel from excess CO\textsubscript{2} emissions, plays in a carbon-neutral future. Such projects include providing funding to start-ups, as well as collaborating with academia and companies that are developing innovative technologies to speed the development of renewable fuels and capture opportunities to market them globally.

Collaboration is also extremely important to the success of the Smart Technology Hub, our new centre of research, product development and production being built in Vaasa, Finland. As the project progressed from planning to implementation in 2019, the selection of the first partners for the Smart Partner Campus took place. This is where research and product development activities can be carried out together with Wärtsilä’s customers and suppliers, start-ups, and universities.

A consistent emphasis on responsible business conduct

While our strategy places a strong emphasis on reducing harmful environmental impact, social considerations are of equal importance to us. We always intend to contribute towards the well-being of society and to foster an inclusive corporate culture by respecting diversity, providing equal opportunities, and demonstrating high ethical standards. In this context, we are committed to supporting the UN Global Compact and its principles with respect to human rights, labour, the environment, and anti-corruption. Another clear priority is ensuring safe working conditions and strengthening safety leadership within the company. The increase in the number of safety walks carried out by
management, and the adherence to near-miss reporting, show that safety is taken seriously throughout the organisation. Furthermore, the decline in our lost time injury frequency shows that we are moving in the right direction.

**Short-term challenges, longer-term optimism**

The business environment is expected to continue to be challenging during the upcoming year. For this reason, we remain cautious on the demand outlook. Our focus will be on improving operational efficiency, with the aim of mitigating, to the extent possible, the near-term performance headwinds related to pricing and mix. We have also taken steps to simplify our portfolio in order to strengthen the focus on core businesses. This entails moving non-core activities into a separate business unit, with the aim of accelerating their performance and unlocking value.

Looking further ahead, we have a solid basis for future performance thanks to our sizeable order book and service opportunities arising from our large installed base. Furthermore, we have the means and the solutions, through our broad offering of flexible technologies and strong in-house capabilities, to enable growth in the adoption of renewable energy sources, and to contribute to the decarbonisation of the maritime industry.

I would like to take this opportunity to thank our shareholders for their continued support. To our customers, I say thank you for your trust in our solutions and services, and finally yet importantly, I want to thank our personnel for their continued dedication and for putting us firmly on the path towards achievement of our common goals.

Jaakko Eskola
President & CEO

**Key figures**

<table>
<thead>
<tr>
<th>Key figure</th>
<th>MEUR</th>
<th>2019</th>
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<td>Order book, end of period</td>
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<td>6 470</td>
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<td>Year-end market capitalisation</td>
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<td>6 060</td>
<td>7 547</td>
<td>8 512</td>
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<td>Personnel, number at end of period</td>
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<td>18 795</td>
<td>19 018</td>
<td>19 239</td>
<td>19 225</td>
<td>19 294</td>
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¹ Figures exclude items affecting comparability.
² The increase in net interest-bearing debt is partly related to the inclusion of lease liabilities on balance sheet as a result of the new IFRS 16 standard.
Sustainability highlights

11.2.
Wärtsilä and Aalto University signed a partnership agreement to broaden cooperation on challenges related to climate change, scarcity of natural resources and digitalisation.

6.3.
Wärtsilä completed the installation and operational staff training for its Vessel Traffic Service solutions project to increase efficiency of two Portuguese ports.
8.3.
Wärtsilä was contracted to supply dual technology option for Ballast Water Management Systems for Eletson’s full fleet of 23 carriers.

20.3.
Wärtsilä was contracted to supply solutions for the new state-of-the-art Wasaline ferry built in Finland, creating world class efficiency and eco-friendliness.
16.4.
Wärtsilä launched the Engine+ Hybrid Energy solution in support of storage and renewable energy adoption.

7.5.
Wärtsilä emissions reducing solutions were recognised with White Snow, Clean Air award. The award is in recognition of Wärtsilä’s solutions that reduce emissions from gas flaring at oil drilling and production sites.
20.5.

Wärtsilä and LUT University signed a research agreement on strategic power system modelling to collaborate on research for 100% renewable energy systems.

18.6.

The Leanships collaboration project with Wärtsilä and partners designed an Energy Saving Device (ESD) suitable for use by ships with Controllable Pitch Propellers (CPPs), achieving 3.5% fuel savings.
25.7.
Wärtsilä signed a 100 MW/100 MWh energy storage system project deal in South East Asia.

3.9.
The Wärtsilä 31DF engine, featuring unprecedented efficiency with fuel and operational flexibility, made entry to the energy industry.
23.9.
Wärtsilä joined "Getting to Zero 2030 Coalition", where along with 74 organisations Wärtsilä committed to collaboration to make commercially-viable zero emission vessels a reality by 2030.

26.9.
Wärtsilä and Q Power signed a strategic cooperation agreement to support the development of renewable fuels.
7.10.
Wärtsilä power plant in Kibuye, Rwanda, using ‘killer lake’ gases, was recognised among Project Management Institute’s (PMI) Top 10 Renewable Energy Projects of the last 50 years.

11.10.
Wärtsilä announced an order for hybrid upgrades saving fuel and reducing greenhouse gas emissions for two offshore supply vessels owned by the Norway-based operator Atlantic Offshore.
14.11.
Wärtsilä and PSA Marine agreed to collaborate in creation of smart technologies for the marine sector to achieve clean energy shipping.

2.12.
Wärtsilä was contracted to provide a full energy storage solution for integrating renewable energy in one of the largest power hybrid projects at the off-grid Fekola Mine in Mali.
Strategy

Wärtsilä’s purpose is to enable sustainable societies with smart technology. The demand for clean and flexible energy and the need for efficient and safe transportation are increasingly affecting the way that customers operate. This forms the basis for Wärtsilä’s Smart Marine and Smart Energy visions.

Wärtsilä’s profitable growth ambitions are supported by its strong presence in key markets and a superior global service network. An integrated portfolio of services, systems, and products that covers customer needs throughout the full lifecycle positions Wärtsilä well to respond to the demand for energy efficient and innovative solutions. Emphasis is given to optimising performance through upgrades, modernisations, fuel conversions, and safety solutions, and to using data analytics and artificial intelligence to support customer business decisions. The utilisation of connectivity and smart technologies plays a key role in the optimisation of assets and in providing strategic input to customers in order to enhance their business growth. Asset management will drive future growth in lifecycle solutions and enable new “as-a-service” business models.

Wärtsilä’s digital transformation provides enhanced customer value through an increased focus on collaboration and knowledge sharing. With its flexible production and supply chain management, Wärtsilä constantly seeks new ways to maintain high quality and cost efficiency - often in co-operation with customers and leading industrial partners. Investments in research and development, and specifically in digitalisation, create a strong foundation for securing and strengthening the company's position at the forefront of market innovation.

This innovative culture, together with a constant emphasis on safety, diversity, and high ethical standards, attracts skilled and committed people and creates the basis for a high performing organisation. The focus on operational excellence ensures that Wärtsilä is a company easy to do business with and drives increased productivity and efficiencies for its customers.

Smart Marine

Wärtsilä’s aim is to lead the industry’s transformation towards a Smart Marine Ecosystem. Building on the sound foundation of being a leading provider of innovative products, integrated solutions, and lifecycle services to the marine and oil & gas industries, we aim to unlock new sources of customer value through connectivity, digitalisation, and use of smart technologies.

The maritime industry faces the challenge of realising decarbonisation by the end of the century. In order to do so, the industry will have to collaborate to introduce new technologies, legislations, and fuels (e.g. bioLNG, synthetic gases, hydrogen, ammonia). Industry players are faced with major sources of inefficiency that impose a significantly negative impact on business operations, environmental performance, and profitability. The three most notable of these are overcapacity, inadequate port-to-port fuel efficiency, and time wasted waiting when entering ports and other high traffic areas. Eliminating these inefficiencies forms the basis of Wärtsilä’s marine strategy towards decarbonisation and ecosystem thinking.

Wärtsilä is ideally positioned, together with its customers and partners, for positive disruptive development and to lead the transformation into a new era of shipping. Building on our extensive offering portfolio, and our vast installed base and industry know-how, we will continue to develop the smart technologies, business models, and competences needed to create a Smart Marine Ecosystem.

By applying smart technology and performance optimisation services, Wärtsilä aims to deliver greater efficiencies, minimised climate impact, and a higher level of safety to the shipping industry. This will result in more sustainable, safe, and profitable operations for ship owners and operators around the world. The ultimate goal is to enable sustainable societies with smart technologies.

Smart Energy

The energy landscape is in transition towards more flexible and sustainable energy systems. Wärtsilä envisions a 100% renewable energy future. Wärtsilä Energy’s objective is to be its customers’ most trusted partner in unlocking
the value of an optimised energy transition by providing all the essential technologies, services, and solutions for sustainable, reliable, and affordable power systems.

The transition from traditional inflexible baseload generation to renewable dominated energy is driven by the decreasing cost of new technologies. The operating environment is becoming more complex, and new players are entering different parts of the value chain. Storage technology is changing old design principles, and the importance of flexible gas is increasing. Simultaneously, the role of consumers is gradually gaining importance in power production and as a source of flexibility. Digitalisation throughout the industry brings new opportunities for predicting consumption and maintenance needs and can deliver improved competitiveness.

Wärtsilä is at the very core of future energy systems. The company’s flexible power generation solutions and energy storage systems provide a unique combination of energy efficiency as well as fuel and operational flexibility in baseload, balancing, and peaking applications. These solutions provide the needed backup for existing high renewable content power systems or can later be shifted from baseload or intermittent operations to backup mode, as the energy transition proceeds. The aim is to continuously develop optimal and environmentally sound solutions for customers by focusing on Wärtsilä’s core competences: market and system understanding, EPC capabilities, system optimisation, and lifecycle support.

Wärtsilä’s energy services provide a broad range of high-quality services and solutions to enhance business performance of power generation companies. The solutions range from spare parts and maintenance services to ensuring maximised operational life, increased efficiency, and guaranteed power plant performance. Wärtsilä maintains and optimises power plant performance with comprehensive lifecycle solutions encompassing technology, software, and service expertise, as well as a holistic view and understanding of installations on a system level. Our goal is to secure our customers’ investments with guaranteed power plant availability and reliability.

Sustainability

Economic

Wärtsilä aims to meet shareholder expectations and contribute towards the well-being of society. This requires efficient, profitable, and competitive company operations. Good economic performance establishes a platform for the other aspects of sustainability – environmental and social responsibility.

Environment

Wärtsilä’s aim is to be a forerunner in sustainable innovation and furthermore reduce emissions in our customer’s operations and in societies overall. Wärtsilä supplies smart technologies and services that help to mitigate climate change and protect our oceans and seas. We continuously work on achieving high environmental standards in our operations, and improving the environmental performance and efficiency of our products and solutions through R&D, collaboration, partnerships, and active engagement in ecosystems. In doing this, we help our customers and society at large to meet the goals of the tightening global environmental regulations and guidelines.

Social

We have high ethical standards and we care about the communities in which we operate. Our business operations and relations with our stakeholders are governed by our Code of Conduct. Wärtsilä is a responsible employer, and we seek to offer our employees an interesting and exciting workplace where openness, respect, trust, equal opportunities, and scope for personal development prevail. A further aim is to offer a hazard-free working environment to our employees and contractors, and to minimise the health and safety risks associated with the use of our products and services. Through effective supply chain management and continuous development we strive to ensure that our values expressed in the Code of Conduct are promoted in our whole value chain.
Wärtsilä's strategy

SMART ENERGY
leading the path towards a 100% renewable energy future

- Increased customer value
- Life cycle optimisation
- Energy efficiency
- Innovative solutions
- Strong presence in growth markets
- Operational excellence

Wärtsilä as a service
Enabling sustainable societies with smart technology

SMART MARINE
leading the industry transformation towards a smart marine ecosystem

- Increased customer value
- Life cycle optimisation
- Energy efficiency
- Innovative solutions
- Strong presence in growth markets
- Operational excellence

Enablers
Targets

Financial targets

Net sales

Target
Grow faster than global GDP.

Development
In 2019, net sales remained stable at EUR 5,170 million.

Growth over cycle

<table>
<thead>
<tr>
<th>Year</th>
<th>MEUR</th>
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- Net sales
- Cumulative new acquisitions
- Growth, % (incl acquisitions)

World nominal GDP growth 2009–2019 averages 3.7%.
USD-denominated (source: IMF)
* Restated, figures include continuing operations
** Restated due to IFRS 15
Profitability

Target

The operating profit margin (EBIT%) target is 14% at the peak of the cycle. At the trough of the cycle, the target is to keep the operating profit margin above 10%.

Development

In 2019, the comparable operating result was EUR 457 million, which represents 8.8% of net sales.

Result

Capital structure

Target

Maintain gearing below 0.50.

Development

In 2019, gearing was 0.30.

Gearing
Target

Distribute a dividend of at least 50% of earnings over the cycle.

Development

The Board of Directors proposes that a dividend of EUR 0.48 per share be paid for the financial year 2019, representing 130.8% of operational earnings.
Sustainability targets

Sustainable power systems

Target
Contribute to the development of an affordable, reliable, sustainable and modern power system worldwide.

Schedule: 2020

Development
In 2019, Wärtsilä’s new product launches included the Modular Block power plant solution, the 31DF multi-fuel engine for energy industry applications, and the Engine+ Hybrid Energy solution, which pairs engines with energy storage to support renewable energy adoption. Wärtsilä signed partnership agreements with Aalto and LUT Universities to collaborate on research aimed at achieving 100% renewable energy systems. In addition, new partnerships were announced with Soletair Power Oy and Q Power Oy to develop clean fuels. Some 1,540 MW capacity of modern, highly efficient, and flexible gas and liquid fired Smart Power Generation plants were sold during the year.

Small-medium scale LNG solutions

Target
Become a global actor in the LNG value chain by developing opportunities, creating solutions, and building infrastructure for clean-burning LNG to replace liquid fuel.

Schedule: 2020

Development
Wärtsilä successfully handed over the Tornio Manga liquefied natural gas (LNG) receiving terminal in September 2019. Wärtsilä supplied the terminal with an engineering, procurement and construction (EPC) solution that included complete unloading, storage, pipeline distribution, regasification, truck loading, and ship bunkering facilities. In the Hamina LNG terminal, the tank top module was lifted into position, civil works continued, and the mechanical contractor work started.

Energy savings

Target
Reduce energy consumption by at least 7% in terms of absolute consumption (GWh) from 2015 levels by 2025.

Schedule: 2025

Development
By the end of 2019, energy savings of 3.4 GWh were achieved, representing 11.4% of the final target.
Ethical behaviour

Target
Ensure commitment to the Code of Conduct throughout the organisation (with a Code of Conduct training coverage of 100%).

Schedule: 2020

Development
Training records are continuously monitored. At the end of 2019, the Code of Conduct training coverage was 94.3% of all employees.

Occupational safety

Target
Reach the long-term goal of zero injuries.

Schedule: 2020

Development
In 2019, the corporate lost-time injury frequency rate (LTIF) was 2.25. It was slightly above the annual target of 2.14, but it nevertheless represents a 10% improvement compared to 2018 (2.50). Proactive measures continued throughout the year. As a highlight, management safety walks increased by 56%, and near miss / hazard reporting by 14% compared to 2018. Wärtsilä also initiated a new training programme “Champions in Safety” for front line employees. Altogether, 3,900 persons completed the training in 2019.

Well-being at work – career

Target
Establish a balance between external and internal recruitments, with more than 50% of the open vacancies filled from the internal applicant pool, including promotions and lateral moves.

Schedule: 2020

Development
In 2019, 64% of open vacancies were filled through internal selections for job levels 3 and up, and 36% through external selections.
Personnel development

Target
Reach 100% coverage for development discussions.

Development
By the end of 2019, altogether 91% of the company's employees had completed development discussions.

Schedule: 2020

Diversity

Target
Increase the share of female employees to 20%.

Development
In 2019, the share of female employees was 17%.

Schedule: 2020

Climate change

Target
Reduce greenhouse gas (GHG) emissions from gas engines by 15% from 2015 levels by 2020.

Development
In 2019, Wärtsilä launched the 31SG pure gas engine for marine market applications. Greenhouse gas emissions from gas engines were reduced by 8.6% from the baseline year.

Schedule: 2020
Decarbonisation of transport

Target
Contribute to the development of more sustainable transportation through gas-based and other technologies.

Schedule: 2020

Development
In 2019, Wärtsilä’s product launches included the Navi-Planner voyage planning and optimisation solution, the Wärtsilä 31SG pure gas engine for marine market applications, and the Wärtsilä HY hybrid power module for dredging operations. In the Intellitug project, Wärtsilä, together with PSA Marine, made feasible an autonomously operated harbour tug concept with trials being carried out under real-world conditions. Wärtsilä joined the Zero Emission Energy Distribution at Sea (ZEEDS) initiative and the Getting to Zero 2030 Coalition to advance zero emissions shipping and commercially viable deep-sea zero emission vessels.

Climate change

Target
Reduce CO\textsubscript{2} emissions from vessels by more than 300,000 tons annually with the help of Eniram solutions.

Schedule: 2020

Development
The estimated reduction in CO\textsubscript{2} emissions during 2019 was approximately 234,000 tons. This was an 18% improvement compared to the previous year.

Supplier monitoring

Target
Reach the following rating coverage for suppliers:

- 96% of direct global supplier spend rated
- 70% of indirect supplier spend rated
- 80% of local supplier spend rated

Schedule: 2020

Development
In 2019, the rating coverages were:

- 96% of direct global supplier spend
- 76% of indirect supplier spend
- 69% of local supplier spend
Wärtsilä Marine Business

We are on a mission to create a Smart Marine Ecosystem – one in which the maritime industry uses only the cleanest available fuels. One where on-board power production is optimised, and routes are precision-planned to avoid navigational hazards, traffic congestion, and unexpected waiting times. Through our know-how, integrated product portfolio, and full lifecycle solutions – all supported by the market's most extensive service network – we are committed to being the main driving force in sustainable shipping.

Wärtsilä has a strong position in the maritime industry. Today, more than 50,000 vessels operate with one or more installed Wärtsilä products. Wärtsilä also provides maintenance services to one out of every three vessels navigating our oceans.

Responding to the challenge of decarbonisation

The biggest challenge facing the maritime industry is to move towards decarbonisation. Over the coming decades, industry players must work together to produce economically viable options that meet the International Maritime Organization's (IMO) greenhouse gas (GHG) reduction targets. Owners of individual vessels and entire fleets must embrace changes in three areas to enable a transition towards decarbonisation. These areas include the use of technologies that improve energy efficiency, the use of data to optimise voyage and operational factors, and the shift of energy sources and fuels towards green alternatives.

Wärtsilä has a broad offering in all these three areas, and we are committed to supporting our customers in their decarbonisation efforts and to collaborating with industry stakeholders, such as regulators, energy companies, and classification societies, to bring decarbonisation to reality.

This commitment is based on our deep understanding of our customers’ businesses, our technological leadership, and having the industry’s broadest portfolio of hardware and software solutions as well as the most extensive service network.

Serving various customer groups during the entire lifecycle of their vessels

Wärtsilä’s marine customer base covers all the main segments, including traditional merchant vessels, gas carriers, cruise ships & ferries, as well as naval and special vessels. In the oil and gas industry, we are active in serving offshore installations and related industry vessels.

During the shipbuilding process, tight cooperation with the shipyard and ship owners is required in order to design and build the vessel according to the specifics of each business operation. It is also important to have a newbuild plan that allows the flexibility to accommodate adaptations during the life of the vessel, in order to achieve the transition towards decarbonisation.

Our customers at various stages during the lifecycle of the vessel include ship owners, ship operators, ship management companies, charterers, and port authorities. Such customers have a stake in:

- Planning and execution of voyage and operations, securing safety and competitiveness in operating costs
- Planning and execution of maintenance to maximize the uptime of their assets
- Maximising asset utilisation
- Upgrading and retrofitting vessels to comply with regulations and GHG emission targets

Shipowners’ decision-making is impacted by freight rates, interest rates, and the capital and operating costs of the ship. Other factors, such as environmental compliance and fuel flexibility, including the transition towards green fuels, are also important. The decision-making process is increasingly influenced by cargo owners and charterers, who are keen on securing the safety of operations, enhancing environmental performance, and lowering fuel consumption. Ports have also become increasingly active in addressing congestion, emissions, and safety. Wärtsilä’s offering in ship-to-shore connecting software includes applications that address the needs of port authorities, such as just-in-time ship arrivals.
Wärtsilä is committed to continue serving a broad customer base. Moreover, we are committed to collaborating with different stakeholders to address the industry's biggest challenges and to making a step change in the sustainability aspects of maritime operations.

**Our offering is the broadest in the industry**

Wärtsilä’s market presence, combined with having the broadest offering in the industry, enables us to understand the needs and requirements related to each of these segments – from initial vessel design choices to everyday operations, in each voyage and throughout the vessel's lifecycle. We provide innovative and competitive hardware and software solutions, delivered efficiently and with high quality.

Our offering comprises engines, propulsion, exhaust gas cleaning systems, electrical solutions, seals and bearings, water and waste treatment, gas solutions, as well as automation, navigation, and communication systems, fleet operations solutions, ship traffic control, simulators and training, and lifecycle solutions.

Our unique value proposition is present throughout three value pillars:

<table>
<thead>
<tr>
<th>Energy management</th>
<th>Voyage management</th>
<th>Asset and fleet management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Within a single vessel, new or existing, we provide technologies and services to:</strong></td>
<td><strong>From port to port for both existing and new vessels</strong></td>
<td><strong>Identify, plan and perform all maintenance and upgrades for a vessel and a fleet, while safeguarding:</strong></td>
</tr>
<tr>
<td>Optimise the use of fuels and fuel choices in order to produce energy in an economical and sustainable way throughout the vessel's lifecycle</td>
<td>Towards autonomy: Planning and executing a safe route with just-in-time arrival, including departure and docking in potentially highly congested port areas</td>
<td>Minimised emissions to air and water</td>
</tr>
<tr>
<td>Minimise emissions to air with a solid path towards the decarbonisation of the maritime industry</td>
<td>Optimisation: Providing guidance and, for certain applications, automatically adjusting operations to increase efficiency and reduce waste, e.g. excess fuel consumption per single voyage and at fleet level</td>
<td>Minimised downtime and savings in operating expense items, such as fuel, manning, and maintenance</td>
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<tr>
<td>Manage energy demand and distribution</td>
<td></td>
<td>Maximum utilisation rate</td>
</tr>
<tr>
<td>Minimise energy losses</td>
<td></td>
<td>Reliable and safe operations</td>
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Wärtsilä has a solid record in guaranteeing the performance of the customers’ assets. Our recent investments in technology developments – from equipment to data collection, connectivity, analytics, and insights generation – give us the unique ability not only to detect anomalies in equipment performance but to address such anomalies with needed actions. In short, we enable more sustainable, safe, and profitable operations for ship owners and operators around the world.
Market drivers

The global demand for new vessels is mainly driven by developments within the global economy, and the resulting impact on trade and transportation capacity requirements. Other factors, such as shipyard capacity, newbuild prices, decommissioning and scrapping, fuel prices and availability, as well as interest and freight rates, also affect decisions related to the building of new vessels. The commitment that the industry has taken towards decarbonisation via the IMO’s GHG targets is the main driver affecting choices being made for newbuilds and all aspects related to operations, including needs for retrofits and upgrades.

The main driver for Wärtsilä’s service business within the maritime industry is the size and age profile of the installed base, paired with the running hours of such equipment.

Competitive landscape and market position

As a result of the broad offering portfolio and global market presence, Wärtsilä’s field of competitors is extensive. These contain several Original Equipment Manufacturers (OEM), including engine companies such as MAN Energy Solutions, Caterpillar and HİMSEN, propeller makers such as Schottel and Thrustmaster, and environmental and auxiliary equipment providers like Alfa Laval. Our competitors also include electrical and automation houses, notably Siemens, GE and ABB, gas system providers, such as TGE Marine, and companies with a broad range of offerings such as Kongsberg. The main source of competition for maintenance services is independent service companies operating globally, and local players with a limited offering scope, such as parts traders, repair yards, local workshops, component suppliers for spare parts (non-OEM), and field service businesses.

Wärtsilä is recognised as a proven supplier of innovative and sustainable technologies and software across its portfolio serving the maritime industry. Wärtsilä has a unique opportunity to comprehensively address the challenge of emissions from shipping by providing financially attractive solutions, and by supporting the move towards decarbonisation.

Wärtsilä’s strengths are:

- Strong knowledge and presence in all major maritime segments
- The broadest portfolio of reliable and high performing equipment and software in the industry
- Ability to support our customers on the journey towards decarbonisation, with solutions in all needed areas to reach GHG targets, i.e. the use of data, energy efficiency, and fuels
- A unique software platform solution (Fleet Operations Solution) to connect ship-to-shore and to use data to optimise voyage planning, fleet use, and operations
- A complete lifecycle service offering supported by an unmatched global service network and technical support
- The capability to lower operational risks for our customers and guarantee asset performance
Wärtsilä Energy Business

Wärtsilä leads the transition towards a 100% renewable energy future. We help our customers unlock the value of the energy transition by optimising their energy systems and future-proofing their assets. Our offering comprises flexible power plants, energy management and storage systems, as well as lifecycle services that enable increased efficiency and guaranteed performance. Wärtsilä has 72 GW of installed power plant capacity in 180 countries around the world.

We serve three main customer segments

Wärtsilä’s three main customer segments in the energy markets are Utilities, Independent Power Producers (IPPs), and Industrial customers.

Utilities supply electricity, heat, and gas to residential, commercial, and industrial end users. They invest in various types of power generation and energy storage assets to ensure adequate load coverage, and the right palette of cost-effective and reliable products and services for their customers.

IPPs are financial investors investing in power generation and energy storage assets. They then sell the generated power either to utilities or directly to end customers. Their investments are return driven, and as with utilities, their technical requirements are application driven.

Industrial customers are mainly private companies with energy intensive production operations. By investing in captive power, they can achieve lower energy costs and be prepared for any grid reliability issues, thus ensuring security of supply. Wärtsilä serves the top end of this customer group, i.e. large industries requiring a relatively high electrical load, such as data centres, cement factories, and mining operations.

Our offering is based on flexibility and lifecycle support

Wärtsilä’s energy solutions are used for a wide variety of applications. These include baseload generation, capacity for grid stability, peaking and load-following generation, and optimisation of high renewable content power systems. We provide our customers with a comprehensive understanding of energy systems, including fully integrated assets and advanced software, complete with value adding lifecycle services.

Our flexible power plants are tailored according to specific customer requirements, utilising modular products and services. The delivery scope ranges from equipment deliveries to complete engineering, procurement and construction (EPC) packages, supported by superior project management capabilities. Wärtsilä’s power plant solutions provide the best means of support to power systems by offering the highest degree of flexibility, thereby enabling the design and build-up of high renewable content power systems, while minimising the system costs. Combined with our offering of energy storage and advanced software for energy management, our solutions enable the transition to a sustainable, reliable, and affordable low carbon power system. In markets where this power transition is still to come, Wärtsilä’s solutions provide efficient, reliable, and flexible baseload solutions, which can be shifted to back up renewable power in the future.

With services ranging from spare parts and basic support to full operations and maintenance agreements, we ensure maximised life and increased availability for plants, along with a lifecycle cost guarantee. The performance of our customers’ installations is optimised over their lifecycle through upgrades, modernisations, fuel conversions, as well as solutions enhancing safety and cyber security. The shift in our customers’ business models increases the need for asset management services and drives opportunities for using real time monitoring and analytics to optimise their business performance.
Market drivers

In the energy markets, the main drivers for Wärtsilä are:

- Economic growth, electrification, and improving standards of living
- Rapidly increasing use of renewables and phasing-out of inflexible thermal capacity
- Decentralised energy
- Increasing role of flexible gas
- Emerging storage technologies
- Data and digitalisation

Economic growth, improving standards of living, and consequential electrification are jointly resulting in increased electricity consumption in non-OECD countries. The development of a more sustainable energy infrastructure is being driven by climate policies and economics. Tightening emissions legislation is forcing the closure of ageing capacity, with carbon-intensive energy sources being replaced by low carbon fuels, such as natural gas and renewable power sources. Investments in renewable generation are growing as solar and wind become increasingly cost competitive. This, in turn, is decreasing the running hours of conventional thermal capacity and creating a substantial need to add flexibility into power systems through energy storage and flexible capacity. Gas as a fuel is seen as having a key role in providing flexibility to the system. In the future, gas will be more and more carbon neutral as power-to-gas technologies utilising renewable energy to produce synthetic fuels penetrate the markets. New data, along with platform-based business models and solutions, enable system level integration and asset base optimisation throughout the entire lifecycle.

Competitive landscape

Wärtsilä’s main competitors in large gas-fired projects are gas turbine manufacturers, such as GE, Siemens and Mitsubishi Hitachi Power Systems. When competing against gas turbines, Wärtsilä’s combination of high efficiency, greater fuel flexibility, and superior operational flexibility enables better value propositions for many different types of customer projects. In smaller gas power plants, and in the liquid fuel power plant market, the competitors are mainly other internal combustion engine suppliers, such as MAN Energy Solutions, Caterpillar (MAK), and Rolls-Royce, as well as high speed engine manufacturers. Wärtsilä’s advanced gas and dual-fuel engine technology, optimised modular power plants, superior project management capabilities, and the global service support provided throughout the lifecycle of installations, have led to Wärtsilä holding a leading position in the gas and liquid fuel combustion engine power plant markets. When looking at energy management systems and battery storage, the competition comes from companies such as Fluence, NEC and Tesla, among others.

Competition within maintenance activities is fragmented in nature and consists mainly of local players with a limited offering scope. The competition for lifecycle solutions comes from a few regional players capable of offering plant operational services. In asset performance management related services, there are new and more established competitors that provide software and analytics across industries, while some utilities are establishing these skills and knowledge in-house.

Wärtsilä’s strengths:

- Competitive capital cost and engineering, procurement and construction (EPC) capability
- Unique operational and fuel flexibility
- The most proven software platform for the optimisation of renewable energy sources
- Strong track-record in operations and maintenance, optimising operating costs and increasing plant availability and efficiency throughout the plant’s life
- Global technical support capabilities and know-how
Manufacturing and R&D

Wärtsilä’s approach to manufacturing emphasises safe, innovative, and digitally connected processes. A strong culture of operational excellence and a commitment to continuous improvement form the basis for ensuring on-time, cost-competitive, and high-quality deliverables from advanced production environments.

The main manufacturing activities of our digitalised factories are focused on the assembly, testing, and finishing of products, as well as on the in-house production of key components. Technology leadership is continuously emphasised in our R&D activities.

A global manufacturing footprint moving towards an Extended Enterprise Vision

We have a global manufacturing footprint that is continuously optimised for competence, availability, customer presence, and efficiency. Our assembly-based manufacturing model, which is strongly connected to a broad network of suppliers, provides a high level of flexibility in capacity.

To further leverage this network and to support our Smart Marine and Smart Energy Vision, we are investing in the creation of a Smart Manufacturing Ecosystem, wherein all the main partners, suppliers, and different manufacturing sites are connected to create an extended enterprise. The investment in the Smart Technology Hub in Vaasa, Finland, is a core element in this ecosystem.

We work in close co-operation with carefully selected suppliers from around the world, and through excellent relations and information sharing we can ensure market-conforming lead times for component supplies. The sourcing strategy emphasises performance and innovation. The aim is to continuously develop and strengthen the company’s global supply chain to maintain quality and cost competitiveness. A high level of connectivity, the smart use of advanced technologies, data integration, and seamless information sharing form the crucial backbone of Wärtsilä’s Smart Manufacturing Ecosystem. For this reason, we are piloting machine learning and analytics to secure value from data gathered throughout the value chain.

Our continuous strive for quality and efficiency is supported by the company’s strong operational excellence mindset, as well as investments in top-notch advanced manufacturing technologies and automatised solutions.

Wärtsilä’s manufacturing and R&D footprint

This pdf is composed of selected elements from Wärtsilä’s Annual Report and may deviate from other generated documents. To view the report in full, please visit www.wartsila.com/ar2019.
Towards a sustainable future through R&D

In order to power a sustainable future for the marine and energy markets, we utilise digitalisation and the development of smart technologies to deliver new products and solutions. A substantial proportion of the investments we make in product and solution development is targeted at securing environmental compliance and providing short- and long-term benefits for our customers. As a result of this approach, Wärtsilä is well positioned to support customers in reducing emissions and decreasing the use of natural resources.

Wärtsilä develops technologies that comply with ever more stringent sustainability targets, in both the Energy and Marine Businesses. New technologies are under implementation to secure both current and future sustainability demands. Such trends include a shift towards the use of carbon neutral fuels, such as bio and synthetic fuels, and Wärtsilä has both the required know-how and the technologies and products to enable this transition.

Optimising the quality of our new solutions and their time to market is carried out using increased levels of simulation, modularisation, virtual testing, and validation. The focus is on continuous improvement, thereby securing reliability and safety without compromising quality. Only after the solutions have successfully passed all the validation process steps and confirmation that the performance meets Wärtsilä’s high standards, new products can be delivered to the market.

Accelerated customer value creation through Open Innovation

Forming meaningful connections with a wide range of stakeholders, including customers, suppliers, partners, government agencies, academia and start-ups, forms the foundation for our Open Innovation activities. By co-creating and collaborating within our ecosystem, we can significantly decrease the time span from innovation to market and respond to new market needs faster. This is amplified by co-creation activities with customers to ensure that all new products and solutions create maximum value, from the assembly line throughout the full asset lifecycle.

The Open Innovation approach is promoted via our increased presence in start-up activities globally. We regularly participate in a variety of start-up accelerators and we have invited partners to co-create, prototype, and validate new products and solutions in our new Smart Partner Campus. By working together with partners in Wärtsilä R&D centres, quick insights into the potential customer values can be identified. The Open Innovation approach brings together capabilities and resources from the ecosystem to accelerate the creation of industry-leading solutions.

Research collaboration programmes

Wärtsilä participates with partners in research collaboration programmes involving universities, research institutions, and industrial partners to increase the reliability and efficiency of products, while striving to reduce their environmental impact.

The Integrated Energy Solutions to Smart and Green Shipping (INTENS) programme is one in which Wärtsilä is participating. INTENS is an industry-wide joint effort dedicated to advancing and promoting the digital transformation in marine industries and beyond.

Smart Technology Hub

Wärtsilä is building its Smart Technology Hub, a new centre of research, product development and production in Vaasa, Finland. Several major milestones in the programme were reached during 2019 as the project progressed from planning to implementation. In August 2019, the excavation work and construction was started. The groundbreaking ceremony was organised on 10 September 2019. The first transfers to the new site are scheduled to take place in late 2020, and the Smart Technology Hub is to become operational during 2021.

Inside the Smart Technology Hub, there will be a Smart Partner Campus where research and product development activities can take place together with Wärtsilä’s customers and suppliers, start-ups and universities. In March 2019, Wärtsilä selected the first partners for the Smart Partner Campus. The first phase in the concept will be designed together with Danfoss, Demos Helsinki Oy, NLC Ferry Ab Oy, Royal Caribbean Cruises Ltd, Vaasan Sähkö Oy, and University of Vaasa.
Innovating for sustainability

Wärtsilä’s purpose is to enable sustainable societies with smart technologies. As a global leader in complete lifecycle solutions for the marine and energy markets, we play a key role in providing our customers with sustainable solutions and services that maximise their environmental performance. This is the cornerstone of our commitment to sustainability, and it is supported by our strong focus on responsible business conduct.

The call for climate action, together with the world’s growing energy demand and scarcity of natural resources, is increasing the need to speed up the transition towards clean and flexible energy and low-emission and smart transportation. Wärtsilä continuously invests in developing technologies for a 100% renewable energy future and a Smart Marine Ecosystem. Sustainable innovation and product development, added with our strong emphasis on digitalisation and smart technologies, are essential for meeting current customer needs, future requirements, and for remaining an industrial frontrunner.

Creating a sustainable future through R&D

Wärtsilä develops sustainable solutions across a broad front, including technologies related to efficiency improvement, fuel flexibility, the reduction of gaseous and liquid emissions, waste treatment, noise abatement, hybrid and energy storage systems, as well as effluent and ballast water treatment. Our proactive approach to meeting future demand has resulted in the development of both primary and secondary abatement technologies and has broadened the range of usable fuels. Moreover, Wärtsilä actively develops digital innovations and advanced data analytics systems for the maritime and energy sectors. We offer intelligent digital solutions and services to collect, analyse, monitor, and report data in order to optimise operations and reduce emissions.

Our commitment to investing in research and product development benefits our customers as well as the environment, both in the short term and over a longer time span. The key features of our environmental solutions and services include:

- Compliance with environmental regulations
- Lifecycle support and optimisation
- Reliability, safety, and a long lifespan
- High efficiency
- Digital intelligence
- Low emission levels
- Renewable energy integration with engines and storage systems
- Fuel flexibility
- Dynamic capabilities
- Low water consumption

By combining these key features, and understanding the system level benefits of our offering, we are able to provide solutions that enable the development of sustainable shipping and power systems.

Improvements in efficiency

**Fleet efficiency**

Wärtsilä Fleet Operations Solution (FOS) is designed to achieve the highest level of safety at sea, increase fleet efficiency and simplify everyday tasks both ashore and on board. FOS unites all navigational processes and voyage data on a single platform, making the crew and the operations centre work as one. FOS offers improved operational processes relating to fleet performance, voyage planning and execution, weather routing, and ship-to-shore reporting in compliance with environmental regulations such as EU-MRV and IMO-DCS.
Total vessel and voyage efficiency
An efficient and low emission system for the entire vessel is achieved by combining optimised ship design with Wärtsilä’s knowledge of automation, machinery, propulsion, and control systems. Wärtsilä has developed numerous efficiency concepts, such as the Electric Propulsion Systems Low Loss Concept (LLC) and Low Loss Hybrid (LLH). Wärtsilä also offers vessel and voyage efficiency optimisation services that improve energy efficiency, reduce emissions and costs, and help make the best possible decisions for asset management and voyage performance.

Power plant efficiency
Wärtsilä engine-based power plants offer the highest single cycle efficiencies with outstanding flexibility using a broad range of fuels. Total plant efficiency can further be improved and optimised by adding hybrid solutions, Flexicycle™ solutions (steam combined cycles), combined heat and power (CHP), trigeneration (power, heat and cooling), and also through Wärtsilä lifecycle solutions, which ensure that the power plant operates in the most energy-efficient way and in accordance with regulations. Wärtsilä also offers tools for the smart integration of energy production and storage at the system level.

Engine efficiency improvements
A long-term focus on improving engine efficiency has resulted in Wärtsilä engines having the highest efficiency ratings among existing prime movers. A key success factor has been the development of integrated engine functionalities that enable low emissions and high engine efficiency. The Wärtsilä 31 engine has the best 4-stroke engine fuel economy in the world. The Wärtsilä 31SG is the newest gas engine we offer, taking efficiency to a new level for internal combustion engines.

Propulsion efficiency upgrades
Propulsion products incorporate environmental features and are critical to the overall environmental impact of the vessel. Wärtsilä’s generation propulsion units and energy saving solutions, such as the Wärtsilä EnergoFlow, result in significant fuel efficiency improvements by up to 10% and reduce NOx and CO2 emissions.

Reducing emissions to air

CO2 and other greenhouse gas (GHG) emissions
Wärtsilä focuses on the development of technologies that reduce GHG emissions in numerous ways. These include, among others, gas and multi-fuel engines, as well as solutions for environmentally advanced vessels, voyage optimisation, and energy storage. Wärtsilä’s flexible energy solutions enable a transition towards a 100% renewable energy future. At the system level, GHG emission reduction is achieved by enabling the optimal integration of renewable energy sources and the use of renewable fuels.

SOx emissions
Wärtsilä provides several solutions to help customers reduce emissions of SOx and comply with local and global regulations. Wärtsilä’s technology development supports solutions that enable the use of fuels with different sulphur contents, as well as systems that clean sulphur from exhaust gas and enable the use of alternative fuels with close to zero sulphur content, e.g. natural gas. Wärtsilä exhaust gas cleaning systems (EGCS) not only reduce SOx emissions but also remove large levels of particulate matter (PM) and black carbon. The Wärtsilä EGCS can be customised for both the 0.1% limit in Emission Control Areas (ECA) and the global 0.5% cap agreed within the IMO.
NO\textsubscript{x} emissions
All Wärtsilä marine engine portfolio products are IMO NO\textsubscript{x} Tier II compliant. Wärtsilä solutions for IMO NO\textsubscript{x} Tier III compliance are Selective Catalytic Reduction (SCR), dual-fuel engines in gas mode, and pure gas engines (Wärtsilä 31SG). The NO\textsubscript{x} emission levels of Wärtsilä stationary engine-based power plants are low enough to meet the most current environmental regulatory requirements. To comply with even the strictest environmental regulations, Wärtsilä offers solutions such as SCR.

Protecting the marine environment

Ballast water management systems
Wärtsilä’s Aquarius range of IMO and USCG approved Ballast Water Management Systems (BWMS) limit the spread of ballast water related invasive species and prevent their introduction to aquatic ecosystems. The Aquarius BWMS range offers both Ultraviolet UV (USCG type approved) and Electro Chlorination EC technology (USCG type approved).

Waste treatment
Wärtsilä offers a complete, fully integrated wet and dry waste treatment system suitable for all vessel types and sizes. Wärtsilä’s innovative advanced waste water treatment technology, with external membrane separation, is based on biological degradation. The system allows for the high purity treatment of black and grey water in accordance with the most stringent global legislation, including the removal of nutrients such as phosphorous and nitrogen compounds, as required for special areas such as the Baltic Sea and Alaskan waters. Wärtsilä’s waste management product range also includes vacuum toilets and collection systems, food waste collection & treatment systems, solid waste handling, drying and incineration, and sewage treatment plants.

Sustainable Innovations in 2019
The Wärtsilä 31 engine application range was expanded during the 2019, with the Wärtsilä 31SG pure gas engine being made available to the marine sector and the Wärtsilä 31DF multi-fuel engine to the power generation markets. The development of these engines is a direct result of Wärtsilä’s on-going commitment to reduce greenhouse gas emissions from its gas engines by 15% by 2020 from 2015 levels. For the energy market, Wärtsilä also launched a hybrid energy solution for isolated and remote grids and a Modular Block power plant solution. For the marine markets, Wärtsilä launched several solutions in support of its Smart Marine Ecosystem vision, including new navigation solutions, hybrid solutions, and offering aimed at smarter performance and greater profitability.

Smart Energy Systems

Launch of Engine+ Hybrid Energy: As with a hybrid vehicle, the solution pairs engines with energy storage to form a fully integrated, automated system that provides reliable and environmentally sound power generation with improved efficiency for isolated and remote grids, such as mining operations and other self-generation systems. The solution enables greater efficiencies, maintenance optimisation, emission reductions, and a more streamlined addition of renewables into power systems.
Introduction of the **Modular Block power plant solution**: This pre-fabricated, modularly configured, and expandable enclosure for Wärtsilä medium-speed 34SG gas engine generators enables the reduction of on-site installation time from several months to a few weeks. It also makes Wärtsilä’s advanced medium-speed engine technology available for applications where it would not otherwise be viable. Medium-speed engine technology has inherently higher efficiency and lower lifecycle costs than containerised high-speed engines or gas turbine solutions. The Wärtsilä Modular Block is easy to integrate with renewable energy and storage systems. It is ideal for providing grid stability and balancing when integrating renewable energy sources with intermittent production.

Introduction of the **Wärtsilä 31DF multi-fuel engine** to the energy industry: Wärtsilä’s latest engine and power plant solution to the power generation markets offers high efficiency and reduced fuel consumption and costs, while minimising carbon emission levels. The level of efficiency is retained even in partial load conditions, and the engine can resist output de-rating when operating in hot and humid conditions.

**Smart Marine Ecosystems**

Launch of **RS24 high resolution radar**: The RS24 is the world’s first commercially available K-band maritime radar. By detecting far smaller objects and at a much higher radar resolution than conventional S or X-band radars, the RS24 enables small vessels and other potential hazards close to large ships to be visible. This promotes safety, especially in congested shipping lanes and busy ports. The technology was developed by Guidance Marine, a Wärtsilä company.

Launch of the **Wärtsilä HY for Dredger**: This new product is based on Wärtsilä’s HY hybrid propulsion technology. It is aimed specifically at enhancing the efficiency and sustainability of dredging operations. The Wärtsilä HY for Dredger features a combination of different power sources, including engines and energy storage systems, power distribution equipment, and the Energy Management System (EMS). Sustainability is enhanced with reduced emission levels in all modes, with zero emissions attained when running in full battery mode.

Unveiling of the new **Navi-Planner voyage planning and optimisation solution**: Developed by Transas, a Wärtsilä company, the new Navi-Planner makes use of the connected Electronic Chart Display and Information System (ECDIS) to significantly shorten voyage planning and to provide a minimum navigational safety standard for less experienced crews.

Introduction of the new **digital version of Operim – Operational Performance Improvement & Monitoring**: Operim provides owners and operators with constant, real-time data on Wärtsilä products and solutions installed on their vessels and utilises the latest digital technology to provide the data needed to allow the vessels, and the machinery driving them, to be operated at optimal efficiency at all times. It monitors performance constantly so that adjustments can be made as operating conditions, including external factors such as sea and weather, change.

Upgrade and redesignation of the LJX series of **modular waterjets to the Wärtsilä WXJ series**: The development is based on a new axial pump design, which boosts performance with an increased thrust of as much as three percent, while the improved cavitation margins help reduce the environmental impact by lowering noise levels.
Launch of the Wärtsilä 31SG pure gas engine for marine market applications: The Wärtsilä 31SG engine further reduces the total cost of ownership and the environmental footprint of vessels operating in regions where there is a developed gas infrastructure.

Launch of Wärtsilä Dualguard – a new sealing solution for oil-lubricated vessels: The solution alleviates the risk of operational oil leakages and related non-compliance. It withstands extreme conditions, safeguards against fishing lines and other debris, and lessens the likelihood of a bonding failure, delivering enhanced operational and environmental efficiency.

Partnerships enhancing sustainability

In 2019, Wärtsilä signed several new partnership agreements and joined initiatives with leading and pioneer companies, universities, and other organisations to put the company’s purpose and strategic goals for a 100% renewable energy future and a Smart Marine Ecosystem into action. These partnerships aim to enhance new research and cooperation on innovative sustainable solutions, improve efficiency, and accelerate the development of close to zero emissions shipping and clean fuels.

University partnerships enhancing research

Wärtsilä signed a partnership agreement with Aalto University in Finland to strengthen and broaden current cooperation, and to create solutions to challenges related to climate change, scarcity of natural resources, and digitalisation. Wärtsilä also signed a research agreement with Lappeenranta-Lahti University of Technology (LUT) in Finland on strategic power system modelling, with the aim of understanding and developing paths towards 100% renewable energy systems. Under the agreement, LUT University's solar economy research group will support Wärtsilä’s development work and provide access to LUT University’s power systems database.

Improved efficiency

Wärtsilä and Samsung Heavy Industries (SHI) signed a joint development project agreement aimed at improving the efficiency of LNG carriers and shuttle tankers. The joint development with SHI supports Wärtsilä’s commitment to creating greater efficiencies, better environmental sustainability, and improved safety for its customers.

Towards close to zero emissions shipping

Wärtsilä, together with five other leading Nordic industrial companies, joined forces to explore the fastest routes to zero emissions shipping under the Zero Emission Energy Distribution at Sea (ZEEDS) initiative. In addition, Wärtsilä joined the Getting to Zero 2030 Coalition, which is committed to getting commercially viable deep-sea zero emission vessels powered by zero emission fuels into operation by 2030. Along with 74 other organisations, Wärtsilä is committed to the decarbonisation of deep-sea shipping and its energy value chains, in line with the most ambitious interpretation of the IMO’s carbon emissions reduction strategy and the latest relevant IPCC climate science.

Moreover, Wärtsilä and Singapore-based PSA Marine agreed to collaborate in the co-creation of smart technologies for the marine sector, including the use of electric or hybrid technologies that further the use of low-emissions energy and propulsion systems. The intention is to integrate the deep capabilities developed in the IntelliTug project with new configurations and concepts of hybrid, electric, and other clean energy sources. Wärtsilä also signed a strategic five-year development agreement with Chinese state-owned shipbuilder CSSC Huangpu Wenchong Shipbuilding Company Limited to develop jointly a hybrid powered dredger, but possibly extending to other hybrid vessels as well.

Clean fuels

Wärtsilä provided seed funding to Soletair Power Oy, a Finland based start-up company operating in the field of Power-to-X. Soletair Power Oy has developed a unique concept to improve air quality in buildings by capturing CO₂ and converting it to synthetic renewable fuel. In addition, Wärtsilä and Q Power Oy, a Finnish pioneer in
biomethanisation, signed a cooperation agreement to accelerate the development and commercialisation of renewable fuels. The companies will work closely together to further develop the market and to find business opportunities for biomethanisation and synthetic fuels globally. The collaborations with Soletair Power and Q Power are a continuation of Wärtsilä’s way of working with start-ups and other energy players to develop and scale up technologies and business opportunities that support a 100% renewable energy future.

Why invest in Wärtsilä

Wärtsilä’s strengths lie in our integrated services and solutions offering, data-driven innovations, close and long-standing customer relationships, and an unparalleled global presence.

Supporting customers with lifecycle solutions

Our business model is based on providing the marine and energy markets with smart technologies and optimised lifecycle services. Our service activities represent approximately 50% of total net sales, providing a good foundation for achieving the long-term target of profitable growth.

The demand for Wärtsilä’s services is supported by the increasing technological sophistication of the installed equipment base. Our commitment to investing in digitalisation provides opportunities to further develop our value-adding customer offering, for instance by leveraging advanced diagnostics to optimise performance.

A leader in smart technology for the marine and energy markets

The shift towards clean and flexible energy production, and the need for efficient and safe transportation, form the basis of our offering of smart solutions. As an industry frontrunner, we are committed to responding to the need for innovative and energy efficient solutions. Our digital transformation will provide enhanced customer value through an increased focus on collaboration and knowledge sharing. Continuous investments in research and development are vital for ensuring the competitiveness of our product portfolio and for securing a leading position in sustainable innovation.

A capital-light business model emphasising increased efficiency

Our manufacturing model is assembly-based, with shared production and R&D facilities. This creates flexibility in aligning operations to market conditions and synergies in innovation processes. We focus on continuous process improvement throughout the organisation in order to achieve operational excellence.

Investing in technological leadership and providing shareholder returns

Our sound financial position enables investments in research and development activities and developing the business through acquisitions, while offering solid dividends to our shareholders.
Wärtsilä’s share price development in 2019

Q1
Growth in net sales, good development in profitability

Q2
Stable development in net sales, equipment profitability challenging

Q3
Project related challenges and low equipment demand - revenues actually remained sound

Q4
Net sales increased but project challenges still burdened operating result

6.1. Wärtsilä initiated a formal process to re-align its operations and resources to secure future profitability and competitiveness.

11.2. Wärtsilä and Auto University in Finland signed a Partnership Agreement that aims at strengthening and broadening their cooperation.

7.3. The Annual General Meeting was held in Helsinki.

11.3. Wärtsilä was contracted to deliver a 132 MW duel-fuel power plant to Bahamas on a fasttrack, EPC basis.

15.9. Wärtsilä successfully tested its remote guidance services onboard the Auto ferry Huskybergen Finn.

18.9. The first dividend installment of EUR 0.26 per share was paid.

20.9. Wärtsilä was awarded a contract to supply an integrated package of products, systems, and solutions to Wasselin’s new, efficient and environmentally sustainable RoPax ferry.

20.9. Wärtsilä selected its first cooperation partners for Smart Partner Campus, a flexible smart marine and smart energy platforms.

10.4. Wärtsilä launched Wärtsilä Online, a new web-based customer platform.

14.4. Wärtsilä agreed to provide seed funding to SolarBay Power Oy, a Finland-based startup company operating in the field of Power-to-X.


2.5. Wärtsilä acquired Ships Electronic Services Ltd, a UK-based company specialising in navigation and communication electronics.

3.8. Wärtsilä secured the first order for SmartDesk, making it the world’s first commercially available auto-doctoring solution.

4.6. Wärtsilä introduced a digital version of Optim-OM = Operational Performance Improvement & Monitoring, as well as the new Navitimer voyage planning and optimisation solution.

11.6. Wärtsilä launched its Modular Block power plant solution.

17.6. Wärtsilä secured a 2-year maintenance management and operational advisory agreement for two power plants in Bangladesh.

9.7. Wärtsilä announced an order to deliver the marine sector’s first hybrid installation for a bulk carrier.

3.8. Wärtsilä introduced the Wärtsilä 31DF multi-fuel engine for the power generation markets.

11.8. Wärtsilä secured a 5-year extension to a guaranteed asset performance agreement for a combined heat and power plant in Hungary.

12.9. Wärtsilä announced an order to fit the new WaspAir RoPax ferry with the Nacos Platinum navigation and communication system.

17.9. Wärtsilä launched the Wärtsilä 31SG pure gas engine for marine applications.

26.9. Wärtsilä and Q Power Oy signed a cooperation agreement to accelerate the development and commercialisation of renewable fuels.

27.9. The second dividend installment of EUR 0.24 per share was paid.

25.10. Wärtsilä co-founded a global cyber security alliance, which aims to bridge dangerous gaps in security for operational technology and industrial control systems.

25.10. Wärtsilä appointed Ari Dettle as Executive Vice President, Human Resources.

7.11. Wärtsilä’s autonomous harbour tug (Intelligent project) proceeded with the successful installation of a twin-driven Dynamic Positioning system onboard a harbour tug.

15.11. Wärtsilä and Singapore-based FSA Marine agreed to collaborate in the co-creation of smart technologies for the marine sector.


25.11. Wärtsilä received a strategically important order to supply its first operations solution to Anglo-Eastern’s global fleet of more than 600 vessels.

2.12. Wärtsilä secured an order to provide a full energy storage solution for one of the largest hybrid power projects at an offshore wind farm in Mål.

12.13. Wärtsilä announced the divestment of its ELAC Nautik business.

16.12. Wärtsilä announced the first order of the Wärtsilä Modular Work to be delivered in Mål.

17.12. Wärtsilä secured an order to supply its Vessel Traffic Service solution to two of France’s leading ports, Cales and Boulogne.
Wärtsilä is included in the following sustainability indices:

- FTSE4Good Index
- MSCI Global Sustainability Index Series
- Ethibel Sustainability Index (ESI) Excellence Europe
- ECPI Global Carbon Equity Index & ECPI Global ESG Best in Class Equity Index
- OMX GES Sustainabiity Finland Index
- S&P Global, The Sustainability Yearbook 2020
- STOXX Global ESG Leaders Index
- Dow Jones Sustainability Indices
- S&P Europe 350 ESG Index