



WÄRTSILÄ

This is
Wärtsilä



This is Wärtsilä

Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets. By emphasising sustainable innovation, total efficiency and data analytics, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers.

In 2017, Wärtsilä's net sales totalled EUR 4.9 billion with approximately 18,000 employees. The company has operations in over 200 locations in more than 80 countries around the world. Wärtsilä is listed on Nasdaq Helsinki.

VALUES

**Energy,
Excellence,
Excitement**

PURPOSE

**Enabling
sustainable societies
with smart technology**

"Central to our purpose is the commitment to promoting a low emissions economy, and providing intelligent ways of producing and using energy."

JAAKKO ESKOLA, PRESIDENT & CEO



NET SALES, EUR

4,923

MILLION

PERSONNEL

18,065

EMPLOYEES

INSTALLED BASE

~180,000

MW

Net sales by market area, % of Wärtsilä's total net sales



Americas

23%



1,960
EMPLOYEES

Europe

31%



10,463
EMPLOYEES

Africa

5%



665
EMPLOYEES

Asia

40%



4,890
EMPLOYEES

In other areas, net sales totalled EUR 102 million and the number of employees was 88.

Business areas

SERVICES



45%

OF WÄRTSILÄ'S
NET SALES

Wärtsilä Services creates lifecycle services for its customers, enhancing their business – whenever, wherever. Wärtsilä provides the industry's broadest range of services for both shipping and power generation. The service solutions range from spare parts and technical support to ensuring maximised lifetime, increased efficiency and guaranteed performance of customers' equipment or installation – in a safe, reliable, and environmentally sustainable way.

ORDER INTAKE
EUR
2,481
MILLION

NET SALES
EUR
2,215
MILLION

NO. OF
EMPLOYEES
10,624

ENERGY SOLUTIONS



28%

OF WÄRTSILÄ'S
NET SALES

Wärtsilä Energy Solutions is a leading global systems integrator offering a broad range of environmentally sound solutions. Wärtsilä supplies ultra-flexible internal combustion engine based power plants, energy storage systems, and utility-scale solar photovoltaic (PV) power plants, as well as liquefied natural gas (LNG) terminals and distribution systems. These flexible and efficient solutions provide superior value to customers and enable a more sustainable and modern energy system for future generations.

ORDER INTAKE
EUR
1,685
MILLION

NET SALES
EUR
1,401
MILLION

NO. OF
EMPLOYEES
1,038

MARINE SOLUTIONS



27%

OF WÄRTSILÄ'S
NET SALES

Wärtsilä Marine Solutions enhances the business of its marine and oil & gas industry customers by providing innovative products and integrated solutions that are safe, environmentally sustainable, efficient, flexible, and economically sound. Being a technology leader, and through collaboration and knowledge sharing, Wärtsilä is able to customise solutions that provide real value to its customers around the world.

ORDER INTAKE
EUR
1,478
MILLION

NET SALES
EUR
1,307
MILLION

NO. OF
EMPLOYEES
5,845

Market drivers & strengths by business area

The main driver for the Services business is the size and development of Wärtsilä's installed equipment base, which consists of propellers, engines and other products. The market conditions faced by Wärtsilä's end customers have a direct impact on the utilisation rate of installations in operation, and dictate the need for services relating to maintenance, lay-down, or redeployments. Throughout the lifecycle of any installation, there are various maintenance requirements and possible needs for upgrades or life-extension services. There may also be a need for equipment retrofits and upgrades based on structural changes in the operating environment, such as changes in the availability or pricing of fuels, regulatory developments, or increased safety requirements. The interest for lifecycle solutions in the form of partnership agreements is evident in the marine and oil & gas markets, as well as in the energy industry. Such agreements further the optimisation of both maintenance and performance, thereby improving operational efficiency, reducing costs, and creating business growth.

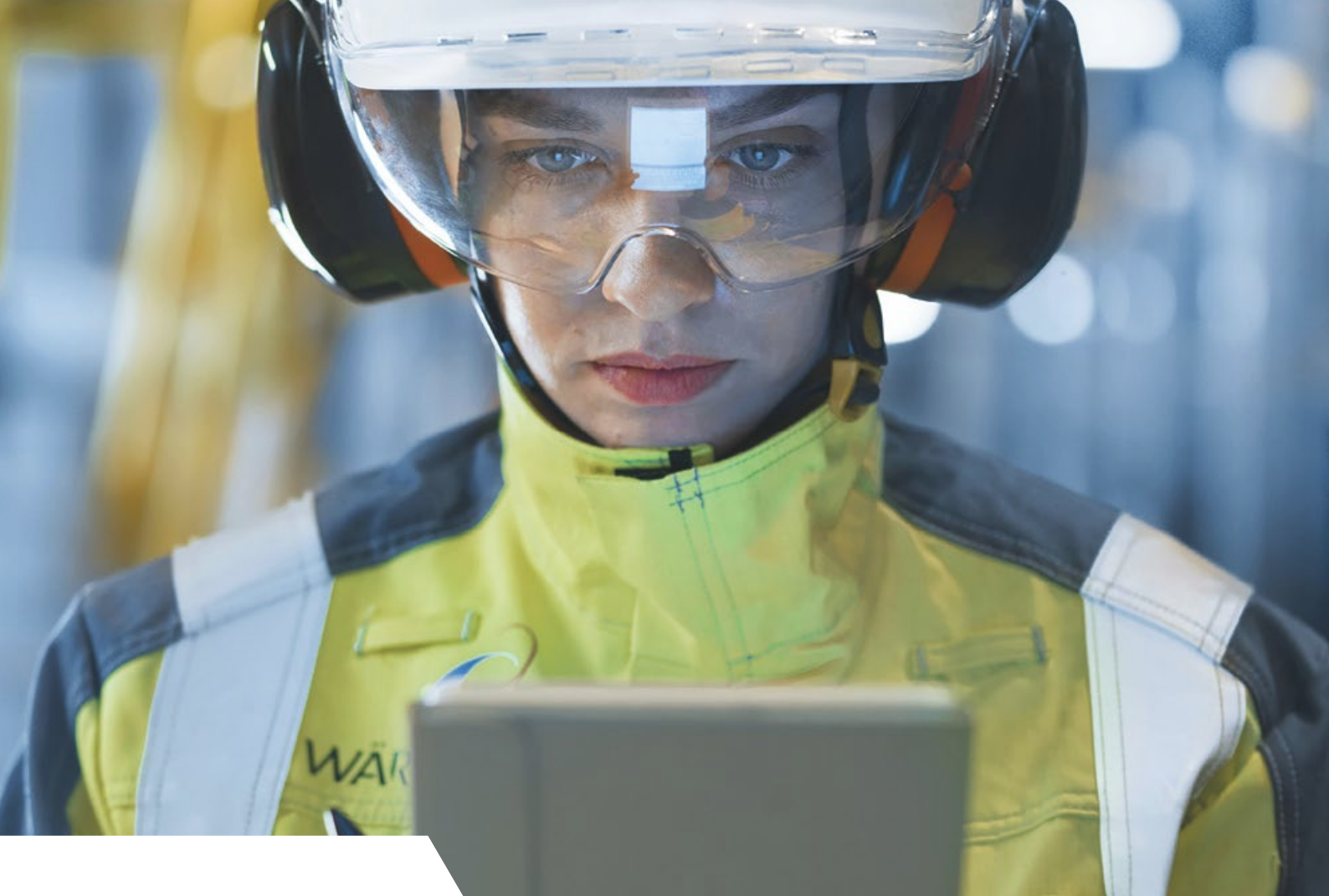
- Long-term relationships with customers and an in-depth understanding of the operation of their assets
- A complete lifecycle service offering and an unmatched global service network
- The capability to deliver operational and asset performance optimisation globally
- State-of-the-art digital solutions for enhancing customer businesses based on optimising, predicting and solving, utilising the benefits of real-time data, and data analytics
- Technical support capabilities and know-how
- The track record and capability to deliver complex projects with performance guarantees

Economic growth, improving standards of living, and electrification are resulting in increased electricity consumption in non-OECD countries. The demand for flexible baseload power plants, as well as for industrial self-generation, is driven by the price of electricity purchased from the local grid, and by fuel price projections. The introduction of gas supply networks to the emerging markets is resulting in increased demand for gas and dual-fuel driven power plants. In the OECD countries, tightening emissions legislation is forcing the closure of ageing capacity, which in turn drives the demand for new investments. Furthermore, the political emphasis towards low carbon power systems is resulting in rapidly increasing levels of renewable generation and creating a substantial need to add flexibility into power systems.

- Competitive capital cost and EPC capability
- Unique operational and fuel flexibility
- The most efficient solution for integrating renewable energy sources
- System integration offering with lifecycle support
- Value added hybrid solutions for existing and new customers
- A leading position in the emerging energy storage market

The global demand for new vessels in the shipbuilding and shipping industries is mainly driven by developments within the global economy and the resulting impact on trade and transportation capacity requirements. The price, availability, and demand for fuel drives development in the oil & gas industry, while in the general shipping industry, fuel costs increase the demand for more efficient vessels. Other factors, such as shipyard capacity, newbuild prices, decommissioning and scrapping, as well as interest and freight rates, also affect these industries. Another important driver is the increasing level of environmental regulations and their impact on the demand for optimised vessel efficiency, environmental solutions, and gas as a marine fuel.

- Strong presence in all major marine and offshore oil & gas segments
- Broadest portfolio of reliable and high performing products, systems, and solutions in the industry
- Fuel efficient solutions that are compliant with the strictest environmental requirements
- Extensive expertise in serving the entire gas value chain
- Delivering cost efficiencies and unlocking new revenue streams through integration, digitalisation and interconnectivity
- Hybrid propulsion combining energy storage and engines for better efficiency and greater sustainability



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 offering of smart solutions to the marine and energy markets. With an integrated portfolio of services, systems and products, the company is well positioned to respond to the demand for energy efficient and innovative solutions. The emphasis is placed on optimising installation performance throughout the lifecycle, using data analytics and artificial intelligence to support customers' business decisions. Wärtsilä's digital transformation will provide increased customer value through a new era of collaboration and knowledge sharing. A strong presence in key markets and a superior global service network support the company's profitable growth ambitions.

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. The investments in R&D and the focus on digitalisation create a strong foundation for securing and strengthening a 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 implementation of operational excellence ensures that Wärtsilä is easy to do business with, and drives increased productivity and efficiency throughout the lifecycle.

COMMITTED TO SUSTAINABILITY

Wärtsilä's aim is to meet shareholder expectations and contribute toward 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.

Wärtsilä's overriding promise is to supply technologies and services that offer high efficiency with low environmental load. The objective is to continuously improve the environmental performance of products and services taking into account the lifecycle perspective, as well as to maintain technological leadership through R&D and by utilising new technologies and collaborating with customers and other stakeholder groups. In doing this, Wärtsilä helps its customers and society at large to meet the goals of the tightening global environmental regulations and guidelines.

Wärtsilä acts as a good corporate citizen wherever the company is active. Business operations and relations with stakeholders are governed by Wärtsilä's Code of Conduct. Wärtsilä is a responsible employer, and seeks to offer its 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 employees and contractors, and to minimise the health and safety risks associated with the use of the company's products and services. Supply chain management and development are integral elements of Wärtsilä's operations.



SMART ENERGY

Wärtsilä's objective is for customers to recognise the company as the leading energy systems integrator, providing all the essential technologies, services, and solutions for sustainable and reliable power systems.

The energy landscape is experiencing a paradigm shift, thus creating a more complex operating environment for the industry. The world is moving from traditional baseload generation to renewable energy, while storage technology is disrupting old design principles and the importance of gas is increasing. Simultaneously, the role of consumers in energy production is increasing. Digitalisation 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 engine power generation solutions provide a unique combination of energy efficiency, and both fuel and operational flexibility. Wärtsilä supports the continued development of the gas infrastructure with small and medium size LNG terminals and liquefaction solutions. Responding to the increasing use of renewable power sources, the company seeks growth by offering solar PV power plants, energy storage solutions, and advanced integration software. 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, systems integration, and lifecycle optimisation.

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, Wärtsilä aims to unlock new customer values through connectivity, digitalisation and smart technology.

The marine industry is moving towards a future that is increasingly connected. The opportunities offered through smart technology will foster a new era of collaboration and knowledge sharing with customers, suppliers, and partners. Industry players are faced with major sources of inefficiency that impose a significant negative impact on business operations and profitability, the three most notable being 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 the Wärtsilä marine strategy towards ecosystem thinking. Wärtsilä sees four primary forces that will re-shape the industry. Shared capacity will improve fill rates and reduce unit costs; big data analytics will optimise both operations and energy management; intelligent vessels will enable automated and optimised processes; and smart ports will result in smoother and faster port operations.

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 Wärtsilä's broad portfolio of products, systems, solutions, and lifecycle services, and its vast installed base and industry know-how, the company 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 safety to the shipping industry, leading to 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.

Sustainability

As a global leader in complete lifecycle solutions for the marine and energy markets, Wärtsilä plays a key role in providing environmentally sound solutions and services that enable its customers to develop their businesses in a sustainable way. This approach is the basis of the company's sustainability work and is supported by its strong commitment to responsible business conduct.

WÄRTSILÄ'S SUSTAINABILITY APPROACH

Our commitment to sustainability and responsible business is based on our purpose and strategy, which along with our sustainable development objectives create the framework for developing the company's activities and products. Wärtsilä's strategy is based on three key areas, energy efficient solutions, lifecycle optimisation, and innovative solutions, all of which contribute to a more sustainable future in both the energy and the marine industry.

Our strength is our technological leadership and therefore technology plays a central role in our sustainability work. Wärtsilä's Energy Solutions and Marine Solutions businesses focus on developing and providing sustainable solutions for the industries in which they operate, whereas Wärtsilä Services has a key role in supporting our solutions and providing the latest technologies for existing installations through upgrades and modernisation packages. The utilization of lifecycle data analytics will enhance our efforts on enabling sustainable societies with smart technology.

Suppliers and business partners are an important and integral part of the total value chain of the products and services of Wärtsilä. They are expected to conduct their businesses in compliance with the same high legal and ethical standards and business practices as Wärtsilä.

INNOVATING FOR SUSTAINABILITY

To secure its leading position at the forefront of sustainable innovation, Wärtsilä continuously invests in technology development. Wärtsilä focuses on improving the energy efficiency of its products, while simultaneously striving to reduce their emissions. As part of its sustainable innovation approach, Wärtsilä seeks to create solutions that benefit the entire power system and marine ecosystem.

Innovation and product development, and the willingness to explore new technologies are essential for meeting current customer needs, as well as for being prepared for future requirements, and remaining an industrial frontrunner. Wärtsilä develops environmentally sound products and solutions across a broad front, including technologies related to efficiency improvement, the reduction of gaseous and liquid emissions, waste reduction, noise abatement, as well as effluent and ballast water treatment. The company's 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. Wärtsilä actively seeks to utilise opportunities provided by the digital transformation taking place in the maritime and energy sectors. Wärtsilä's commitment to investing in research and product development benefits both its customers as well as the environment, both in the short-term and over a longer time span.

WÄRTSILÄ'S SUSTAINABILITY GOALS

Wärtsilä's sustainable development is based on three closely interrelated pillars: economic, environmental, and social performance. In the field of sustainable development, Wärtsilä's overriding focus is on the following:

- Economic: profitability
- Environment: environmentally sound products and services
- Social: responsible business conduct

From a sustainability impact point of view, product-related environmental issues are the most significant for Wärtsilä.

THE KEY FEATURES OF WÄRTSILÄ'S ENVIRONMENTALLY SOUND SOLUTIONS INCLUDE:

- Reliability, safety, and long life span
- Low emission levels
- The ability to utilise renewable energy, including storage systems
- Fuel flexibility
- Efficiency improvement with lower lifecycle costs
- Low water consumption
- Design and operational optimisation of vessels

SUSTAINABILITY HIGHLIGHTS



10.2.

Wärtsilä joins Seabin Project in the battle against ocean plastics.

22.3.

Wärtsilä contracted to supply a solar PV plant to Burkina Faso – creating Africa's largest engine-solar PV hybrid power plant.

18.5.

Wärtsilä acquires Greensmith Energy Management Systems Inc. enabling Wärtsilä to expand its footprint in the energy storage market and position itself as a leading global energy systems integrator.



30.5.

A new era of technological evolution arrives with the first order for the Wärtsilä HY, a hybrid power module that combines engines, an energy storage system, and power electronics.

31.5.

Wärtsilä introduces its Eniram SkyLight 2.0 monitoring & predictive analysis system update. The Eniram SkyLight 2.0 adds nautical maps, weather layers, and route importation to make predictive analysis and proactive planning more available. The updated system can visualise a vessel's route from economic, environmental, and safety perspectives.



30.6.

Wärtsilä joins the Global Industry Alliance, a new public-private partnership initiative of the IMO, which aims to bring together maritime industry leaders to support an energy efficient and low carbon maritime transport system.

7.9.

Wärtsilä included in the Dow Jones Sustainability Indices (DJSI).



20.9.

Wireless charging of a hybrid coastal ferry successfully tested.

15.11.

Introduction of the Wärtsilä 31SG engine raises simple-cycle efficiency to an entirely new level.



The tale of a North Sea Giant

When North Sea Shipping AS discovered the efficiencies they could achieve with energy storage, they decided that their North Sea Giant, one of the offshore industry's largest and most advanced subsea construction vessels, would be the first such vessel in the world to benefit. In 2017, Wärtsilä agreed to carry out the retrofit project.



HARALD TORBJØRN KLEPSVIK
Owner,
North Sea Shipping AS:

"The relationship between Wärtsilä and North Sea Shipping is long established, and we have had ten vessels with Wärtsilä systems on board. This collaboration goes back many years, and we have always been challenging each other in various ways to find the best solutions. That is also why we started with the battery system. We contacted Wärtsilä and we sat down to discuss how to come up with a system that could deliver operational savings based on efficiency improvements."



TORE MARKHUS
General Manager,
E&A Services,
Wärtsilä Norway AS:

"In 2014, we carried out a modification to one of North Sea Shipping's vessels, the Atlantic Guardian. The experience from that case caused the customer to see the actual amount they were saving in fuel costs. This pushed them towards examining what we could do with other vessels to make them even more efficient.

Discussions regarding North Sea Giant began in 2017. Throughout the year, we were looking – together with the customer – at the possible alternative solutions for this vessel. We began exploring the idea of combining traditional diesel engine operation with batteries and operating the vessel using fewer engines."



SVEINUNG ØKLAND,
Operation Manager,
North Sea Shipping AS:

"Battery solutions on other vessels have been done before, but not on this scale, and not according to this concept. So, by leveraging Wärtsilä's background and competences, we knew this would work, although we also knew it might take some time to adjust and to tune the system being installed on the North Sea Giant. Such a complex system has never been installed on a sub-sea construction vessel. But the track record of the technology is certainly there, so we have every confidence that this really works."



TORE MARKHUS:

“We at Wärtsilä have been involved in developing marine-power battery solutions for several years, with more and more cases emerging each year. This is something the offshore community has become increasingly interested in.

It’s not a one-size-fits-all approach, however. For expansive installations such as this one, the project planning plays a significant role with a tailored solution being designed, even before any agreement is signed.”

HARALD TORBJØRN KLEPSVIK:

“Working with Wärtsilä on this case, we have had very fruitful meetings, as we always do. We begin by making sure that everybody understands what we want out of the system, before going into the detailed planning. The feedback stages have also been excellent, and Wärtsilä keeps us up to date consistently with all the necessary information needed to make crucial decisions leading up to the project execution.”

TORE MARKHUS:

“Vessels like the North Sea Giant operate with six diesel engines powering the electrical system on board. With this new installation, we are adding three energy storage units to that mix. This will be a backup system – the customer could still operate the vessel with all engines, but in addition they will have several megawatts in reserve available from the batteries.

When they really want to operate efficiently, they will run with only one engine connected to the grid, along with the battery units. In this way, the batteries will act as a power backup to handle low peaks in the systems if they suddenly require additional power for certain operations – on these occasions the batteries will kick in and cover that need. They will also work together with the engines in such a way that allows the

engine to be operated at its optimal load level, which of course improves fuel consumption and reduces the exhaust emissions as well.”

SVEINUNG ØKLAND:

“Systems like the one Wärtsilä has developed for us here will be the standard on all our vessels in future, that’s for sure. The industry’s increasing focus on climate change demands it. For today’s circumstances, the battery-hybrid solution is the most prudent technology, and it doesn’t take that much space to install it. Alternative options, with hydrogen for example, the installation takes a lot of space, not to mention that it’s not easy to get hold of hydrogen and the infrastructure is not in place yet. So, I believe that battery technology will play a major role in future new builds. And you can see the same thing happening with new ferries – everybody is including battery packages.”

TORE MARKHUS:

“The North Sea Giant is a DP3 vessel, which puts it in the most advanced category of vessels that apply dynamic positioning. Retrofitting an energy storage solution on this class of vessel has never been executed before, and the process actually required the applicable classification rules to be re-defined. This meant that in addition to planning an ambitious installation, we also had to work closely with the customer and the DNV-GL classification society to create new classification rules as well.”

SVEINUNG ØKLAND:

“The community of operators in Norway and beyond is now very curious about this type of energy storage solution and want as much information as possible. This will be the new future. If they want to stay competitive, they just have to pursue it.” ■

Beyond the battery

In 2017, the Wartsilä group acquired Greensmith Energy Management Systems Inc., a market leader in grid-scale energy storage solutions, integration and software. John Jung, Greensmith's President & CEO, outlines the company's exciting contributions to the future of integrated energy within an intelligent grid.



Any discussion with **John Jung**, President & CEO of Greensmith Energy, is likely to provide a fresh perspective on the matter at hand. It's easy to see why, in 2009, when a group of investors saw the potential for creating a new contender in energy storage, they elected to put Jung at the helm.

Even though the market potential for battery-based energy solutions was already in the air, Jung was keen to push for a more expansive outlook for the electrical grid and differentiated technology approach:

"I decided to set a very different strategy and course for the company than the rest of the industry, which was fascinated with finding a better battery or trying their hand at small systems for home use. I believed that it was important to have a larger impact on the grid by going utility-scale right away."

"I also believed that while they're merely components, battery innovations would continue to be developed indefinitely, and that no particular battery would be appropriate for all uses of energy storage. Most importantly, I felt there was greater value in thinking about energy storage as a distributed computer that – like data centres and now cloud computing – could be built large or small, integrated into a network as appropriate, and serve different jobs simultaneously."

Jung saw energy storage technology as having the potential to become a flexible, programmable asset – one that would deliver value as a generation or distribution asset – and could complement other grid assets through integration and optimisation algorithms. He speculated that energy storage could become the first versatile appliance used by operators of all shapes and sizes of grids around the world to solve a variety of grid congestion issues.

"While the venture capital community was funding investments in battery technologies and chemistries, the crux of our technology strategy was that of energy storage adding tremendous value through scale, integration, software and data. This also involved building a platform that could leverage different batteries for different applications and be fully integrated with any other grid asset."

Jung takes the iPhone as an analogous product from another industry altogether:

"No one talks about the chips inside their phone – these are just viewed as a commodity. Whereas everything you can do with it – and the huge number of products that have been substituted by this single device and platform – that's where the value lies. In fact, Apple sold more iPhones in Q4 2016 than the PC industry sold computers."

CHANGING THE CONVERSATION

Jung's perspective has certainly borne fruit since the strategy was set, and Greensmith Energy's solutions are now in place and working with a large variety of battery technologies from different providers. In many ways, their way of working espoused a component- and technology-neutral approach, before the term came into vogue in the industry.

"We changed the focus from the battery to the other possibilities, predominantly through the use of software. First, as I mentioned, we saw that energy storage could be used to orchestrate an entire network of distributed energy resources. We then put an emphasis on solving some of the largest grid problems being faced around the world – whether the customer was a utility, a power producer, or from any other segment or concern. We took a platform approach to solving our customer's problems."

Lessons learned in the technology industries helped Jung see the potential benefits for energy-producing customers:

"It seemed like the kind of technology that would benefit from economy of scale. Reducing the price per MW and the price per MWh were obvious metrics to pursue."

A RAMPANT SUCCESS STORY

Following this strategy, Greensmith Energy's roster of successful deployments has grown, hand in hand with the energy storage market as a whole. By 2016, Greensmith solutions had delivered a third of the energy storage capacity of the United States, a colossal figure for a team of under 30 personnel.

It's a success story that Jung attributes to concentrating the company's accumulated expertise and exceptional staff upon

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I decided to set a very different strategy and course for the company than the rest of the industry. I believed that it was important to have a larger impact on the grid by going utility-scale right away.



its key product – the Greensmith GEMS software platform. Indeed, he is almost evangelical about the platform’s capabilities:

“Having successfully developed our multi-application grid software through hundreds of megawatts of system integration and installation experience on either side of the meter, our GEMS platform stands alone as the most proven software platform available to energy storage operators.”

The company’s track record has encompassed some of the largest and most noteworthy cases to hit the North American energy market in recent years. It also resulted in a year-long global cooperation with Wärtsilä on stand-alone energy storage and hybrid energy solutions.

For instance, in 2016 Greensmith successfully deployed its largest system to date – a 20 MW/80 MWh energy storage system at the AltaGas Pomona Energy Facility in Pomona, California – in response to a massive gas leak in Aliso Canyon. The project highlighted the company’s ability to deliver such a system safely, on time, and on budget, in just four months – an industry record.

“Aliso Canyon demonstrated our ability to leverage major OEM relationships and our proven experience and technology platform,” says Jung, “allowing us to deliver North America’s largest and most complex energy storage system safely, quickly and reliably. Our system-wide expertise and deep integration experience were critical to the delivery of this installation, which was qualified into CAISO before other large competitors.”

The system in question delivers 80 MWh of electricity during peak periods of energy demand to power around 15,000 homes for four hours each day. The 20 MW system is part of North America’s largest battery storage facility, and is comprised of a breath-taking 12,240 lithium-ion batteries in 1,020 racks and ten inverters. The system also delivers four separate applications – including participating in the California energy market, which at times yields more than \$1,000/MWh for asset owner AltaGas, an independent power producer.

ENABLING RENEWABLES

Jung is also keen to demonstrate the effectiveness of GEMS in enabling sources of renewable energy to become viable. “To take one example, photovoltaic, or PV, represents an intermittent resource,” he says, “one that can disrupt the grid with frequency and voltage fluctuations on cloudy days.

Evidently a complementary solution is required here, but then it’s a question of which one.”

By using PV integrated with Greensmith’s energy storage and GEMS software platform, an energy producer can provide smooth power output when weather conditions are less than ideal, minimising the impacts on grid stability.

Fast-acting energy storage, operating in concert with the PV system, can control power quality by calibrating battery charging and energy exports to the grid. In doing so, the system mitigates the need for large-scale PV to curtail output as clouds come and go.

“As the needs of the grid change,” says Jung, “the time-shifting power to isolate generation and demand will help solar plus storage evolve. Everyone purchasing electricity, be it the utility in the wholesale market or the residential end-customer, wants a stable supply of energy, but daily peak energy consumption is a constantly moving target affected by demand growth, energy efficiency, temperature and other factors.”

By using the GEMS platform, Jung points out, producers can optimize performance to provide a fast response when one is called for throughout the day, while storing enough energy to discharge when it’s needed most. The role of energy storage here is to help bridge the gap between production and consumption.

SMART POSSIBILITIES

If these benefits sound familiar, that may be due to the similarities between Greensmith’s working philosophy and the Smart Power Generation approach Wärtsilä has been driving forward for a number of years.

This is no coincidence. Jung is confident in the two companies’ shared mind-set, and in the assertion that Greensmith’s new place at the heart of Wärtsilä’s Energy Solutions business area will pay dividends for years to come. The collaboration has begun at full throttle, with joint projects already active around the world.

“This is the perfect moment for this collaboration to begin,” he emphasises. “The energy storage market is growing increasingly quickly, and the need for integrated, intelligent hybrid energy solutions is shaping a wealth of new opportunities.”

On the evidence of Greensmith’s progress thus far, the fruits of this new partnership will come to define what energy storage means to Wärtsilä’s customers – and more importantly, what it can do for them. ■

The smart ecosystem

The fundamentals of every industry are being shaken by digital disruption, and the ramifications of integrated connectivity. Touching upon so many places in the marine value chain, Wärtsilä could be said to have a unique opportunity as the industry develops in this direction. Mauro Sacchi, Director, strategy and business development, explains how a newly unified approach to smart technologies will truly unlock the offering's potential.

"The fundamental principal of Wärtsilä's Smart Marine Strategy is ecosystem thinking," says **Mauro Sacchi**. "This is very much related to the process of digital transformation that is happening around the world and in many other verticals."

Sacchi points to the automotive sector by way of example. Autonomous cars are just one component of the revolution now taking place in land-based transport thanks to connectivity and data sharing. But as individual units, without the networks of route, usage and service data they rely upon – all supplied and managed by different entities – such vehicles are virtually useless.

So it is with the marine industry, explains Sacchi; a single company can only hope to be one element in this ecosystem, but nevertheless, it can help to drive progress in the right direction.

FROM VESSEL TO VALUE CHAIN

This is the guiding motivation of Wärtsilä's new Smart Marine Strategy, which Sacchi describes as the application of the epochal changes taking place in the wider world to the maritime industry.

"Its scope is actually far broader than simply vessels – even automated vessels" he explains. "It is actually better defined in relation to the value chain. In principle, everything that happens from port to port – where the ship is just one element of the ecosystem – is in focus here."

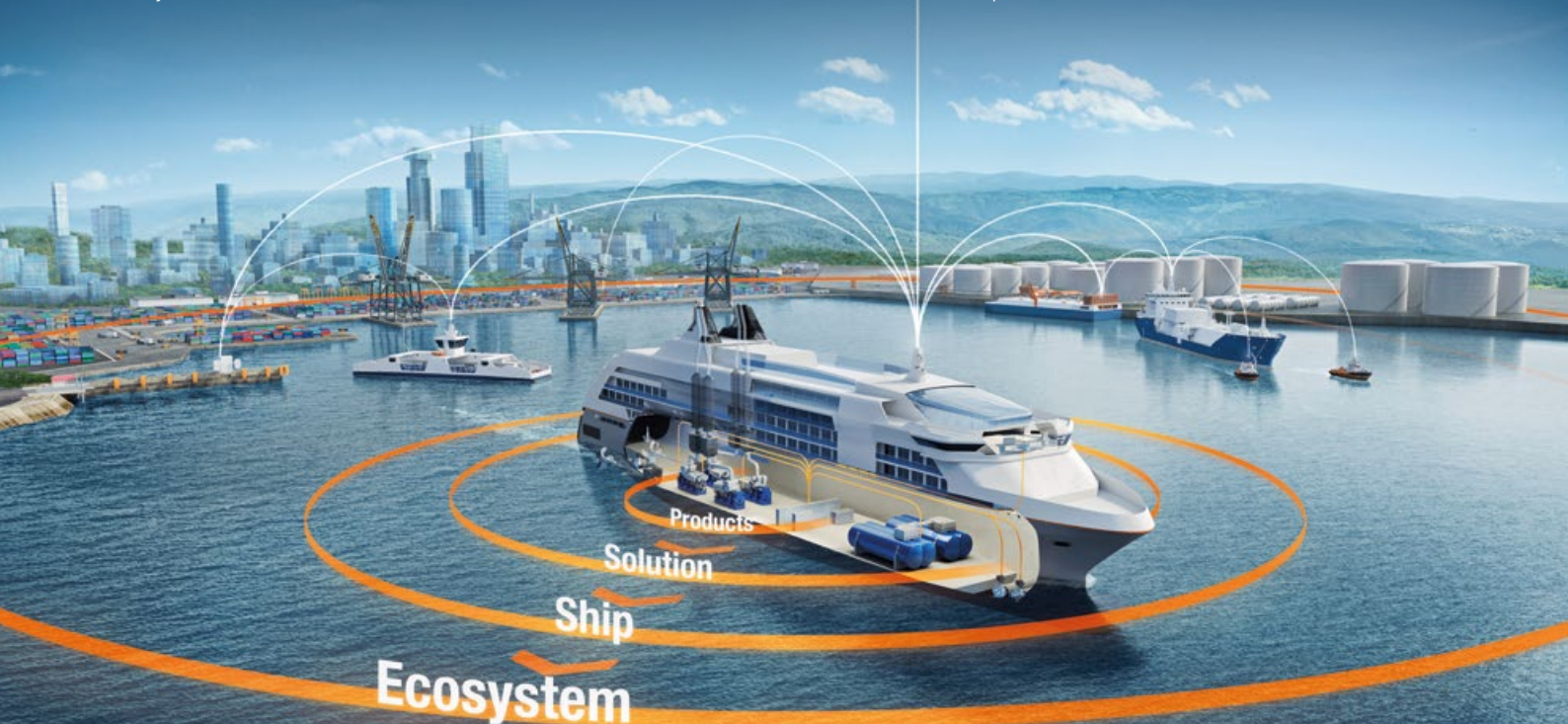
Simply stated, the 'smart marine' capability, as Wärtsilä sees it, is what allows the company to connect an intelligent vessel with two smart-technology-equipped ports, while striving to optimise every process taking place in between.

SMART MARINE IN PRACTICE

Naturally, Sacchi maintains, the various segments in the maritime industry – such as container vessels, cruise ships, and oil and gas – have different drivers in play, but there are certain commonalities which can provide an open platform for progress on this topic.

"If we try to simplify this picture for a moment, we have a ship, if you will, moving from one location to another. There are some systems to manage: the allocation of the boat, anchoring, some logistics to execute in the harbour, and then we arrive at a vessel sailing some distance, before arriving and undergoing a similar process once again."

"If you take this value chain from end to end," he continues, "and you imagine how to create the optimal ecosystem for it to exist and function in, it would be one in which every process takes place flawlessly. In principle, there would be zero waiting time due to delays or issues of any kind at terminals – no delay whatsoever at the point of embarkation nor the destination."



And then it follows that there would be no inefficiency between the ports either, either due to waiting time itself or to not taking vessel traffic into consideration properly. The same would apply to weather conditions, and the capability of the ship itself.

“And last but not least,” Sacchi says, “it’s also the fact that you might also want to address the capacity of the fleet. Perhaps you have ships that are not optimally loaded, meaning that you have a lot of traffic where the utilisation rate of the asset is not optimal.”

All of these elements can be considered to be waste in the ecosystem, be that waste of tangible resources or simply time and effort. Sacchi arrives at the final, critical point: minimising this waste through the application of new technologies, wherever they can be useful, is the principal aim of the Smart Marine Strategy.

AN INDUSTRY TRANSFORMED

While these changes necessitate a number of new technologies, Sacchi emphasises the fact that the chief benefits will be recognisable to all ship owners and operators:

“The application of smart technologies to the marine sphere confers three major benefits,” he explains. “First of all, efficiency – allowing operations based upon the minimal usage of resources. This doesn’t necessarily mean crew – but also natural resources like fuel and so forth. It is an optimisation exercise on a much broader scale than just one component.”

Where personnel are concerned, Sacchi points out, the automation of certain vessel functions are more apt to give crew members the resources to run the vessel to its optimal capacity, rather than reducing their number. This is no unmanned robotic future, but rather one in which the machines do what they do best and the humans likewise.

“Secondly,” Sacchi continues, “we contend that the ecosystem of the future will be a carbon-free one, with the least possible impact on the environment – possibly none. We are striving for this goal also in the maritime sphere.”

“Finally, but just as importantly, the third significant benefit is the enhanced safety of operations. This is always present in our thinking, and with the advent of smart technology, there are real advances to be made here.”

THE CUSTOMER APPETITE

Futuristic thinking can take time to set in, and customer adoption of new solutions is no given, but it is heartening to see that Sacchi’s encapsulation of these benefits chimes well with current expectations within the industry.

In August of 2017, Wärtsilä successfully tested its remote-control ship operating capability off the North Sea coast of Scotland in collaboration with Gulfmark Offshore, the U.S.-based operator who provided the vessel for the project. Upon taking the opportunity to discuss the smart marine ecosystem with the company’s CEO **Quintin V. Kneen**, a number of familiar chords were struck.

“Initiatives like this provide a lot of potential to grow, and to capture efficiencies,” he pointed out, “but there is a lot of work to be done.”

“In order to truly get to the automated vessel stage, for example, we have to address so many factors. Pushing towards this goal means that every process has to be standardised. I believe we will see a real sea change in terms of standardisation in the near future.”

For Kneen, and in all likelihood many others in the offshore industry, safety is perhaps the greatest benefit of increased automation through smart technology:

“Offshore oil-field installations are notoriously difficult environments,” he said. “If you can get your processes down to the point where everything is automated and standardised you’re taking people out of the equation. People are, of course, very concerned that you’re reducing labour, but that’s not why I embrace it. I embrace it because it makes things safer in the offshore oil field. There are plenty of jobs for everyone in the offshore sector. Trying to get the people who are in harm’s way out of harm’s way through automation is key.”

“The primary driver is safety,” he emphasised. “Safety through automation and the standardisation of smart technology. That’s going to be something that people will come to fully embrace.”

And this is not to overlook the parallel importance of efficiency. Kneen foresees that developments already seen in the land-based transport sector will come to impact upon the shipping industry, eliminating inefficiencies and reducing the pollution generated by vessels doing needless work.

“Become more efficient and you’re going to burn less fuel, and by burning less fuel you’ll create less pollution. Standardisation much like we see in land-based logistics will allow offshore operators the benefits of sharing resources to maximise efficiency.”

THE CONNECTED PORTFOLIO

As the tone of this discussion may suggest, there are still advances to be made in this area, and the future is not to be predicted. Customer confidence is an important asset, however, and Sacchi is keen to reinforce the sentiment with reference to Wärtsilä’s existing offering.

“The strength of this company and what we believe is the foundation that will allow us to even be a player in this game is the fact that we have the widest product portfolio,” he says. “Because whenever new smart technologies do kick in to enable all these new benefits, at the end of the day we will still need vessels.”

“As long as you need ships, this equation will boil down to hardware. That’s where we have been strongest historically, and that’s what we need to build this journey upon. This where the adventure begins for us, because we have the widest portfolio of solutions – which gives us by some way the largest installed base and, you could infer, the greatest potential.” ■



The ‘smart marine’ capability is what allows Wärtsilä to connect an intelligent vessel with two smart-technology-equipped ports, while striving to optimise every process taking place in between.

Tackling decarbonisation challenges

Maritime industry champions join forces to support the transition of shipping towards a low carbon future.

The Global Industry Alliance to Support Low Carbon Shipping (GIA) is a public-private partnership initiative launched by the International Maritime Organization (IMO) in June 2017. The aim of the initiative is to collectively identify and address barriers to the uptake of energy efficiency technologies and operational measures. Wärtsilä is among the 16 members of the alliance, providing expertise in maritime fuel efficiency, as well as contributing financially towards the GIA Fund from which its activities are funded.

“It is well recognized that decarbonisation of the maritime sector is no easy feat and that significant improvements in energy efficiency cannot be achieved by one single player alone. GIA is a prime example of the kind of innovative model of collaboration between the public and private sectors that can pave the way towards low carbon shipping and ever-improving energy efficiency,” says **Astrid Dispert**, Technical Adviser for the GEF-UNDP-IMO Global Maritime Energy Efficiency Partnerships Project (GloMEEP), which forms the framework for GIA.

Dispert notes that although there are operational measures that can significantly improve the energy efficiency of a ship, they are yet to be established as common or best practices. The role of the GIA initiative is to look into why this is the case - what are the existing technical and commercial barriers, and how can they be overcome.

ROOM FOR IMPROVEMENT

Although shipping is already one of the most sustainable and economical modes of transporting goods and commodities, Dispert says that there are always opportunities for improving its environmental performance.

“In terms of energy efficiency, one can benefit from simply ensuring proper maintenance of the vessel or by installing new and innovative technologies. It is also important to take into consideration the decisions made shore side. These include operational measures pre-defined in charter-party contracts, such as ship speed and load, which can have a considerable impact on performance.”

Dispert points out that a variety of commercially viable emission reduction solutions for sustainable shipping already exist. For example, propeller polishing, water flow optimisation, and hull cleaning each offer energy savings that far outweigh their upfront costs. According to the IMO’s Second GHG Study, the energy consumption and CO₂ emissions of ships could be reduced by up to 75% by applying operational

measures and implementing existing technologies. Many of these measures are cost-effective and offer net benefits, since reduced fuel bills ensure a timely pay-back of the operational or investment costs.

Considering further challenges, Dispert notes the uptake of low-carbon technologies in developing regions.

“The lack of an enabling environment for technology cooperation, diffusion and uptake in many developing countries, especially small island developing states and the least developed countries, adds to this challenge. One advantage the GIA possesses is its ability to engage with developing country policy makers and private sector players.”

INNOVATION IS KEY

Technological innovation is at the heart of the success story of shipping. Innovation has dramatically increased the efficiency of shipping, as well as making it safer and helping to reduce its environmental footprint. In Dispert’s view, the development of electric and autonomous ships is one of the most exciting current initiatives, providing insight into the potential wider application of such energy efficiency technologies, including the technical and operational areas that require further R&D.

“Also, we are seeing a broader diversity in the fuels used for shipping, with an increased uptake of lower carbon fuels, such as LNG and methanol, and different types of biofuels. This trend is expected to continue as the IMO has decided to cut, as of 1 January 2020, the maximum sulphur content in marine fuel oil used by ships operating outside emission control areas from 3.5% to 0.5%.”

Dispert adds that the use of big data and data analytics also provides interesting opportunities for the maritime sector. Big data can help companies

make changes that increase profits, improve shipboard operations, and reduce their carbon footprint. The GIA includes key partners, such as port authorities, which are seen as vital to providing an enabling environment for shipping to decarbonise.

“As the IMO’s regulatory framework for addressing emissions from international shipping evolves and is further strengthened, innovation and new technologies will certainly continue to emerge. We are committed to working hard to catalyse innovation and address implementation obstacles, and thereby support the shipping industry to continue to develop in the most sustainable and environmentally conscious way,” Dispert concludes. ■

Innovation has dramatically increased the efficiency of shipping, as well as making it safer and helping to reduce its environmental footprint.



Read more Wärtsilä stories

- A cleaner ocean for Finland's 100th
- Entering the biogas upgrading market
- An introduction to induction
- Hurricane rescue

Discover the year's most important events and initiatives at WWW.WARTSILA.COM/AR2017

Financials 2017

The year 2017 developed in line with our expectations. Increased power plant deliveries supported some growth in net sales, while profitability was in line with the previous year. The highlight of the year was the order intake growth seen in all business areas. This provides a sound foundation from which we can develop our business.

The steady demand for power plant related service work, and healthy activity in the cruise and gas carrier markets resulted in solid net sales for Services, while the increased demand for long-term service agreements in both the marine and energy markets supported growth in order intake. Energy Solutions' order intake was boosted by both increased investments in modernising power infrastructures in the emerging

markets, and the growing need for flexible power capacity to support the transition into renewable energy sources. In the marine industry, the sentiment among merchant customers improved during the latter part of the year. This, together with a healthy demand in the cruise and gas carrier segments, supported the growth of Marine Solutions' order intake.

During the year, Wärtsilä continued to develop its business by expanding its offering of products and solutions through research and development activities, partnerships and acquisitions.

SOLID NET SALES
EUR

4,923

MILLION

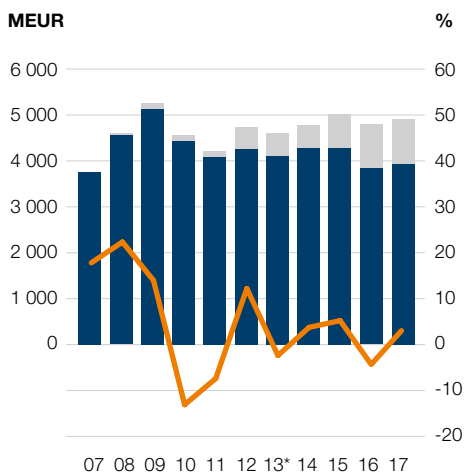
PROFITABILITY AT
LAST YEAR'S LEVEL

12.0%

ORDER INTAKE
GROWTH OF

15%

GROWTH OVER THE CYCLE

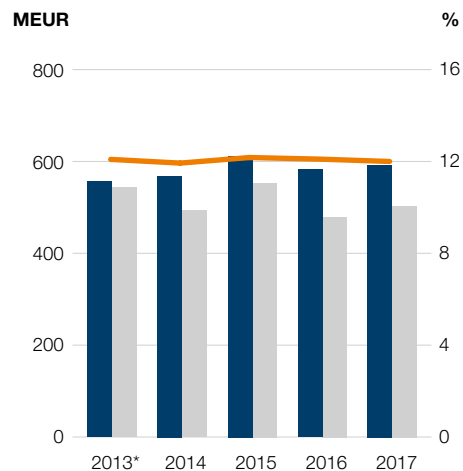


■ Net sales
■ Cumulative new acquisitions
■ Growth, % (incl. acquisitions)

World nominal GDP growth 2007–2017 averages 3.2% USD denominated (source: IMF).

* Restated, figures include continuing operations.

RESULT



■ Comparable operating result
■ Profit before taxes
■ Comparable operating result, %

* Restated, figures include continuing operations.

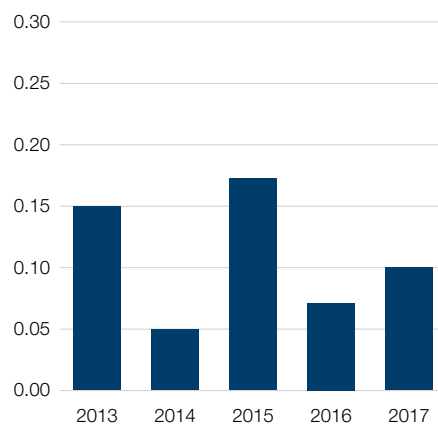
Key figures

MEUR	2017	10-12/2017	7-9/2017	4-6/2017	1-3/2017	2016	2015
Net sales	4 923	1 445	1 178	1 292	1 007	4 801	5 029
Services	2 215	654	526	546	490	2 190	2 184
Energy Solutions	1 401	425	324	412	239	943	1 126
Marine Solutions	1 307	366	328	334	279	1 667	1 720
Depreciation, amortisation and impairment	-134	-42	-30	-30	-33	-138	-124
Comparable operating result ¹	590	244	135	126	86	583	612
Comparable operating result ¹ , %	12.0	16.9	11.4	9.7	8.5	12.1	12.2
Profit before taxes	506	215	114	103	74	479	553
Earnings per share, EUR	1.95	0.86	0.43	0.38	0.28	1.79	2.25
Order intake	5 644	1 514	1 354	1 363	1 413	4 927	4 932

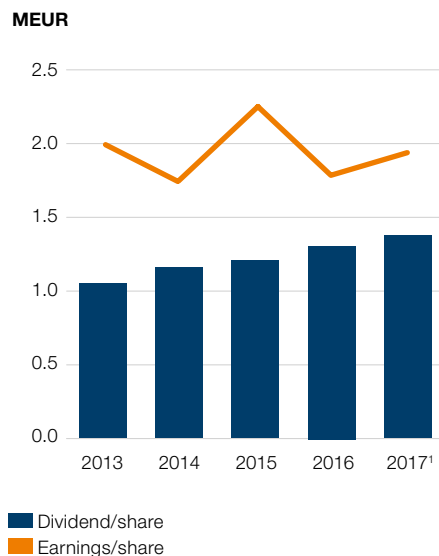
MEUR	2017	31.12.2017	30.9.2017	30.6.2017	31.3.2017	2016	2015
Balance sheet total	5 607	5 607	5 365	5 264	5 382	5 391	5 589
Interest-bearing liabilities, gross	619	619	729	637	670	629	724
Cash and cash equivalents	379	379	292	332	403	472	334
ROI, continuing operations, %	18.9	18.9	19.5	19.5	16.9	17.1	21.0
Gearing	0.10	0.10	0.20	0.14	0.13	0.07	0.17
Order book, end of period	5 064	5 064	5 075	5 065	5 096	4 696	4 882
Year-end market capitalisation	10 375	-	-	-	-	8 418	8 314
Personnel, number at end of period	18 065	18 065	17 859	17 783	17 832	18 011	18 856

¹ Figures exclude items affecting comparability.

GEARING



EARNINGS/SHARE, DIVIDEND/SHARE



¹ Proposal by the Board 2017.

Consolidated statement of income

MEUR	2017	2016
Net sales	4 923	4 801
Change in inventories of finished goods & work in progress	28	-134
Work performed by the Group and capitalised	12	2
Other operating income	60	55
Material and services	-2 558	-2 353
Employee benefit expenses	-1 214	-1 159
Depreciation, amortisation and impairment	-134	-138
Other operating expenses	-577	-556
Share of result of associates and joint ventures	13	14
Operating result	552	532
as a percentage of net sales	11.2	11.1
Financial income	12	19
Financial expenses	-59	-72
Profit before taxes	506	479
Income taxes	-122	-123
Profit for the financial period	383	357
Attributable to:		
equity holders of the parent company	384	352
non-controlling interests	-1	4
	383	357
Earnings per share attributable to equity holders of the parent company (basic and diluted):		
Earnings per share (EPS), basic and diluted, EUR	1.95	1.79

Consolidated statement of comprehensive income

MEUR	2017	2016
Profit for the financial period	383	357
Other comprehensive income, net of taxes:		
Items that will not be reclassified to the statement of income		
Remeasurements of defined benefit liabilities	7	-12
Tax on items that will not be reclassified to the statement of income		3
Total items that will not be reclassified to the statement of income	7	-9
Items that may be reclassified subsequently to the statement of income		
Exchange rate differences on translating foreign operations		
for equity holders of the parent company	-74	-52
for non-controlling interests	-2	-1
Associates and joint ventures, share of other comprehensive income	-1	1
Cash flow hedges		
measured at fair value	1	-16
transferred to the statement of income	36	58
Tax on items that may be reclassified to the statement of income		
Cash flow hedges		
measured at fair value	-1	4
transferred to the statement of income	-8	-14
Total items that may be reclassified to the statement of income	-50	-21
Other comprehensive income for the financial period, net of taxes	-43	-30
Total comprehensive income for the financial period	341	327
Total comprehensive income attributable to:		
equity holders of the parent company	344	323
non-controlling interests	-3	3
	341	327

Consolidated statement of financial position

ASSETS

MEUR	31.12.2017	31.12.2016
Non-current assets		
Goodwill	1 237	1 112
Intangible assets	340	322
Property, plant and equipment	338	394
Investment properties	11	12
Investments in associates and joint ventures	83	84
Other investments	13	15
Interest-bearing investments	5	6
Deferred tax assets	123	141
Trade receivables	109	13
Other receivables	18	18
Total non-current assets	2 277	2 116
Current assets		
Inventories	1 051	1 042
Trade receivables	1 307	1 220
Current tax receivables	53	46
Other receivables	539	494
Cash and cash equivalents	379	472
Total current assets	3 331	3 275
Total assets	5 607	5 391

EQUITY AND LIABILITIES

MEUR	31.12.2017	31.12.2016
Equity		
Share capital	336	336
Share premium	61	61
Translation differences	-133	-57
Fair value reserve	-10	-39
Remeasurements of defined benefit liabilities	-38	-45
Retained earnings	2 156	2 032
Total equity attributable to equity holders of the parent company	2 371	2 288
Non-controlling interests	24	34
Total equity	2 396	2 321
Liabilities		
Non-current liabilities		
Interest-bearing debt	517	520
Deferred tax liabilities	102	93
Pension obligations	154	168
Provisions	52	44
Advances received	64	58
Other liabilities	1	1
Total non-current liabilities	889	884
Current liabilities		
Interest-bearing debt	102	108
Provisions	209	206
Advances received	459	458
Trade payables	539	502
Current tax liabilities	83	78
Other liabilities	931	833
Total current liabilities	2 323	2 186
Total liabilities	3 212	3 070
Total equity and liabilities	5 607	5 391

Consolidated statement of cash flows

MEUR	2017	2016
Cash flow from operating activities:		
Net profit for the financial period	383	357
Adjustments for:		
Depreciation, amortisation and impairment	134	138
Financial income and expenses	47	53
Gains and losses on sale of intangible assets and property, plant and equipment and other changes	-17	-6
Share of result of associates and joint ventures	-13	-14
Income taxes	122	123
Cash flow before changes in working capital	657	650
Changes in working capital:		
Receivables, non-interest-bearing, increase (-) / decrease (+)	-264	89
Inventories, increase (-) / decrease (+)	-27	162
Liabilities, non-interest-bearing, increase (+) / decrease (-)	189	-167
Changes in working capital	-102	84
Cash flow from operating activities before financial items and taxes	555	734
Financial items and taxes:		
Interest income	1	
Interest expenses	-6	-13
Other financial income and expenses	-2	19
Income taxes paid	-119	-127
Financial items and paid taxes	-126	-121
Cash flow from operating activities	430	613
Cash flow from investing activities:		
Acquisitions	-191	-81
Investments in associates and joint ventures		-9
Investments in property, plant and equipment and intangible assets	-64	-55
Proceeds from sale of property, plant and equipment and intangible assets	17	18
Proceeds from sale of other investments	2	1
Loan receivables, increase (-) / decrease (+), and other changes	1	
Cash flow from investing activities	-235	-126
Cash flow after investing activities	195	487
Cash flow from financing activities:		
Proceeds from non-current debt	90	131
Repayments and other changes in non-current debt	-101	-91
Loan receivables, increase (-) / decrease (+)	2	-4
Current loans, increase (+) / decrease (-)	-5	-125
Dividends paid	-264	-250
Cash flow from financing activities	-278	-339
Change in cash and cash equivalents, increase (+) / decrease (-)	-83	148
Cash and cash equivalents at the beginning of the financial period	472	334
Exchange rate changes	-10	-9
Cash and cash equivalents at the end of the financial period	379	472



Why invest in Wärtsilä

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

SUPPORTING OUR CUSTOMERS WITH LIFECYCLE SOLUTIONS

Wärtsilä's business model is based on providing the marine and energy markets with smart technologies and optimised lifecycle services. The Services business, which represents nearly 50% of Wärtsilä's net sales, provides a good foundation for achieving the company's long-term target of profitable growth.

The demand for Wärtsilä's services is supported by the increasing technological sophistication of the installed equip-

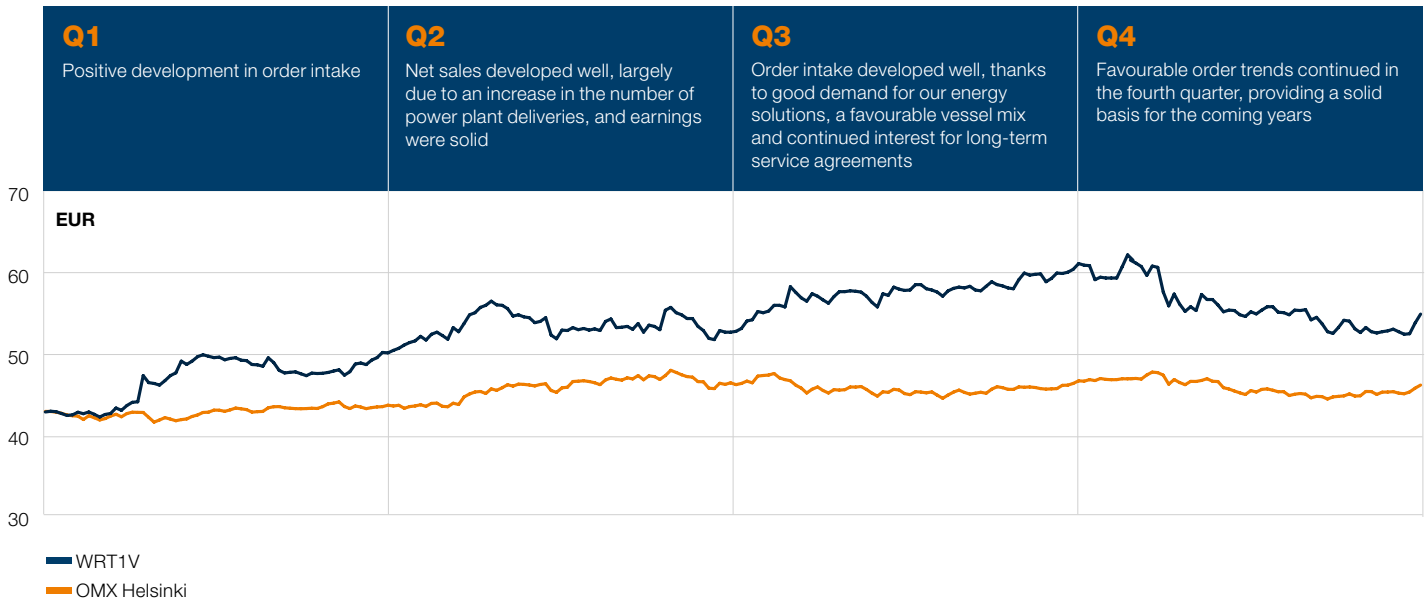
ment base. Digitalisation provides further opportunities to develop a value-adding customer offering. It also enables the leveraging of new technologies to build capabilities that will create a future offering with equipment-as-a-service.

A LEADER IN ADVANCED 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 Wärtsilä's offering of smart solutions. As an industry frontrunner, Wärtsilä is well positioned to respond to the need for innovative and energy efficient solutions. Wärtsilä's digital transformation will provide increased customer value through a new era of collaboration and knowledge sharing. Continuous investing in research and development is vital for ensuring the competitiveness of the company's product portfolio, and for securing a leading position in sustainable innovation.

Share price development in 2017



9.1. CSSC Wärtsilä Engine Co Ltd (CWEC), the joint venture company formed between Wärtsilä and China State Shipbuilding Corporation (CSSC), opened its new production facilities

25.1. Wärtsilä and Carnival Corporation announce strategic performance-based partnership

2.3. Annual General Meeting held at the Messukeskus Helsinki Expo and Convention Center in Finland

7.3. China State Shipbuilding Corporation (CSSC) and Wärtsilä establish new electrical & automation joint venture

13.3. First dividend instalment of EUR 0.65 per share paid

15.5. Acquisition of Greensmith Energy Management Systems Inc., a US-based leader in intelligent energy storage technology and solutions

30.5. Launch of the Wärtsilä HY, a fully integrated hybrid power module combining engines, an energy storage system, and power electronics optimised to work together through a newly developed energy management system

1.6. Wärtsilä will supply two power plants with a combined gross capacity of 188 MW to Upper Michigan Energy Resources Corporation (UMERC)

30.6. Wärtsilä joins Global Industry Alliance to support low carbon shipping

1.9. Successful testing of the remote control of ship operations in collaboration with Gulfmark Offshore

7.9. Wärtsilä selected as an index component of the Dow Jones Sustainability Indices

12.9. Partnership with AW-Energy adds wave power generation to Wärtsilä's capabilities as energy system integrator

21.9. Second dividend instalment of EUR 0.65 per share paid

4.10. Acquisition of Puregas Solutions, a provider of biogas upgrading solutions

10.10. Acquisition of Guidance Marine, a leader in sensor solutions for dynamic positioning and other vessel control systems

11.10. The first Digital Acceleration Centre opened to speed up innovation and co-creation with customers

20.11. Wärtsilä will supply a broad scope of products and systems to Viking Line's new environmentally friendly ferry

5.12. Wärtsilä and GTT finalise cooperation agreement to create one-stop availability for LNG fuel tank and supply systems

21.12. Acquisition of Trident B.V., specialised in underwater ship maintenance, inspection, and repair services

A CAPITAL-LIGHT BUSINESS MODEL FOCUSED ON INCREASING EFFICIENCY

Wärtsilä's 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.

Achieving operational excellence by focusing on continuous process improvement throughout the organisation is a central pillar for reaching Wärtsilä's

financial targets. So too is the driving of benefits related to a business line-based organisation with decentralised accountability.

INVESTING IN TECHNOLOGICAL LEADERSHIP AND PROVIDING SHAREHOLDER RETURNS

Wärtsilä's financial position enables the securing of future positioning by allowing investments in research and development activities, and by developing the business through acquisi-

tions. It also enables solid dividends to be offered to the company's shareholders. ■

Highlights 2017



ENERGY SYSTEMS INTEGRATION

The acquisition of Greensmith Energy Management Systems Inc. enables Wärtsilä to expand its footprint in the energy storage market and position itself as a leading global energy systems integrator.



ENTERING THE BIOGAS UPGRADING MARKET

With the acquisition of Puregas Solutions, Wärtsilä gained further expertise in biogas upgrading, complementing its existing offering in liquefaction solutions.



DIGITALISING WÄRTSILÄ'S OPERATIONS AND CUSTOMER OFFERING

During 2017, the first digital acceleration centre was launched with the aim of developing promising ideas and co-creating them into service concepts and products together with customers and partners. The acquisition of Guidance Marine represents a further step in Wärtsilä's digital transformation by enhancing the company's frontrunner position in intelligent shipping technologies.



RESEARCH & DEVELOPMENT

Wärtsilä is strongly committed to research and development. The aim of its R&D activities is to continuously strengthen the company’s technology leadership position, and to further improve its competitive edge in the global marine and energy markets. In 2017, R&D investments amounted to EUR 141 million or 2.9% of net sales.



OCCUPATIONAL SAFETY ENGAGEMENT

“Leader in safety, leader in business” – Wärtsilä’s Board of Management kicked off the new ZeroMindset leaders’ occupational safety engagement programme.

Wärtsilä Corporation Annual Report 2017

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The background is a deep blue gradient. It features several white geometric lines forming a large, abstract shape that resembles a stylized 'W' or a series of overlapping planes. In the lower-left quadrant, there is a dynamic, glowing trail of blue particles and lines, suggesting motion or data flow. The overall aesthetic is clean, modern, and technological.

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