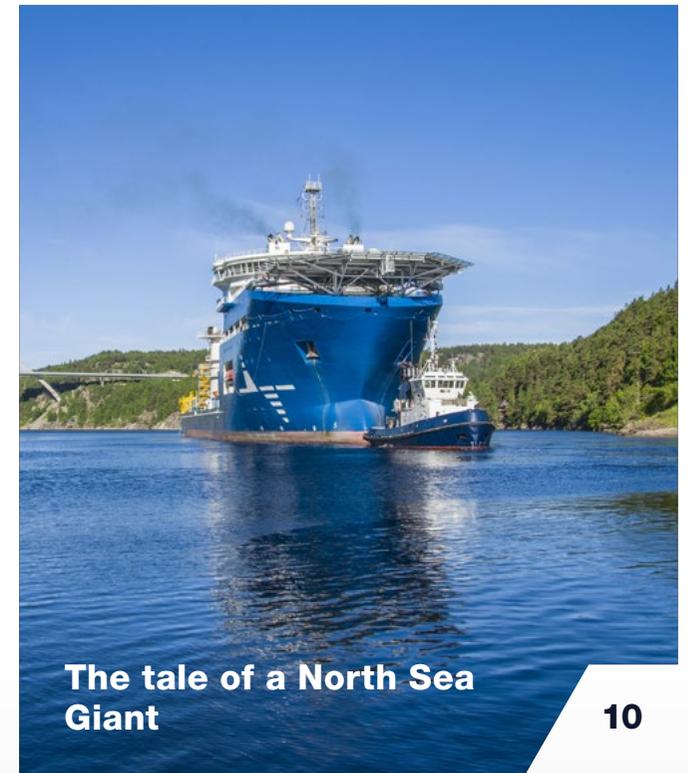
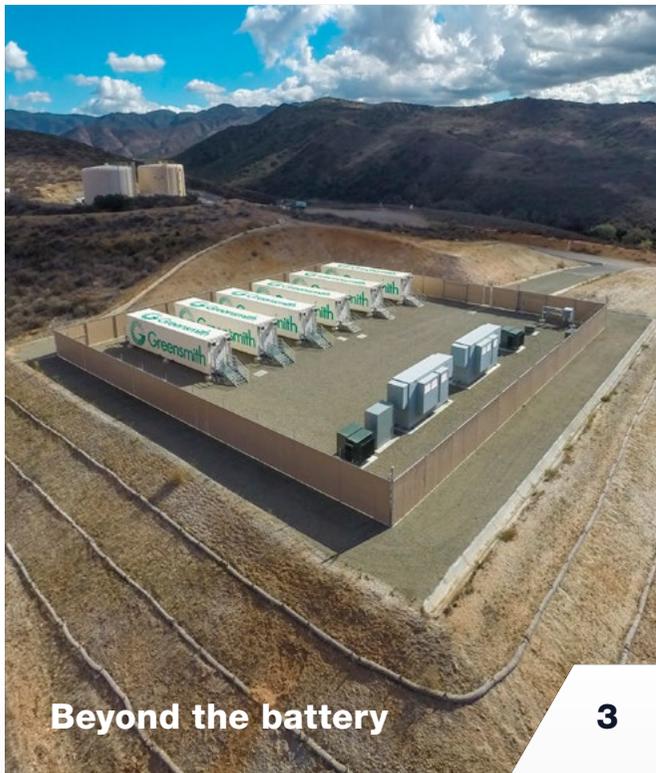


Stories

Wärtsilä Corporation Stories 2017

Wärtsilä Corporation Stories 2017

Beyond the battery	3	Entering the biogas upgrading market	15
The smart ecosystem.....	7	An introduction to induction.....	17
The tale of a North Sea Giant	10	Tackling decarbonisation challenges	19
A cleaner ocean for Finland's 100th	13	Hurricane rescue	21





Beyond the battery

In 2017, the Wärtsilä group acquired Greensmith Energy Management Systems Inc., a market leader in grid-scale energy storage solutions, integration and software. John Jung, 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

“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.”

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 its key product – the

“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.”

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/ 80MWh energy storage system at the AltaGas Pomona Energy Facility in Pomona, California – in

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.

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

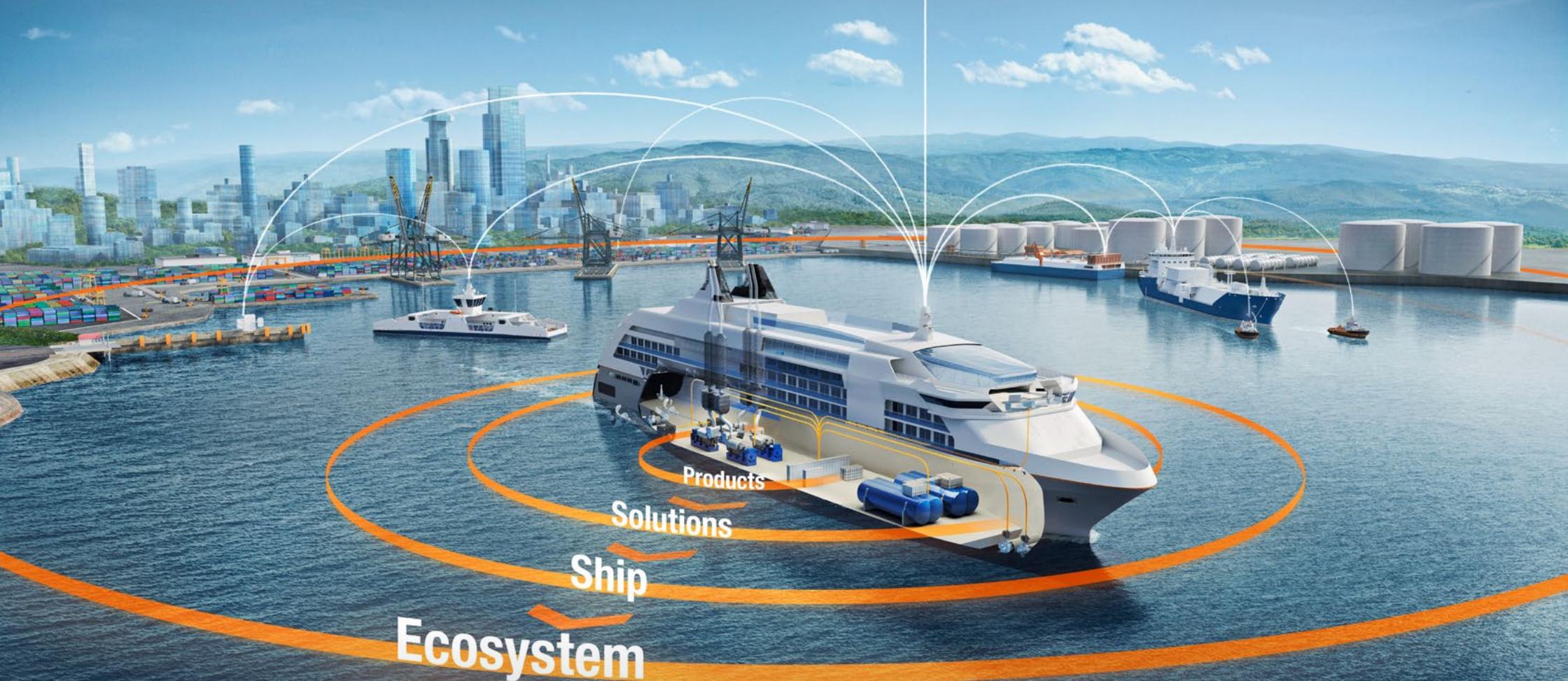
If these benefits sound familiar, that may be due to the similarities between Greensmith's working philosophy and the Smart Power Generation approach Wärtsilä has been driving forward for a number of years.

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, Marine Solutions, explains how a newly unified approach to smart technologies will truly unlock the offering's potential.

“The fundamental principle 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 as a result of connectivity and data sharing. But as individual units, without the networks of route, usage and service data they rely upon – all supplied and managed

“No one company alone can drive the transformation – co-creation is required to drive progress in the right direction.”

by different entities – such vehicles are virtually useless.

So it is with the marine industry, explains Sacchi. “No one company alone can drive the transformation – co-creation is required 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 a strategy for applying to the marine industry the epochal changes taking place in the wider world.

“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 that 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 the vessel sails 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 in which it can exist and function, 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 either the point of embarkation or the destination.”

“And then it follows that between the ports there would also be no inefficiency, either due to the ship’s own waiting time or because of not taking other vessel

traffic properly into consideration. 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 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 assets is not optimal.”

All of these elements can be considered to be waste within the ecosystem, be that waste of tangible resources, or simply time and effort. Sacchi arrives at the final, critical point, namely that minimising this waste through the application of innovative technologies, new ways of working, disruptive business models, and industry-wide cooperation 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 use 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, rather than reducing crew size, the automation of certain vessel functions is more likely to give



crew members the resources to run the vessel at its optimal capacity. 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 carbon-free, 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

“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.”

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,” Sacchi 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 the shipping industry as well, 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 to be the foundation that will allow us to even be a player in this game, is the fact that we have the industry’s broadest 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 is where the adventure begins for us, because we have such an extensive portfolio of solutions – which gives us by some way the largest installed base and, you could infer, the greatest potential.” ■



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.”

“Battery solutions on other vessels have been done before, but not on this scale, and not according to this concept.”

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. “

“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.”

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.” ■

“Systems like the one Wärtsilä has developed for us here will be the standard on all our vessels in future, that’s for sure.”



SUSTAINABILITY ASSURED 2017

A cleaner ocean for Finland's 100th

Wärtsilä's gift to Finland for the country's 100th anniversary involves a unique sustainability innovation raising awareness of the plight of the world's oceans.

In 2017, Finland celebrated its 100th year as an independent nation. Commemoration of this anniversary took many forms across the country, from New Year's Day throughout the entire year to the official Finnish Independence Day celebrations in December.

As part of the festivities, Finland's largest companies set about providing the country with a range of momentous and symbolic gifts, and Wärtsilä was no exception. Having selected the centennial theme of 'The future of the seas' as one that captured the company's key priorities of technology, the environment and digitalisation, Wärtsilä began a long-term cooperation with the Seabin Project, sponsoring both the city and port of Helsinki's involvement with the programme.

A CLEANER MARINA

The Wärtsilä – Seabin partnership aims at dynamic and versatile actions using Wärtsilä's experience, established technologies, and know-how in environmental product development. This initiative hinges on a unique innovation that has captured the public's imagination, and drawn much welcome attention to one of the most important environmental issues currently faced.

The Seabin is a floating rubbish bin that sits in the water at marinas, docks, yacht clubs and commercial ports, where it collects all floating rubbish. Water is sucked in from the surface and passed through the catch bag inside the Seabin.

The water is then pumped back into the marina, leaving litter and debris trapped in the catch bag to be disposed of properly.

The Seabin also has the potential to collect some of the floating oils and pollutants in the water. The Seabin Project's team currently uses 12-volt submersible water pumps that can utilise alternative and clean energy sources. These may include solar, wave or wind power, depending on the location and available technology.

As a Global Pilot Partner for the initiative, Wärtsilä was among the first to have Seabins put into operation, purchasing and installing units in the ports of Helsinki, Turku and Vaasa.

PUMPING UP THE VOLUME

The Wärtsilä – Seabin partnership became one of the biggest centennial stories in the Finnish media, largely thanks to the project's promotional appearances at several key events throughout the year. These included the Boat exhibition at Helsinki's Messukeskus Expo and Convention Centre, the Tall Ship's Race in Turku, and the annual Baltic Herring Market in Helsinki.

These events not only communicate the idea behind the Seabin, but more importantly, helped to raise awareness of the environmental issues facing the world's oceans.

The events also helped to familiarise the Finnish public with Wärtsilä's operations, its aims and, of course, what the company actually does. Furthermore,

they highlighted Wärtsilä's proven environmental products, such as systems for ballast water, wastewater treatment management, and exhaust gas cleaning.

"Wärtsilä is taking responsibility for the future of the marine environment, and we are honoured to be involved in the Seabin project," says Atte Palomäki, Wärtsilä's Executive Vice President, Communications & Branding. "As one of the leading solution providers in the marine industry, we are constantly developing new environmental technology, such as using plastics as fuel, which we are currently testing. However, the

most important thing to remember is that every one of us can do our bit for the cleanliness of the marine environment."

Following the success of the Wärtsilä – Seabin partnership in 2017, the project looks set to reach new heights beyond the centennial year with the installation of Seabins at several Wärtsilä's locations outside Finland. The company will also work in cooperation with the Seabin Project for the next three years, offering its expertise in Nordic marinas and product development know-how to ensure the project's future success. ■





SUSTAINABILITY ASSURED 2017

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.

Following an agreement signed in October 2017, Wärtsilä acquired Sweden-based Puregas Solutions, a provider of turnkey biogas upgrading solutions. Having cooperated earlier as partners on various biogas projects, Wärtsilä sees the technology and know-how offered by Puregas as a natural add-on to the company's strategic focus area of gas solutions. Furthermore, integrating such a transformational solution into the company offering is perfectly in line with

“We believe the amine-based absorption technology used by Puregas is one of the prevailing ones going forward, and a good choice for expanding our reach in the gas value chain.”

Wärtsilä's newly defined purpose of enabling sustainable societies with smart technology.

“When making an annual revision of our strategy in gas solutions last spring, we identified small-scale liquefaction and biogas as especially attractive growth areas. Combining our strong position in the liquefaction market with Puregas' biogas upgrading technology and competencies will allow us to optimise our solutions even better, and offer a more complete scope with real added value to

our customers,” says Timo Koponen, Vice President, Flow & Gas, Marine Solutions.

Puregas utilises a unique CApure process to convert raw biogas to biomethane, a renewable natural gas. This process of gas upgrading and purification is required before the biogas can be liquefied, enabling efficient and cost-effective distribution to the small-scale market.

“We have been involved with the core technology of liquefaction from the very beginning. Having thoroughly studied the multiple technologies for biogas upgrading, our conclusion is that the amine-based absorption technology used by Puregas is one of the prevailing ones going forward, and a good choice for expanding our overall reach in the gas value chain,” Koponen adds.

HUGE POTENTIAL

Puregas is a leading player in its field, with subsidiaries in Germany, Denmark, the UK and the USA. Since Wärtsilä is relatively new to the biogas market, the Puregas Solutions brand name will remain in use for a transition period, with the Wärtsilä brand gradually introduced.

“Liquefied biogas volumes are relatively small compared to the much larger general biogas market. Obviously, our aim is to grow in liquefaction, but we also plan to take a larger market share in biogas upgrading as well. Overall, the renewable natural gas market is expected to grow significantly. According to certain estimates, the annual growth could even reach double-digit numbers,” Koponen says.

In Koponen's view, getting a major player such as Wärtsilä to enter the biogas



market is a positive signal for customers.

“This can, however, also be a somewhat unpredictable market. In many countries, subsidies are needed for progress to be made, and their implementation can face delays. At the same time, we can clearly see the strong tendency towards renewables in the energy market and major energy players are, for instance, becoming seriously interested in biomethane. In this sense, biogas is a very interesting element, enabling us to make our gas solutions even more sustainable.”

Although Wärtsilä's current technology offering in the gas value chain is already rather comprehensive, Koponen fully expects it to expand.

“This doesn't mean in any way that we are complete, and will certainly continue to look for further competencies and different ways to address the market in the future.” ■





SUSTAINABILITY ASSURED 2017

An introduction to induction

In September, Wärtsilä successfully tested its automatic wireless induction charging system on a hybrid-powered coastal ferry. This is the first commercial ferry in the world operating with high-power wireless charging capability for its batteries, and the successful project represents a notable breakthrough in the evolution of plug-in electrically operated vessels.

“The wireless charging industry is being driven by the automotive and consumer electronics industries,” says Ingve Sørfonn, Chief Expert Electrical & Automation, Wärtsilä Marine Solutions.

“How many power cords for different appliances have you had in your lifetime?” he asks. “They are often unique, incompatible, and fast become obsolete while gathering dust in a drawer. There is a strong demand across many industries to implement some kind of standard, and even do away with power cords altogether.”

CUTTING THE CORD

Wireless charging eliminates the cable connection between the vessel and shore, thereby creating a safe and convenient means of charging the ship’s batteries. It also reduces maintenance, as wear and tear to physical connection lines is eliminated. The integrated Wärtsilä system is based on inductive power transfer and is capable of transferring more than a MW of electrical energy.

“Inductive charging uses an electro-magnetic field to transfer energy between two coils,” explains Sørfonn. “A sending induction coil is used to create an alternating electro-magnetic field, while a second induction coil takes the power from the electro-magnetic field and converts it back into electrical energy.”

The recent tests were carried out in Norwegian waters on the 85-metre-long

‘MF Folgefonn’, owned by Norled, one of Norway’s largest ferry operators. The project was partly funded by Innovation Norway, a Norwegian funding institution.

In practice, the system allows a hybrid-powered ferry to dock for a few minutes at a time while it is charged without the need for cables, the fitting of which is a challenging task in the harsh Norwegian seas. On the Folgefonn, the charging plates are approximately two square-metres in size and can send an electrical charge without physical contact over a distance of 40–50 centimetres. The physical stability of the ferry is accomplished by an innovative vacuum-mooring system developed by Cavotec.

CRUISING INTO THE MAINSTREAM

Wireless charging makes inherent sense in many industries, and in the coastal ferry market in particular.

“New contract demands in the coastal ferries business require strict targets for the use of energy and the release of greenhouse gases,” says Sørfonn. “This is a new trend in this market segment and is driven by regulatory demands, political visions and incentives, and the need for a more sustainable way of running this business.”

For Wärtsilä, the short stop-and-go schedules of coastal ferries make them particularly well-suited to this technology, and a great starting point for the wireless charging revolution. ■

“Wireless charging eliminates the cable connection between the vessel and shore, thereby creating a safe and convenient means of charging the ship’s batteries.”





SUSTAINABILITY ASSURED 2017

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.

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

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. ■



SUSTAINABILITY ASSURED 2017

Hurricane rescue

Superintendent Niko Puutio explains how Wärtsilä service engineers assisted a client in dire need following the disastrous effects of a hurricane.



With the advent of climate change, and the unpredictable weather phenomena experienced around the world during the past year, it is important to remember that sometimes maintenance can be a less than routine affair.

When Hurricane Irma hit the island of Anguilla in September 2017, the result was catastrophic damage and the loss of electricity supply across the entire territory. Monitoring the situation continually on behalf of our customer Anguilla Electricity Company (ANGLEC), Wärtsilä Caribbean's service engineers were quick to respond, and Superintendents Niko Puutio and Alfonso Morales were dispatched at once.

TOTAL BLACKOUT

With all flights cancelled and air traffic at an absolute minimum, getting to the site was easier said than done. The pair

arrived by private charter, ready to work hand-in-hand with the customer – free of charge – to re-energise critical areas in Anguilla with the maximum haste.

"The island was in a total blackout when we arrived," says Puutio. "We agreed upon a plan immediately on arrival, first performing a fast overall check of the whole installation. We checked each engine, one by one, and then started up the unit to make sure it worked normally."

The biggest issues, explains Puutio, were caused by water found inside high-voltage cabinets and generators. These required a thorough visual inspection, followed by drying using heaters, a mechanical inspection and fixing, and electrical insulation inspections. Only after these procedures had been undergone could the units be turned on and tested.

"I stayed on Anguilla for 10 days," he continues. "Within that time, we made the

power plant available to provide electricity to the whole island. The power distribution system suffered heavy damage during the storm, and because of this, the load demand was low in the beginning."

CRISIS AVERSION

Puutio points out that good engineering is still the most important aspect of power-plant design, and that with this in place, and a customer such as ANGLEC with a strong technical background, even crises like these can be dealt with.

"My personal opinion is that the best result comes when we work together with the customer – planning spare parts, maintenance, and possible technical audits for their power plants," he says. "This is how Wärtsilä can help the customer in the best possible way."

Unfortunately, Hurricane Irma was not the only weather-related incident that

affected our customers during 2017, and the Caribbean was particularly badly struck on more than one occasion.

To assist these communities in re-establishing normality, Wärtsilä made a donation of USD 50,000 to aid in the restoration of power to Caribbean communities hit by hurricanes. The cheque was handed over to the Chairman of CARILEC, the association of Caribbean electric utilities, at a ceremony held on the island of Grenada in October. ■

"With good engineering in place, and a customer such as ANGLEC with a strong technical background, even crises like hurricanes can be dealt with."