

OFFSHORE SOLUTIONS

ENERGY  
ENVIRONMENT  
ECONOMY



# OFFSHORE DRILLING

At Wärtsilä, we are passionate about optimising lifecycle value by offering precisely what each of our customers need. We can deliver on this promise because we provide integrated solutions, products and services for every phase of oil and gas exploration, production, transportation and refining worldwide – both onshore and offshore.

Even though this brochure is just a beginning to learn why we are involved in bringing more than 5 million barrels per day to the market, which is more than 6% of the total world oil production, it still demonstrates how we are able to customise our comprehensive offering in order to give customers a crucial competitive edge. Whatever the conditions, we deliver world-class efficiency, fuel flexibility and environmentally sound solutions.

Our solutions for the offshore drilling market include systems for:

- Jack-up rigs
- Well intervention units
- Semi-submersible drilling units
- Drilling ships

We take total responsibility for the larger scope and various interfaces of drilling projects.

An integrated, total drilling solution is a diesel electric system consisting of project management and engineering, engines, thrusters, electrical and automation systems, telecom and navigation, bridge, dynamic position (DP) system, as well as commissioning and lifetime service through our worldwide service network.



## PERFORMANCE AND FLEXIBILITY FOR BETTER RESULTS

Wärtsilä provides integrated solutions to keep business afloat and flowing. We have the widest product portfolio available. Our offshore experts are well acquainted with marine power solutions, including power generation, propulsion, automation, power distribution and drives.

Our dual-fuel engines ensure maximum fuel flexibility, efficiency, reliability and environmental performance. Together with an integrated automation system and Wärtsilä's patented Low Loss Concept for power distribution, onboard efficiency is improved significantly.

We follow our customers' projects throughout their lifecycle. Through early involvement and long-term commitment, it is our objective to provide leading-edge solutions. Based on our customers'

needs we provide everything from design and engineering, project management, comprehensive building support and commissioning. Wärtsilä's worldwide service network provides lifetime support.

By choosing a total integrated solution from Wärtsilä, asset owners can be assured of:

- Reliable systems with high availability at all times
- Minimised newbuilding and project risks
- Unique and innovative designs
- Fuel and operational flexibility
- Economical and efficient lifetime operation
- Full compliance with environmental and safety regulations
- Proven design and faster project lead time

## THE WORLD'S LARGEST DRILL SHIP

Wärtsilä delivered the integrated power and control solution for the world's largest ultra-deepwater drillship/FPSO vessel, the Dalian Developer.

The Dalian Developer will be drilling in water depths up to 10,000 feet with a maximum drilling depth of 30,000 feet. It is also designed for extended well-testing and production, with an extensive deck space and large variable deck load capacity accommodating process facilities and a capability of storing up to one million barrels of oil.

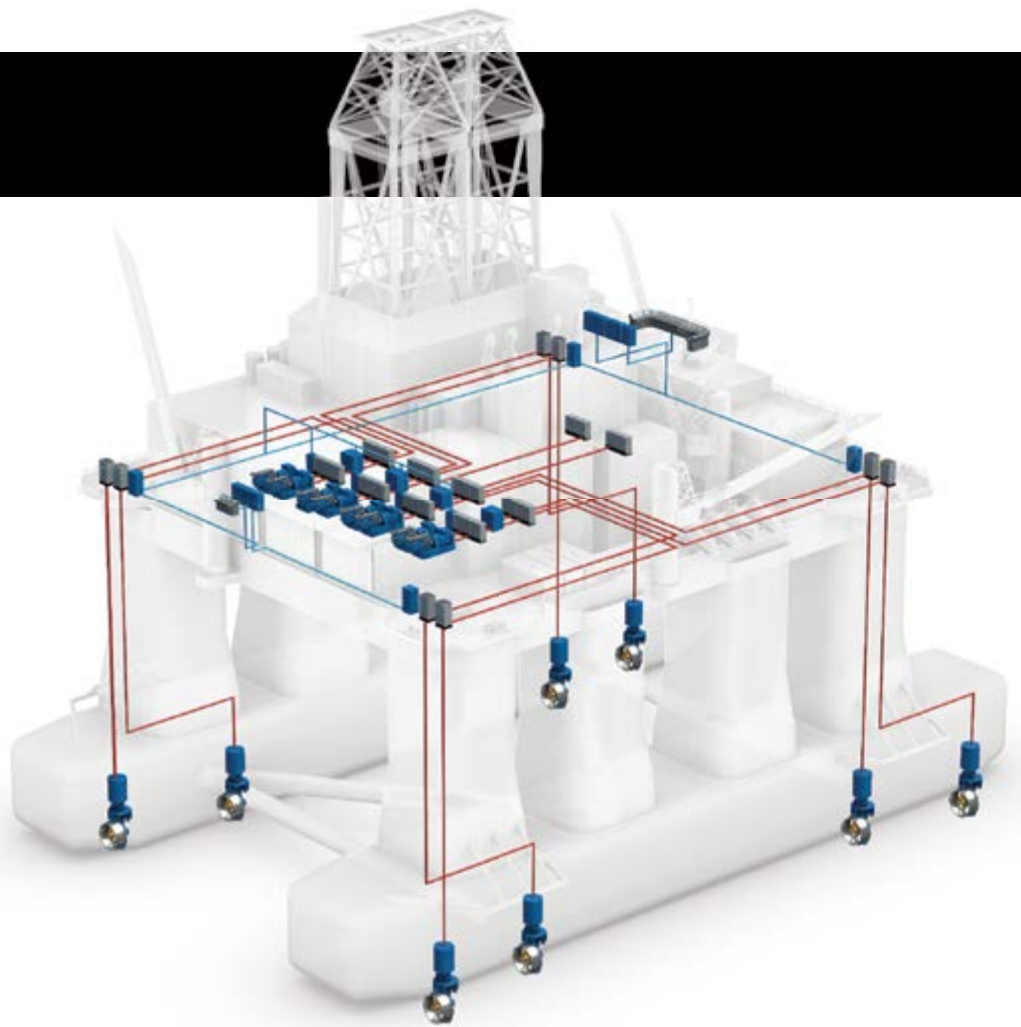
### Scope of supply

- Power station ● Power distribution ● Integrated control system, incl. PMS and safety systems ● Electrical propulsion system ● AC drives for drilling applications ● Engine room pumps ● Ballast and seawater pumps ● Fire water pumps
- Shipowner ..... DVB-Bank, Singapore  
Shipyard..... Cosco Dalian  
Delivered..... 2008-2012

# AND EXPLORATION

Wärtsilä's reliable systems have an excellent track record. Reliability is a prerequisite for safe operation and avoiding economic impacts caused by downtime. Our solutions enable units to operate smoothly even in remote areas and in the most demanding conditions.

We have a large range of pumps, valves, sewage treatment plants and fresh water makers. We also offer rig tensioning and seismic compressor packages fully integrated and compact, and safety & emission reduction systems such as exhaust gas cleaning and ballast water treatment.



**Wärtsilä's system integration includes engineering and operational services and power, propulsion, electrical and automation systems.**



## ULTRA DEEP COMMITMENT

The H6e drilling rig is a sixth-generation semi-submersible DP3 rig designed for global operation in ultra-deep waters. The hull section of the rig was built at the Dubai Drydocks in Dubai. The top side and complete rig was built by Aker Kvaerner's Stord Yard in Norway.

In addition to the delivery of equipment, Wärtsilä was responsible for all system engineering and the electrical system.

The rig market is a watershed between the traditional shipbuilding industry and the oil and gas industry. Versatility was the key asset when forming the project teams. Fortunately, Wärtsilä had what it took: strong and experienced teams to handle both oil and gas and ship power deliveries within this remarkable project.

### Scope of supply

- Generators 8 x 5300 kW
- Thruster system 8 x 4500 kW
- Power distribution system
- Drilling system
- Commissioning /start up
- Delivered .....2008

## GIANTS AMONG SHIPS

The Stena Drill MAX drilling ships are among the most powerful in the world. The first of four vessels was delivered to Stena Drilling, Scotland in 2007 as the result of a co-operation between Samsung and Wärtsilä. The vessels are capable of drilling for crude oil and gas in deep seas where there are severe winds and low temperatures, making construction of fixed platforms impossible.

Wärtsilä supplied six 16-cylinder Wärtsilä 32 diesel engines and ancillary equipment including fuel and lubricating oil filters, coolers and pumps.

We also supplied a purpose designed and manufactured compressor package unit producing

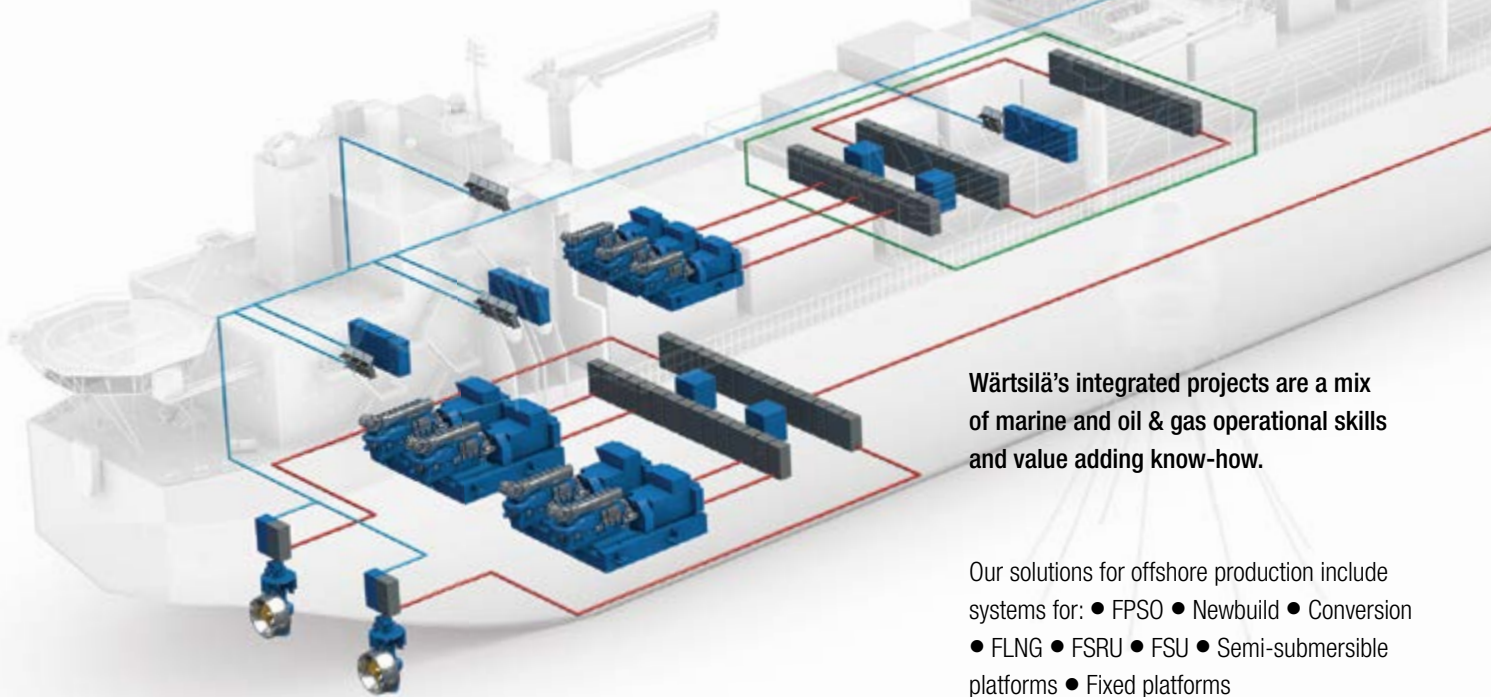
dry, filtered high pressure air for the riser tensioning applications.

Each engine has an output of 7290 kW at 720 rpm to drive the vessel's main generators. At the heart of the vessel, these engines power the dynamic positioning, propulsion, drilling, and hotel services.

Main engines .....	6 x Wärtsilä 16V32
Compressors .....	Hamworthy 4SW80 MK2
Shipyard.....	Samsung Heavy Industry
Ship owner .....	Stena Drilling Ltd
Delivered .....	2007-2011



# OFFSHORE PRODUCTION



**Wärtsilä's integrated projects are a mix of marine and oil & gas operational skills and value adding know-how.**

Our solutions for offshore production include systems for: • FPSO • Newbuild • Conversion • FLNG • FSRU • FSU • Semi-submersible platforms • Fixed platforms

Wärtsilä takes on a large part of the scope under one contract, this makes it easier to handle the challenges related to the interfaces and reduces the risk of delays. We have developed a cost effective pumping system comprising electric driven deepwell pumps which use less energy than other comparable distributed systems. Our pumps are designed

Wärtsilä is today the leading power generation provider, with a wide range of engines that are able to run on various fuels. For example, Wärtsilä's dual-fuel technology means that engines can be powered by MDO, crude oil or gas straight from the well, whenever possible.

The complete scope of our production package includes EICT (Electro, Instrument, Control and Telecom), power generation and thruster systems. We also offer engineering services and take responsibility for the complete detailed interface engineering of the EICT package.

## A POWERFUL OFFSHORE ALLIANCE WITH EMERSON

The Wärtsilä Emerson Alliance is an enabler of safe, efficient and enhanced solutions within the production and drilling market. We manage a larger scope and complex interfaces under one responsibility and thus mitigate the customer's project completion risk.

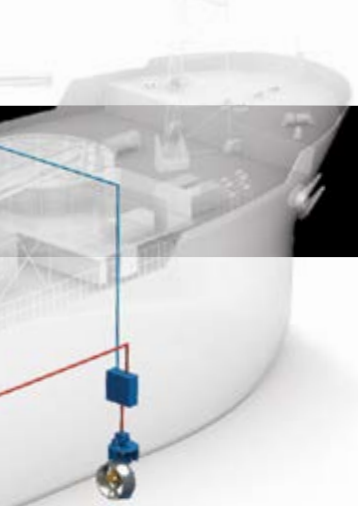


## BOOMING BUSINESS IN BRAZIL GOES FOR FUEL FLEXIBILITY

Wärtsilä has supplied three main power modules, each including two Wärtsilä 50DF multi-fuel engines, alternators and auxiliary equipment, for the P-63 Floating Production Storage and Offloading (FPSO) vessel to operate on Brazil's Papa Terra oilfield, 110 km off the coast of Rio de Janeiro. This FPSO will be the first to utilise gas engines to produce more than 100 MWe of power. The EPC delivery includes commissioning, start-up and operational supervision. The power modules were installed on P-63 in December 2011 and oil production is scheduled to begin in 2013.

Wärtsilä has also signed a framework agreement with Brazil's OSX Leasing B.V., part of the OSX Group, to deliver six multi-fuel Wärtsilä 50DF gensets that will provide some 102 MW of power for FPSOs in Brazil's booming exploration and production sector. The Wärtsilä 50DF engines offer true fuel flexibility as three different fuels can be employed: natural gas, marine diesel oil (MDO) and crude oil.





to comply with the highest offshore requirements and are designed for various applications, such as crude, process, fire and seawater pumping.

Wärtsilä also supplies various safety and emissions reduction systems such as inert gas, hydrocarbon blanketing systems, flare gas and VOC recovery systems. We also offer oil and water separation solutions to enhance production and waste water management systems. We offer lifetime support; once our project department is done with the execution, we offer operational maintenance on different levels.

Wärtsilä also offers a range of gas handling systems to the offshore market, such as its LNG regasification plant, LNG liquefaction plant and LPG cooling and re-liquefaction systems.

## TOTAL INERT GAS SOLUTIONS FOR TOTAL

Four FPSOs for French super-major Total currently feature Wärtsilä Hamworthy's inert gas systems. Each vessel has a storage capacity of 2 million barrels. Two of them will be based offshore Angola and the other two in Nigeria. Commissioning of the IGS on the DALIA FPSO has also been completed, while the already commissioned AKPO FPSO has reached the 'first oil' stage. Two further systems underwent full scale tests at Wärtsilä Hamworthy's test generator in Moss, Norway, before they were installed in the PAZFLOR FPSO and USAN FPSO. Wärtsilä Hamworthy has also been contracted to deliver a fully assembled inert gas system to the Goliat FPSO, located in the Barents Sea, and on an FPSO for the challenging Clov oil complex of Angola, also for Total.

## THE DYNAMIC PRODUCER

Wärtsilä has supplied the entire power, automation and propulsion system for the Dynamic Producer, a dynamically-positioned well-testing FPSO vessel. The Dynamic Producer was converted from an existing Aframax tanker and equipped with drilling, as well as production equipment. Dynamic Producer Inc. will employ the ship offshore in Brazilian waters from 2010 onwards.

Wärtsilä supplied the electrical propulsion, control and electrical distribution systems, including diesel generating sets, steerable thrusters and the complete automation and safety system, including topside automation. Wärtsilä also provided an integrated engineering

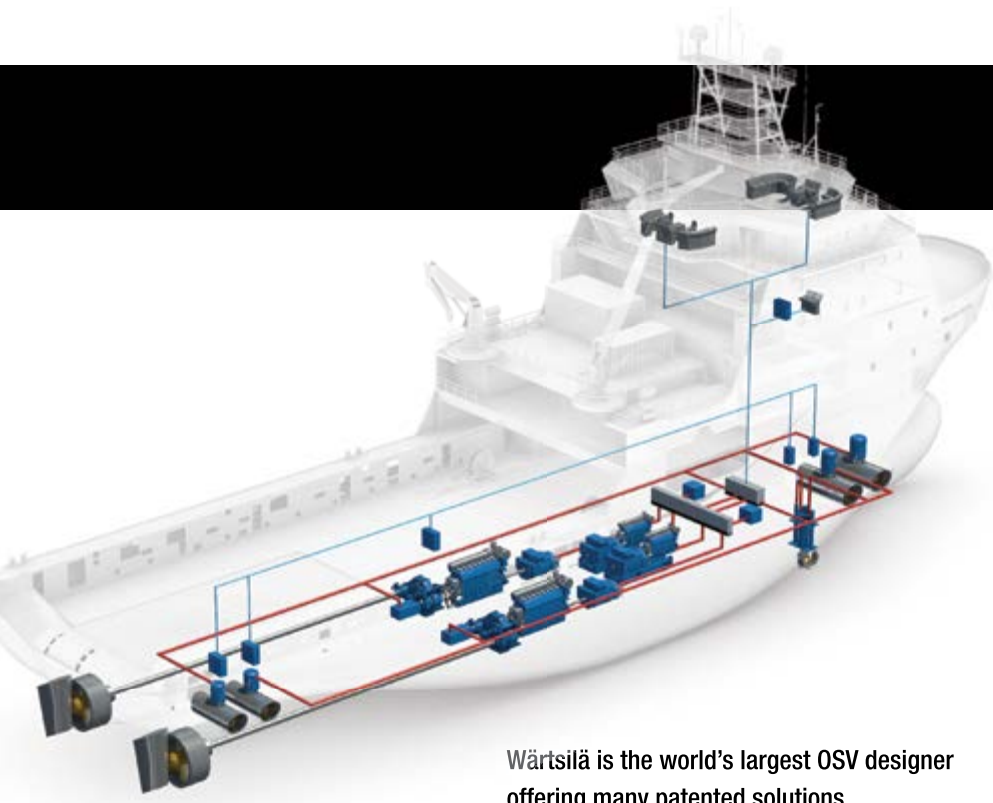
team which took care of all engineering related to the delivery of the scope. This team was also involved in the commissioning phase during the conversion.

### Scope of supply

- Integrated engineering
  - Diesel engines and generators
  - Steerable thruster systems
  - Thruster drives including transformers, el. motors, variable speed drives
  - MV and LV power distribution
  - UPS systems
  - Safety and automation system
  - Commissioning/start up
- Shipowner ..... Dynamic Producer Inc.  
 Shipyard..... Sembawang Shipyard  
 Delivered..... 2010



# OFFSHORE SERVICE



**Wärtsilä is the world's largest OSV designer offering many patented solutions.**

We provide integrated solutions for:

- AHTS – Anchor Handling Tug Supply Vessels
- OCV – Offshore Construction Vessels
- PSV – Platform Supply Vessels
- DSV – Diving Support Vessels
- Seismic research vessels
- Jack-up vessels

The varying operational modes of OSVs require a unique design in order to achieve high fuel efficiency. Smart integration of the propulsion systems optimises the performance of thrusters and prime movers. With Wärtsilä's Low Loss Concept, diesel-electric machinery is ultimately utilised in OSVs with variable speed solutions, reducing fuel consumption and emissions.

## ROYALLY EFFICIENT

The 'Viking Prince' entered service in March 2012. The environmentally friendly LNG dual-fuel engines ensure low emissions of NO<sub>x</sub> and reduction of CO<sub>2</sub>.

The vessel is a Wärtsilä VS 489 Gas PSV design and features outstanding energy efficiency, a unique hull form, fuel flexibility, and outstanding vessel performance in areas such as fuel economy and cargo capacity.

The Eidesvik orders include a unique configuration of the gas electric propulsion system. This is based on a combination comprising the Wärtsilä Low Loss Concept for electric propulsion, the Wärtsilä 34DF main engines, and the Wärtsilä 20DF engine.

Wärtsilä has the ability to offer total concept solutions that include the design of

the vessel, the propulsion plant, electrical and automation system, and a host of fuel saving and environmentally sustainable options.

### Scope of supply

Generating sets: Two Wärtsilä 6L34DF generating sets, 2610 kw/2510 ekW and two Wärtsilä

6L20DF generating sets, 056 kW/1014 ekW

Ship design: Wärtsilä Ship Design VS 489 Gas

PSV

Thrusters: Two steerable thrusters, 2 x 2450 kW

Two tunnel thrusters, 2 x 1000 kW

One retractable thruster, 1 x 830 kW

Owner ..... Eidesvik ASA

Shipyard..... Kleven Maritime AS

Delivered ..... 2012



## WÄRTSILÄ AT THE FOREFRONT IN EN

Wärtsilä is the clear market leader in supplying design and propulsion solutions for LNG-powered OSVs. In addition to the complete design of the vessel, Wärtsilä can offer a full scope of supply for OSVs including dual-fuel main engines and generating sets, electrical power and propulsion systems, integrated automation, and power management systems.

An integrated solution, utilising the Wärtsilä Ship Design VS499 LNG PSV, Wärtsilä's dual-fuel engines and the Low Loss Concept, means that the vessel owner will have the highest possible redundancy and reliability – and a state-of-the-art vessel with high outstanding energy efficiency, a unique hull form, fuel flexibility, and exceptional fuel



Photo: Harald M. Valderhaug

# VESSELS

Our reliable and proven products, high redundancy solutions and technical support provide our customers with many business benefits, from reduced newbuilding risks to increased flexibility of the fleet.

We offer a large range of engine room pumps, valves, sewage treatment and fresh water makers, all designed for easy operations, high efficiency and quick service turnaround.

Within the offshore service vessel market we also provide training and condition-based maintenance with excellent spare part availability from a wide range of manufacturers.



## ENVIRONMENTAL OSV SOLUTIONS

economy, cargo capacity and overall performance in all conditions.

Wärtsilä has delivered approximately 300 gas engines for various vessel applications, and designed more than ten LNG-powered vessels contracted or in service. With LNG as fuel, carbon-based greenhouse gas emissions can be reduced by at least 15%, while sulphur and nitrogen oxide emissions are virtually entirely eliminated.

Wärtsilä designed OSVs also have the highest possible Environmental Regularity Number (ERN) 99.99.99.99, which represents the vessel's capability for maintaining its position and normal operations under certain weather conditions.



## WÄRTSILÄ SERVICES: LIFECYCLE EFFICIENCY SOLUTIONS

Optimising your operations and preventing the unexpected is our shared passion – we serve you whenever, wherever.

Companies now focus on efficiency and impact of their operational expenses. Wärtsilä Services serves and supports customers in improving and optimising their operational efficiency throughout the whole lifecycle of the installation. Wärtsilä Services provides full service throughout the product lifecycle for both marine and power plant customers, and constantly develops its network worldwide.

We offer lifecycle efficiency solutions in the following areas of expertise:

- Engine services
- Propulsion services
- Electrical & automation services
- Boiler services
- Environmental services
- Service agreements
- Service projects
- Training services.

Our services cover everything from basic support with parts, field service and technical support to service agreements and

condition based maintenance; from installation and commissioning, performance optimisation, including upgrades and conversions, to environmental solutions, technical information and online support. The choice available to you extends from parts and maintenance services to a variety of comprehensive, customised long-term service agreements, including performance and operations & management agreements.

Additionally, we are continually broadening our range of services by adding valuable solutions and specialist services to our portfolio. In this way we support you around the globe through our workshops and in key ports, regardless of your equipment make.

Our Services organisation currently features more than 11,000 dedicated professionals in 70 countries.

Wärtsilä adds value to your business at every stage in the lifecycle of your installation. With us as your service partner, you receive many measurable benefits such as availability and performance, productivity gains and cost benefits.

Above all, peace of mind in the knowledge that your installation is being serviced by the most experienced partner you could have – Wärtsilä.

Wärtsilä is a global leader in complete lifecycle power solutions for the marine and energy markets. By emphasising technological innovation and total efficiency, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers. Wärtsilä is listed on the NASDAQ OMX Helsinki, Finland.

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