



MV Willem de Vlamingh & MV Willem Barentsz

Rederij Doeksen's new LNG catamarans

In service to and from the isles of Terschelling and Vlieland: 7th January 2020

70M ROPAX FERRY
VIA
VRIJPAK
VIA
VRIJPAK



Specifications

Names	MV Willem de Vlamingh MV Willem Barentsz
Mesurements	70 m lenght overall – 17,3 m breadth – 2.60 m hull design draft
Capacity	Certified for 66 cars and 700 passengers, 573 of which are covered in the saloon and 36 in the conservatory
Freight	120 meters
Load capacity	345 tonnes
Speed	14 knots
Fuel capacity	2 X 46 M3 LNG type C tanks
Propulsion	2x MTU single fuel LNG engines, each driving a Veth rudder propeller (CRP)
Construction material	Aluminum
Emissions improvement	-11% CO ₂ , -90% NO _x , -95% PM, -100% SO _x
Energy usage	Extremely low fuel consumption, low ship weight, low wave resistance, maximum energy generation from residual heat and solar energy, energy-efficient lighting.
Ice	Reinforced ice belt
Anti-fouling	Silicone-based, less environmental impact due to less resistance and does not wear off
Class	Lloyd's Register of Shipping
Scoop	These vessels will be the first single fuel LNG ferries in the Netherlands and the very first ships in the world where single fuel LNG engines directly drive a fixed propeller.
Keel laying	Willem Barentsz: Vung Tau (Vietnam) 15 juli 2016 Willem de Vlamingh: Vung Tau (Vietnam) 9 augustus 2016
Baptizm	Both the Willem de Vlamingh and the Willem Barentsz were baptized according to good sailor practice and in accordance with family tradition before they were first entrusted to the sea. In this case the sober baptismal ceremonies took place in Vung Tau on resp. January 19 and 22, 2019.



Background

B.V. Shipping company G. Doeksen and Zn.

Rederij Doeksen is an ambitious and innovative family business that was founded in 1908 by Gerrit Doeksen and his oldest sons. They earned their living by sucking shells, storing and towing. Since 1923, the Rederij has also been providing passenger transport between Terschelling, Vlieland and Harlingen and has developed multi-functional ships of innovative design.

Today, Rederij Doeksen is part of the Koninklijke Doeksen BV holding company. The company has 194 FTEs, spread over the locations Harlingen, Terschelling and Vlieland. Of these, 40 FTEs have a temporary contract for the peak season. The company transports around 736,000 passengers a year across the Wadden Sea with its fleet of car ferries, fast catamarans and a freight catamaran. In 2014, a transport concession to the Wadden islands of Terschelling and Vlieland was granted to Rederij Doeksen for 15 years by the then Ministry of Infrastructure and the Environment.

Rederij Doeksen has never avoided unorthodox solutions and, with the help of the latest technologies, has strived for more speed, flexibility, service and efficiency over the years. "Sustainability" has also been added to this series as a powerful core value.

A green choice for the wadden region

In 2020, Rederij Doeksen will be the first Wadden Sea Shipping Company in the Netherlands to start using liquefied natural gas (LNG) passenger ships. Thanks to innovative applications, these light-built ships use substantially less energy than traditional steel ferries. With the choice of LNG as fuel instead of low-sulfur gas oil, an active choice is made for around 11% less CO₂ emissions, 90% less NO_x, 100% less SO_x and 95% less PM₁₀ (particulate matter). If suitable Bio-LNG (liquefied biomethane from the fermentation of biomass streams) becomes commercially available in the long term, the CO₂ reduction could increase even more. This makes a significant contribution to the preservation of the vulnerable environment of the wadden region.

Wadden Fund

The Wadden Fund is a joint arrangement of the Wadden provinces Fryslân, Groningen and Noord-Holland. The fund invests in initiatives and projects that strengthen the ecology and sustainable economic development of the Wadden area. Projects from (cooperating) entrepreneurs, associations, foundations and government organizations can be eligible for a contribution from the Wadden Fund.

With the commissioning of the two new ships of Rederij Doeksen, a higher degree of environmental protection is achieved than required by law. It represents a first step in the direction of LNG transition in the Wadden Sea area (ferry services, inland vessels etc.) and that is good news for the vulnerable environment in the Wadden Sea World Heritage. This project thus actively contributes to the theme "Sustainable development of ports and energy transition" from the Wadden Fund Pioneer Program 2012-2013. The Wadden Fund awarded Roeke Doeksen a subsidy of € 1,207,500 for this new-build project.

Achtergrond

Collaborating specialists

The construction of a ship, let alone the construction of two ships at the same time, is a complex matter. It took years of preparation before we were ready. Not surprisingly, for this project we have only invited the best specialists to think along and build. Some of them:

Strategic Marine from Australia and BMT Nigel Gee from Southampton

Building an aluminum ship of this size requires different skills from a shipyard that builds steel ships. Designing and being able to build such large aluminum ships must be in good hands with companies that have a lot of experience in this. With the experienced design agency BMT Nigel Gee from Southampton and Strategic Marine this is in very good hands. BMT Nigel Gee has a great deal of experience in constructing all kinds of high speed aluminum ships. Strategic Marine Vietnam is originally an Australian shipyard, specialized and pre-eminently experienced in the construction of all kinds of (fast) aluminum ships, including passenger ships. The company is part of the stock market-listed Triyards in Singapore which, in addition to Strategic Marine, also has a number of large shipbuilding sites in Asia and the US, specializing in the construction of complex offshore installations.

Marine Service Noord (MSN) from Hoogezand (NL)

We have been in talks with these specialists in the field of LNG fuel systems since 2014. Marine Service Noord from Hoogezand in Groningen supplied the entire design of the LNG fuel installation from the tanks to the engines. The gas installation was built and assembled entirely in its own workshop in Westerbroek. The four installations were then transported with the tanks to Vietnam to be built into the ship there. The final commissioning of the entire LNG installations will be carried out by MSN in the Netherlands.

Vripack from Sneek (NL)

The Frisian company Vripack from Sneek has designed both the exterior and the interior of the ships. The ideas that Vripack launched were distinguished by surprising applications and innovation. It is also interesting that Vripack has a holistic design vision and expertise in the field of naval architecture, ship engineering and design. For example, the design office uses the same design and 3D modeling software as most shipyards. Since 1961, the renowned nautical design agency has designed more than 7,300 innovative yachts worldwide for private clients and leading shipyards.

MTU from Germany

This German motorcycle specialist, with a Dutch branch in Dordrecht, is at the forefront when it comes to the development of clean and efficient high performance engines. They have developed highly efficient engines that only run on LNG (single fuel). We are proud that our ships will be the first ferries in the world to be equipped with engines from this MTU 4000 series. Periodic maintenance will be done by the engine manufacturer himself: an additional benefit from a producer that is relatively close.

Background

Other Dutch suppliers

Because the ships will eventually sail in the Netherlands for decades, the availability of parts and the service of installations in Western Europe have been carefully examined. For example, the two counter-rotating rudder propellers are delivered by ship by the leading Dutch company Veth from Papendrecht. The entire ventilation and air-conditioning installation is designed and supplied by Heinen and Hopman from Spakenburg. The two lifts on board both ships are designed and supplied by Lift Emotion from Meppel. The electrical system for driving the bow thrusters is designed by Danfoss, based in Heerenveen.

The complete new construction project has become a very close collaboration between leading specialists who, each in his own field, are of great added value for this international project. Building together is learning together and from the cooperation that started with the construction of our ships, new collaborations have emerged between various suppliers. It has turned out to be a cross-pollination of knowledge that leads to far-reaching innovation and new possibilities. And that's how we like it!

Knowledge processes

MIWB / NHL and Maritime Academy Harlingen

This project focuses on experimental activities and / or research and development and contributes to the (availability of) knowledge for the sustainable energy transition in the Wadden Sea area. This is the first ferry concept on the Dutch Wadden that brings these techniques together. During the realization of the project, students and teachers of the Maritime Institute Willem Barentsz (MIWB / NHL) and the Harlingen Maritime Academy can gain knowledge during engineering and construction and translate this into teaching material for new training courses on LNG technology for ships. This gives the northern maritime training courses a head start. The required knowledge will also be built up at supply companies and will boost employment in the region. Conversely, the employees of Rederij Doeksen will be able to follow courses in the field of LNG at the MIWB.

Green Deal LNG and Energy Valley

There is national interest in the Doeksen Shipping Company project in the context of the Green Deal LNG on the Rhine and the Wadden. The Green Deal LNG Rhine and Wadden aims to give an impulse to the use of clean, economical and silent LNG (Liquefied Natural Gas) for heavy transport (inland shipping, shipping, fishing and trucks). The aim is to achieve a sufficient critical mass for 2020, when it comes to the use of LNG, so that it can develop further economically and profitably. Energy Valley, one of the actively involved in this Green deal, sees Harlingen (alongside Eemshaven) as the starting point for the further rollout of LNG as a transport fuel in the wadden region.

With the right preconditions and successful cooperation, it is potentially possible to open up a (Dutch) market for 2-3 million tonnes of LNG in 2030. This means a reduction in CO2 emission equivalents of more than 1 Mton per year and for particulate matter a reduction of 400 to 400 600 tons per year.

Green features

Material and shape

How do you make a boat as environmentally friendly as possible? A question that we started working on in 2003. We wanted more sustainable solutions for our ferries that fit better with the nature reserve that we use every day. It is not for nothing that the Wadden Sea has been declared a UNESCO World Heritage Site.

The shape of the hull influences the resistance in the water and therefore the consumption. Research has shown that on the shallow Wadden Sea, the catamaran hull shape is more efficient than a single hull vessel with a comparable load capacity. That is why we have once again opted for a catamaran hull shape for the new ships. We have gained a lot of experience with this type over the years and we like it.

Driving role

The importance of environmentally-friendly fuels has been recognized from all sides, but more is needed to make their use by companies like ours a success. There are LNG terminals in a few places in the Netherlands that make LNG available to users. But not yet in the north of the Netherlands. To clarify the importance of this locally, we organized a mini conference on LNG in collaboration with the MARIKO maritime competence center. Amongst others, the representative of the province of Fryslân Sytske Poepjes and alderman Maria Le Roy (Harlingen) were present. During this meeting we discussed the importance of facilitating LNG in the seaport of Harlingen. Because what should be first: the question or the supply? And isn't everything connected? Here too the reactions were enthusiastic. And that is how it should be: together explore and realize the possibilities.

Environmental protection

The ferry services between Harlingen and the islands fall under the rules for inland shipping, including the emission rules. The emission standard is determined with the CCR2 standard, with mandatory use of low-sulfur fuel. This standard will be replaced in 2020 by the EU stage 5 emission standard. The natural gas engines of the new ships meet this requirement.

The new ferries, however, have more environmentally-friendly features, among other things.

- The use of solar energy sources provides part of the hotel services with energy, so that less LNG is used;
- Maximum heat is recovered from residual heat for heating and generating electricity. This residual heat recovery system covers the entire energy demand for driving the bow thrusters while maneuvering in the harbor. The result is that the use of the two ePacks means an annual CO₂ reduction of 318 tonnes for each - a saving of 260,000 liters of fuel and 462,600 kWh per year.

Heat recovery and reuse

Making LNG-fuelled catamarans more efficient by using waste heat

How do you make lightweight LNG-fuelled catamarans even more efficient? One shipowner is looking to waste heat to answer the burning question.



Start of 2020, Dutch shipping company Doeksen will put two new catamarans into service on the environmentally sensitive Wadden Sea, which was declared a UNESCO World Heritage site in 2009. The ships, built in Vietnam by Strategic Marine, bundle environmental technologies and materials to make the operation as sustainable as possible. The 70-m vessels, which will sail between Harlingen and the islands of Terschelling and Vlieland from mid-2019, carry up to 66 vehicles and around 600 passengers. A lightweight aluminium body significantly reduces fuel consumption compared to a traditional steel hull. The vessels are powered exclusively by LNG via pure gas engines from MTU.

Even more innovative than the engines is using waste heat recovery on the ships. Doeksen managing director Paul Melles notes that – however environmentally friendly the fuel you use – more than 50% of the energy contained in fuel is lost as waste heat when using internal combustion engines.

“The waste heat simply evaporates in the air or is dumped into the sea,” says Mr Melles. “Using waste heat to generate electricity that can be used on board is a crucial step forward and a must for a modern ship.”

Waste heat recovery is widely used today on land but is still the exception on a ship. “Contrary to land-based applications, installation space on board a ship is strictly limited,” says Mr Melles. “So, we were looking for a solution that not only worked but above all was compact.”

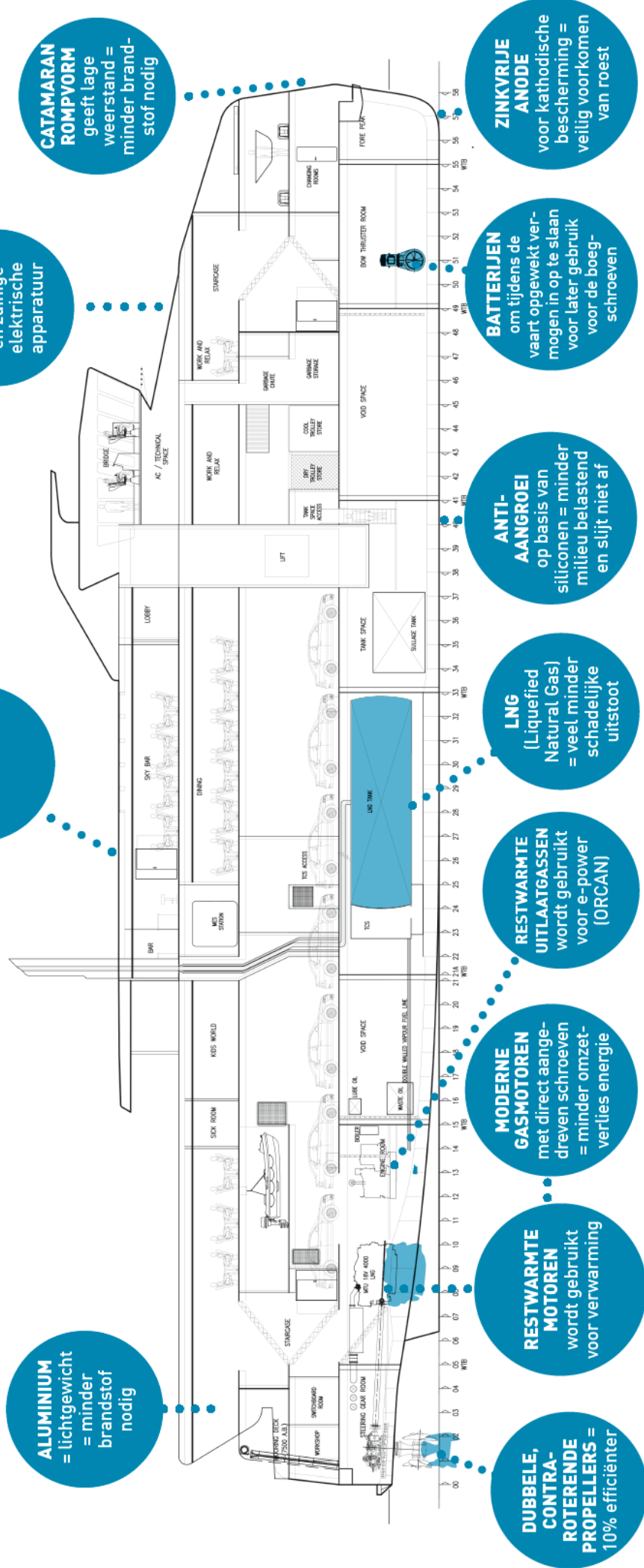
Doeksen selected a system from Munich-based company Orcan Energy, which has been building solutions for converting waste heat into electricity for industry, mobility and power generation for several years. Orcan’s efficiency packs are the size of a shower cabin. In order to use the heat contained in the engine exhaust gases to drive an electric generator, the catamarans were each equipped with two efficiency packs, each generating an electrical net output of up to 100 kW.

The packs are based on the Organic Rankine Cycle, in which a refrigerant is continuously cycled to convert waste heat into mechanical work. The power generated is converted into direct current by a frequency converter to charge batteries, which supply electric power to bow thrusters when manoeuvring in harbour. The waste heat recovery system thus covers the entire energy demand for this intensive operation. The result is that using the two efficiency packs means an annual CO₂ reduction of 318 tonnes for each – a saving of 260,000 litres of fuel and 462,600 kWh a year.

The catamarans have yet to enter service, but Orcan is already growing its marine orderbook. According to chief executive Andreas Sichert, the company will soon reach orders for 32 installations. Depending on the size of the heat source on board, Orcan delivers a stack of three to five modules (300-500 kW). For high-powered ships (such as the biggest container vessels), the company could marinise its industrial module, with each module supplying 400 kW, resulting in the supply of 1 MW of electric power to large ships.

“Doeksen has just made the start,” says Dr Sichert, “Now it is important to convince other shipowners of waste heat recovery on board. Only then will an environmentally friendly structural change in shipping be achieved.”

More info: https://www.lngworldshipping.com/news/view,harvesting-waste-heat-on-the-wadden-sea_57673.htm



ALUMINIUM
= lichtgewicht
= minder
brandstof
nodig

ZONNEPANELEN

**LED-
VERLICHTING**
en zuinige
elektrische
apparatuur

**CATAMARAN
ROMPVORM**
geeft lage
weerstand =
minder brand-
stof nodig

**DUBBELE,
CONTRA-
ROTERENDE
PROPELLERS** =
10% efficiënter

**RESTWARMTE
MOTOREN**
wordt gebruikt
voor verwarming

**MODERNE
GASMOTOREN**
met direct aange-
dreven schroeven
= minder omzet-
verlies energie

**RESTWARMTE
UITLAATGASSEN**
wordt gebruikt
voor e-power
(ORCAN)

LNG
(Liquefied
Natural Gas)
= veel minder
schadelijke
uitstoot

**ANTI-
AANGROEI**
op basis van
siliconen = minder
milieu belastend
en slijt niet af

BATTERIJEN
om tijdens de
vaart opgewekt ver-
mogen in op te slaan
voor later gebruik
voor de boeg-
schroeven

**ZINKVRIJE
ANODE**
voor kathodische
bescherming =
veilig voorkomen
van roest