



## Active, long-term environmental work

Viking Line operates in a sensitive maritime region. The Group therefore works each day to ensure that the Baltic Sea and its precious archipelagos are conserved for future generations as well. For a long time, Viking Line has required more environmentally sustainable technology, implemented fuel-saving programmes and introduced new environmentally sustainable concepts on board. The Group intends its environmental work to be a natural part of its day-to-day work and to continuously evolve. Thanks to its long-term, active commitment to this task, the Group has developed environmental work that extends beyond what the regulations in force require.

The Group's Head Office, the subsidiary Viking Line Buss Ab and all vessels are certified in compliance with ISO 14001 environmental management standards. In addition, the Viking Line organization and all vessels are certified according to the International Safety Management (ISM) Code, which stipulates organizational rules for safe vessel operation and for preventing pollution.

National legislation and international agreements are the basis for the Group's environmental work. The most extensive set of environmental protection regulations is the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), which was devised by the International Maritime Organization (IMO), a United Nations agency.

#### **No discharges into the sea**

Viking Line vessels discharge no wastewater into the sea. All wastewater is pumped ashore to municipal wastewater treatment plants, thereby easing the burden on the Baltic Sea. A vessel generates three main types of wastewater: grey water from showers and other washing activity, black water from toilets and bilge water that is separated from water in engine rooms that contains oil.

According to the MARPOL convention, discharging black water and bilge water into the sea is still permitted if the water meets certain stated criteria. Discharges of grey water are not regulated by legislation at all. Over the past two decades, Viking Line has chosen to let land-based treatment plants handle all its wastewater because these treatment plants are significantly more efficient than the treatment systems available for use on vessels.

#### **Minimizing atmospheric emissions**

All of Viking Line's vessels, except for the Viking Grace,

run on diesel oil with a sulphur content of less than 0.1 per cent by weight in order to meet the requirements of the European Union's new sulphur directive, which went into effect on January 1, 2015. Until then, the vessels in question operated on low-sulphur oil with 0.5 per cent content by weight in order to reduce sulphur oxide (SOx) emissions. The Viking Grace runs on liquefied natural gas (LNG), which is free of sulphur.

To decrease nitrogen oxide emissions, reduction technology is used on two of Viking Line's vessels – catalytic converters on the Viking Cinderella and Humid Air Motor (HAM) technology on the Mariella. HAM is a globally unique method that reduces nitrogen oxide emissions by lowering the combustion temperature of vessel engines. This temperature reduction is achieved by adding vaporized sea water to the combustion process. The Viking Grace has about 85 per cent lower nitrogen oxide emissions than vessels that use marine diesel oil.

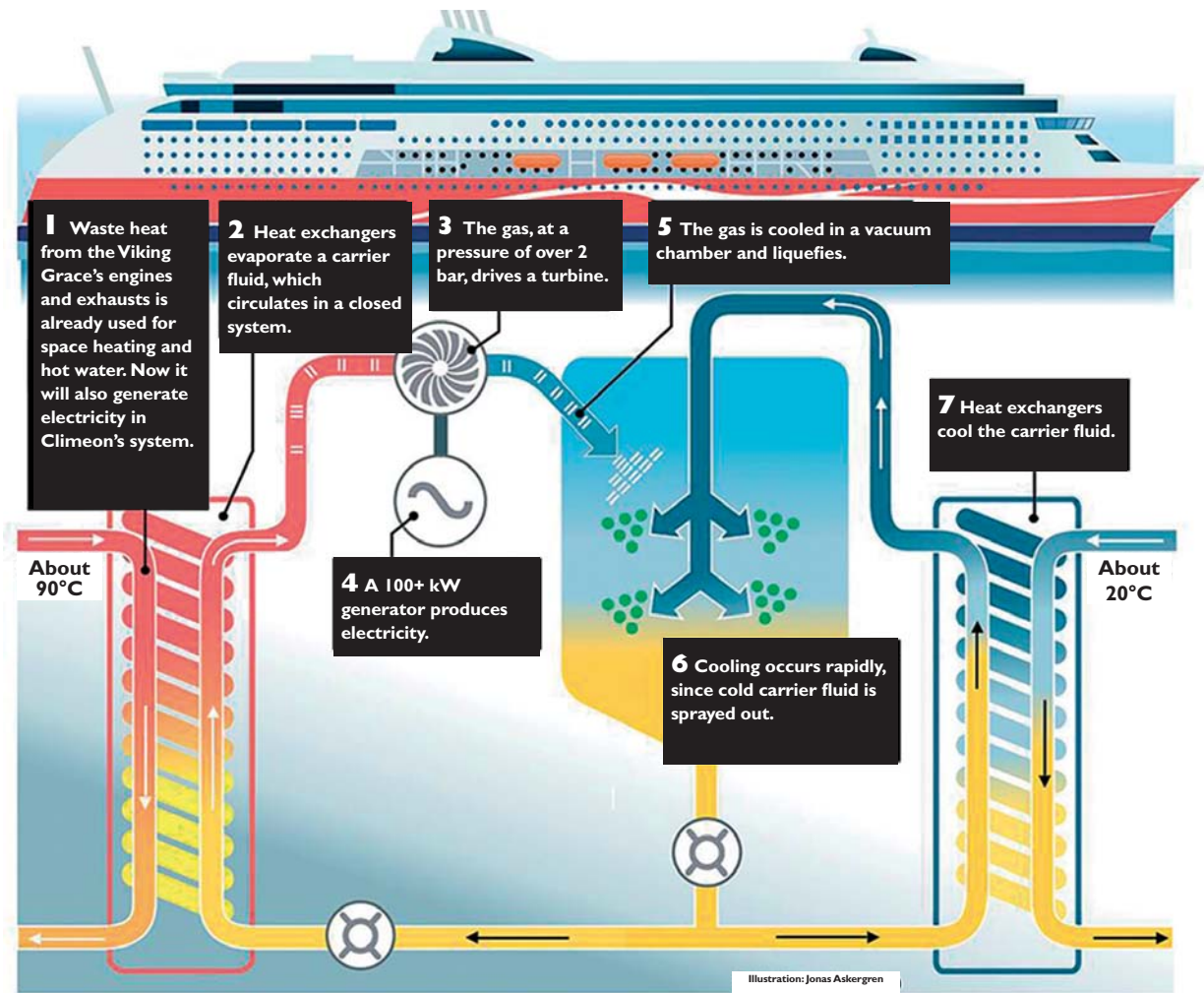
The Gabriella and the Mariella operate using a land-based electricity supply while they are docked during the daytime in Helsinki and in Stockholm. Using land-based electricity decreases emissions of air pollution and engine noise in ports and their vicinity.

Viking Line runs an internal energy efficiency programme to reduce exhaust gas emissions. In this programme, vessel operating staff and the Group's technical department are working to introduce fuel-efficient operating methods, install new and more energy-efficient technology, reduce the hydrodynamic resistance of vessels and recover energy.

#### **New energy recovery system**

Viking Line has an agreement with the Swedish innovation company Climeon related to the new Ocean Marine energy recovery system, which the Viking Grace is the first vessel to use. Climeon's patented





The Viking Grace is the first vessel to use the new Ocean Marine energy recovery system.

technology allows economically profitable recovery of heat, which is converted to electricity through a unique vacuum process. The system will convert waste heat from the vessel's engines into 700,000 kWh of clean, emission-free electricity per year. This electricity is used mostly in its hotel operations, among other things for lighting.

**Divers clean the bottoms of vessels**

Instead of using environmentally hazardous paints on the bottoms of vessels, their hulls are brushed by divers several times each year. The diving company that Viking Line works with uses a patented, environmentally sound brushing method that it developed in-house. This method involves collecting all growths loosened from the bottoms of vessels during brushing into a separate container, which is then brought ashore for further treatment. The waste is used in part to make biogas.

**Environmental audits**

To ensure that Viking Line meets environmental certification standards, continuous internal audits of its operations are conducted. In addition, DNV GL – an independent certification body – performs yearly external audits of the environmental management system in order to verify compliance with the established objectives. In addition, the Finnish, Swedish and Estonian regulatory authorities perform continuous ISM Code-related audits connected to both safety and environmental work.

**Active environmental work**

Viking Line participates actively in the task of saving the Baltic Sea by aiding and collaborating with different environmental organizations. During 2015, Viking Line supported the Baltic Sea Action Group's projects to ensure a cleaner Baltic Sea. The plastic carrier bags that are sold in the shops on board Viking Line vessels

KEY FIGURES	2015	2014
Passengers	6,568,864	6,610,146
Cars	649,327	634,433
Cargo units	133,163	129,255
Total distance (000 km)	1,138	1,141
<b>Resource consumption</b>		
Fuel oil (m <sup>3</sup> )	93,838	87,060
Lubricating oil (m <sup>3</sup> )	620	744
Urea (m <sup>3</sup> )	284	211
Fresh water (m <sup>3</sup> )	331,736	335,185
LNG (tonnes)	15,480	15,951
<b>Emissions (tonnes)</b>		
Nitrogen oxides (NO <sub>x</sub> )	3,218	3,684
Sulphur oxides (SO <sub>x</sub> )	76	433
Carbon dioxide (CO <sub>2</sub> )	286,797	307,853
<b>Residual products (tonnes)</b>		
Solid waste for combustion	3,138	3,025
Waste sent to landfills	158	210
Waste for recycling	1,565	1,321
Biowaste	1,042	958
Hazardous waste	67	70
<b>Wastewater pumped ashore (m<sup>3</sup>)</b>		
Grey and black water	294,364	298,066
Bilge water	8,423	7,468
<b>Waste oil (m<sup>3</sup>)</b>	2,506	2,314



The Viking Grace's LNG tanks.

have an environmental message printed on one side of each bag. Part of the revenue from these carrier bags is being donated to Finland's Keep the Archipelago Tidy Association and the Keep Sweden Tidy Foundation – two organizations that work towards a cleaner environment on their respective sides of the Baltic Sea.

**The LNG-powered Viking Grace**

The Viking Grace is the world's first passenger vessel of its type and size class that runs on liquefied natural gas (LNG). As a fuel, natural gas creates substantially less hazardous emissions than marine diesel oil. Nitrogen emissions and particulates are reduced by about 85 per cent and greenhouse gases by some 15 per cent. Sulphur emissions are virtually zero.

The vessel's hydrodynamically optimized hull design and highly efficient drive technology result in

major energy savings. Efficient ventilation units, whose air flow varies in response to prevailing external and internal circumstances, lead to further savings. Other factors that result in high energy efficiency are the heat recovered from the engine exhaust gases and cooling water as well as the air conditioning system, the advanced galley energy management system, the high insulation category of the windows and the vessel's light structures. The lifts in the Viking Grace are 30 per cent powered by their own braking energy, and on-board lighting largely consists of LED technology. This technology is used in all entertainment venues and in 90 per cent of the vessel's public areas.

The engines have sound frequency-adapted mufflers, which lower the noise level of the vessel. The hull design minimizes swells and is the result of a lengthy development process.

# Environmental awareness on board

**Environmental thinking is also visible in Viking Line's shipboard customer services, including organically grown coffee and water in a personal glass bottle. Viking Line chooses organically grown coffee as one element of its efforts to practice environmentally conscious procurement. When purchasing the seafood that is served on board its vessels, Viking Line follows the Swedish Environmental Management Council's list of sustainable fish and shellfish stocks.**

The Food Garden restaurants on Viking Line vessels no longer offer table water in plastic bottles. Instead they serve specially purified water poured directly from the tap into an environmentally themed reusable glass bottle. This has a number of environmental advantages – it reduces the need to transport bottles of water as well as the quantity of single-use bottles in shipboard solid waste.

### Reduced water consumption

Shipboard cleaning staff members also employ various environmentally friendly practices. On board they use a special dosage device that mixes concentrated cleaning agents with water according to predetermined norms. Because of careful dosage, they achieve optimal water and cleaning agent use when cleaning the cabins and galleys on Viking Line vessels.

Cleaning equipment made of micro-fibres is used, which minimizes cleaning agent and water use on board.

To reduce water consumption, Viking Line has installed water-saving mouthpieces on faucets and showers, which reduce water flow without affecting passenger comfort. The vacuum toilets and waterless urinals aboard the vessels also help to reduce water use.

### New cleaning agent

Purchasing and use of chemicals are governed by internal environmental standards. A list of products approved for use at Viking Line is being compiled at Group level. Environmentally friendly alternatives are used as far as possible.

Viking Line worked for a long time with the company KiiltoClean Oy to develop a new general cleaning agent for cabins. The company was required to ensure that the cleaning agent would comply with Viking Line's environmental policy and could be certified. Nor could it have too strong a scent and, keeping in mind the on-board water supply, it had to be easy to rinse away. The final product was named Kiilto Total Fresh and is used on board today.

### All waste is taken care of

All solid wastes generated aboard Viking Line vessels are brought ashore for subsequent recycling, re-use, combustion, depositing in landfills, composting or other waste management by an approved recipient. On the Viking XPRS and Viking Grace, equipment has been installed to make efficient sorting and collection of biowaste possible. On the Mariella, all biowaste is collected in receptacles. The biowaste is then transported to a digestion plant for production of biogas.

## During 2015...

...Viking Line brought ashore from the Viking XPRS, the Viking Grace and the Mariella a total of **1,042** tonnes of food waste for biogas production. This yielded **78,000** cubic metres of biogas, equivalent to **88,000** litres of petrol. Biogas production neither increases atmospheric carbon dioxide levels nor contributes to the greenhouse effect. Biogas is thus usually described as carbon dioxide-neutral.

...Viking Line served **6,230,776** cups of organically grown coffee on board its vessels. Organic cultivation means that the beans are grown amid rich biological diversity and without artificial fertilizers, chemical pesticides or genetic manipulation.

...Through recycling Viking Line spared our environment from emissions comparable to driving a car more than **20,875,680** km on a motorway.

During 2015 Viking Line brought the following ashore from its vessels for recycling:



**19 tonnes of plastic,**

*which is equivalent to a 33 tonne reduction in CO<sub>2</sub> emissions – comparable to driving a car 175,560 km on a motorway.*

**12 tonnes of aluminium,**

*equivalent to a 120 tonne reduction in CO<sub>2</sub> emissions – comparable to driving a car 638,400 km on a motorway.*



**2,155 tonnes of used oils,**

*equivalent to a 3,771 tonne reduction in CO<sub>2</sub> emissions – comparable to driving a car 20,061,720 km on a motorway.*



**461 tonnes of glass packaging.**

*When recycled glass is melted down to make new glass, the process consumes 20 per cent less energy than starting from sand, soda ash and limestone as raw materials. Glass packaging can be recycled any number of times without deteriorating in quality.*



**71 tonnes of scrap metal.**

*Recycling of steel, for example from food tins, consumes 75 per cent less energy than production from iron ore.*



**720 tonnes of paper and cardboard packaging.**

*Because of recycling, we do not need to cut down as many new trees. A tonne of recycled paper is equivalent to about 14 trees. Paper can be recycled around seven times.*



**DID YOU KNOW THAT** recycling of materials is very beneficial to the environment – greater recycling reduces our climate impact. It requires much less energy to recycle materials than to extract new ones from nature.  
**ECO-CYCLES BENEFIT THE CLIMATE.**