The Wilh. Wilhelmsen group aims to reduce the impact of its cargo-carrying operations and environmental footprint, as an operator and a product and service provider.

On the shipping side, our vision is to continuously improve operations to achieve zero emissions and thereby contribute to a cleaner environment globally. On the product and service side, we offer a wide range of environmental solutions that cover the entire vessel life cycle, from design to building, operation and green recycling.

1: Friendly vessel operation
2: Environmental account
3: A solid green offering
4: Useful links
The Wilh. Wilhelmsen group (WW) aims to reduce the impact of its cargo carrying operations. The group works on a broad scale, implementing environmental initiatives to reduce its emissions to air, sea and land. We are on the right track. An example of this is that fuel consumption measured in grams/tonnes/nautical miles (g/tonnes/nm) on our vessels has been reduced by 26% compared with 2009.

In 2010, WW reduced its CO₂ emissions measured in g/tonnes/nm by 26% compared with 2009. Total CO₂ emissions increased by 5% however due to transporting more cargo with 2009. Total CO₂ emissions increased by 5% however due to transporting more cargo because of the global economic recovery.

WW reduces its carbon footprint by focusing on reduction in fuel consumption. WW is also involved in developing new carbon indexes for the industry.

Carbon dioxide
WW aims at reducing its carbon footprint by focusing on reduction in fuel consumption. WW is also involved in developing new carbon indexes for the industry.

In 2010, WW reduced its CO₂ emissions measured in g/tonnes/nm by 26% compared with 2009. Total CO₂ emissions increased by 5% however due to transporting more cargo because of the global economic recovery.

CO₂ emissions from shipping are not currently regulated by law. However, WW is engaged in the International Maritime Organisation’s (IMO) work to create an Energy Efficiency Design Index (EEDI) and an Energy Efficiency Operational Indicator (EEOI). WW is also aligning its environmental management system with IMO’s Ship Energy Efficiency Management Plan (SEEMP), all three aiming at having more efficient vessels in the future.

Fuel
WW’s overall goal is to reduce the amount of fuel consumed by its fleet. Special initiatives are being pursued in both reducing fuel consumption and emissions.

In 2010, the group reduced its fuel consumption measured in g/tonnes/nm by 26% compared with 2009. This was mainly driven by the global economic recovery which led to higher vessel utilisation, energy and fleet optimisation.

Fuel saving initiatives include:
- Choosing optimal speed wherever possible
- Environmental awareness training courses for crew and vessel superintendents
- Energy management systems that help the crew to identify optimum sailing conditions
- Weather routing systems installed on board all our vessels to ensure efficient route planning and safe sailing
- An extensive new building programs and design studies with fuel efficient vessels
- Installing new equipment and solutions which will reduce fuel consumption
- Upgrading existing equipment on board for providing better information regarding fuel saving.

Industry partnership
WW has taken the initiative to cooperate with major Norwegian shipowners such as Øyvind Klaveness, Høegh and WW Asia to encourage collaboration on R&D projects of common interest.

As a consequence, the project energy management in practice was kicked off in January 2010 after a pre-study the previous year. It has received support from The Research Council of Norway. All companies participating have test vessels with good energy management with respect to monitoring, recording and decision support systems. Crew environmental awareness is another topic of common interest that is being followed up.

Oil spills
Oil spills from WW vessels are not acceptable. The group continuously works to reduce the chance of oil spill incidents.

In 2010, no oil spills to sea were reported from vessels owned or controlled by WW.

Oil spills
Oil spills from WW vessels are not acceptable. The group continuously works to reduce the chance of oil spill incidents.

In 2010, no oil spills to sea were reported from vessels owned or controlled by WW.

Antifouling
WW evaluates new and more sophisticated low-toxic low friction coating systems. By contributing to a smoother hull surface, these products are expected to reduce fuel consumption by up to 5% compared with a vessel using conventional antifouling. As of end of 2010, 13 WW vessels were coated with advanced antifouling systems.

WW always seeks to use the least harmful chemical products available and to reduce consumption of refrigerants.

Chemicals and refrigerants
WW always seeks to use the least harmful chemical products available and to reduce consumption of refrigerants.

Wallenius Wilhelmsen Logistics (WWL) was in 2005 the first worldwide merchant shipping operator with a 1.5% sulphur policy. EUMOR Car Carriers has practiced a 2.5% sulphur policy since 2007.

Currently, the sulphur content limit set by the International Maritime Organisation (IMO) is 4.5% worldwide. From 2012 it will become 2.5%. In addition, two Sulphur Emission Control Areas (SECA) have been established covering northern Europe and the Baltic region. In these SECA’s, use of bunkers with sulphur content higher than 1.0% is prohibited. From August 2012, North America will have similar areas.

The number of SECA areas is expected to increase in the future. Using low-sulphur fuel incurred an additional cost of approx. USD 2 million (WWL’s share) in 2010.

Sulphur oxides
Vessels operated by WW’s operating companies maintain sulphur content standards below international regulations.

The Wilh. Wilhelmsen group (WW) aims to reduce the fuel consumption measured in grams/tonnes/nautical miles (g/tonnes/nm) on our vessels has been reduced by 26% compared with 2009.
The first vessel of the new Mark V class was delivered in March 2011. The new vessels incorporate 40 years of the company’s experience in handling energy-related cargo, utilising the roll-on roll-off concept. It is the most advanced ro-ro vessel ever built, with a ramp capacity of more than 500 metric tonnes.

Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity. These vessels will also convert exhaust heat into electricity. A steam turbine generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vessels will also convert exhaust heat into electricity.

To secure more advanced vessels, WW has performed extensive model tests of new vessels designed to be more fuel and cargo efficient. Reduced fuel consumption combined with higher cargo capacity cuts emissions per unit of cargo by 10-15% compared with the latest generation of ro-ro vessels. A turbine steam generator on these vehicles will also convert exhaust heat into electricity.
### 2: ENVIRONMENTAL ACCOUNT

#### FUEL CONSUMPTION AND EMISSION

<table>
<thead>
<tr>
<th>Fuel consumption and emission aspects</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of vessels in the accounting</td>
<td>24</td>
<td>20</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Number of ro-ro vessels</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Number of LCTC vessels</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Number of PCTC vessels</td>
<td>16</td>
<td>19</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Number of vessels owned 50%</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

- **Fuel consumption metric tonnes:** 630 279
- **Fuel consumption gram/tonnes/nm:** 18.23
- **Fuel consumption reduction gram/tonnes/nm:** 1.78%
- **Average percentage sulphur content of fuel:** 1.58%
- **S0x emission metric tonnes:** 11 674
- **S0x emission metric tonnes:** 12 983
- **CO2 emission metric tonnes:** 1 175 821

Other environmental aspects

- **Ballast water treatment system (BWT)**
  - Selected

Inventory list for hazardous materials

- **Alternative antifouling coating (AT) types tested:**
  - Tested into R00 on 2 vessels

Ship dismantling and recycling - business case

- **Ship dismantling policy draft ready:**
- **Business idea taken over by Wilhelmsen Ship Management:**
- **4 vessels recycled using Wilhelmsen Ship Management:**

**FUTURE TARGETS**

<table>
<thead>
<tr>
<th>Future targets</th>
<th>Target 2010</th>
<th>Target 2011-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum sulphur in fuel gram/tonnes/nm</td>
<td>1.5%</td>
<td>Further development to follow IMO</td>
</tr>
<tr>
<td>Fuel consumption reduction gram/tonnes/nm in CO2 emission reduction</td>
<td>50% reduction by 2020</td>
<td>50% reduction by 2020</td>
</tr>
<tr>
<td>Ballast water treatment (BWT) unit</td>
<td>All newbuildings delivered to have BWT installed</td>
<td>All newbuildings to have BWT installed</td>
</tr>
<tr>
<td>Bilge water treatment system max 5 ppm</td>
<td>When replaced, new oily water separator to have 5 ppm</td>
<td>All newbuildings to have oily water separator with 5 ppm</td>
</tr>
</tbody>
</table>

#### FUEL CONSUMPTION

- **g/tonnes/nm in % CO2 emission reduction:**
  - 2005: 18.23%
  - 2006: 19.25%
  - 2007: 24.04%
  - 2008: 17.78%

- **Fuel consumption reduction gram/tonnes/nm:**
  - 2005: 1.36%
  - 2006: 1.56%
  - 2007: 1.75%
  - 2008: 1.81%

- **Average percentage sulphur content of fuel:**
  - 2005: 1.49%
  - 2006: 1.65%
  - 2007: 1.49%
  - 2008: 1.65%

- **S0x emission metric tonnes:**
  - 2005: 11 674
  - 2006: 14 658
  - 2007: 12 583
  - 2008: 13 694

- **CO2 emission metric tonnes:**
  - 2005: 1 175 821
  - 2006: 1 403 668
  - 2007: 1 199 905
  - 2008: 1 318 394

#### TOTAL NOx EMISSION

- **kTonnes:**
  - 2005: 1 318 199
  - 2006: 1 403 668
  - 2007: 1 199 905
  - 2008: 1 318 394

#### TOTAL SOx EMISSION

- **kTonnes:**
  - 2005: 36 611
  - 2006: 39 227
  - 2007: 30 330
  - 2008: 32 096

#### TOTAL CO2 EMISSION

- **kTonnes:**
  - 2005: 1 175 821
  - 2006: 1 403 668
  - 2007: 1 199 905
  - 2008: 1 318 394

**NOTE 1**

Together with partners, WW’s operating companies controlled 128 vessels by the end of 2010. However, WW owned or controlled 34 vessels at 31.12.2010 which are included in WW’s environmental account.

**NOTE 2**

The reduction in fuel consumption is measured against an average consumption in 2005-2006, which was 18.55 g/tonnes/nm for 24½ vessels. A 6.4% reduction was recorded in 2007. In 2008, a slight increase was recorded as more vessels were included in the statistics and certain vessels had a higher consumption per g/tonnes/nm. In 2009, the consumption measured g/tonnes/nm increased. The reason for this was the substantial drop in fuel prices below 50% in 2008, which was 17.78 g/tonnes/nm. In 2010, the average sulphur content for vessels operated by WWL was 1.49% and in line with the company’s 1.5% sulphur policy. In EUKOR, the average sulphur content was 2.46%. In sum, the average for the vessels in the account was 1.78%. The average for the industry is approximately 2.7%, while the target set by IMO is currently 4.5%.

**NOTE 3**

The increase in CO2 emissions are equivalent to the increase in fuel consumed by the fleet. The total CO2 emissions increased by 5% in 2009 compared to 2008 due to several vessels being laid up in 2009 as a consequence of the global economic recession. For WW this meant lower fleet utilization and less cargo volumes. However, the consumptions measured g/tonnes/nm increased by 20% compared to 2010 due to the global economic recovery which led to higher vessel utilization.
The three business areas of Wilhelmsen Maritime Services – Wilhelmsen Technical Solutions, Wilhelmsen Ship Management and Wilhelmsen Ships Service – offer a portfolio of environmental solutions and services that are both innovative and meet all the upcoming regulatory demands that the shipping industry is facing. Wilhelmsen Maritime Services is owned 100% by Wilh. Wilhelmsen Holding ASA.

Shipping is claimed to be the most environmentally effective form of transport, but it still faces significant environmental challenges. Air pollution from shipping contributes to acid rain and greenhouse gases. Handling of oily water needs practical solutions. The results of transferral of ballast water have been seen across the globe where marine life in coastal waters has been destroyed by invasive species.

UNITOR BALLAST WATER TREATMENT SYSTEM
SUSTAINABLE MARINE CHEMICALS
GREEN SHIP RECYCLING
INVENTORY OF HAZARDOUS MATERIALS/GREEN PASSPORT
UNITOR BALLAST WATER TREATMENT SYSTEM

Wilhelmsen Technical Solutions continued their efforts to offer environmentally friendly solutions to the maritime and offshore markets in 2010. Their environmental solution range include systems for reduction of Emissions to Air (ETA), both under operation and while docking, an innovative technology for energy management, an oily water pod to ensure oily water discharge of less than 15 parts per million (ppm), and the Unitor Ballast Water Treatment System (Unitor BWTS).

With the upcoming ratification of the ballast water convention, the Unitor BWTS was an important focus area for Wilhelmsen Technical Solutions in 2010.

The system, designed to meet the performance standards of the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, received Final Approval in March 2010, and type approval from the South African Maritime Safety Authority (SAMSA) in August 2010.

WSS’s worldwide network provides an optimal distribution channel for the supply of chemicals to vessels. Within the network, highly competent marine chemical specialists provide application and technical support to vessels globally.

The marine chemicals range covers the following:
- Fuel oil treatment
- Cooling water treatment
- Boiler water treatment
- Cleaning and maintenance chemicals
- Tank and cargo hold cleaning
- Biochemicals
- Pool and spa products
- Test kits for water and fuel oil testing
- Dosing equipment
- Oil spill kits

WSS strives to develop the most efficient, safe and environmentally adapted products. The chemical range met the European REACH regulations already before these regulations came into force. Their quality standards are amongst the highest in the industry. WSS uses objective criteria to measure and

SUSTAINABLE MARINE CHEMICALS

Wilhelmsen Ships Service (WSS) is the market leader in marine chemicals for the merchant fleet. The company offers a comprehensive range of Unitor and Nalfleet branded marine chemicals, produced in-house at the ISO 9001 and 14001 certified production facility, located outside Tønsberg, Norway.

WSS's worldwide network provides an optimal distribution channel for the supply of chemicals to vessels. Within the network, highly competent marine chemical specialists provide application and technical support to vessels globally.

The marine chemicals range covers the following:
- Fuel oil treatment
- Cooling water treatment
- Boiler water treatment
- Cleaning and maintenance chemicals
- Tank and cargo hold cleaning
- Biochemicals
- Pool and spa products
- Test kits for water and fuel oil testing
- Dosing equipment
- Oil spill kits

WSS strives to develop the most efficient, safe and environmentally adapted products. The chemical range met the European REACH regulations already before these regulations came into force. Their quality standards are amongst the highest in the industry. WSS uses objective criteria to measure and

A SOLID GREEN OFFERING

Microorganisms before (above) and after treatment within the system reactor unit.
evaluate their environmental management systems. Throughout the production process WSS is committed to reducing waste, transport volumes, hazardous substances and recycling materials. The company’s aim is to keep increasing the effectiveness of its chemicals and, at the same time, to improve safety and reduce environmental impact.

**GREEN SHIP RECYCLING**

Green ship recycling was the new and additional green product in the portfolio of Wilhelmsen Ship Management (WSM) in 2010.

Green ship recycling services are specially designed for ship owners who demand a demolition process based on a safe working environment at the yard and identification and safe disposal of all hazardous materials on board.

With green awareness in mind, WSM has signed agreements with several yards in China to carry out ship recycling work. The yards, which dismantle at the quayside, have been selected by WSM based on their compliance with the International Maritime Organisation’s new Hong Kong Convention (May 2009) on ship recycling.

The recycling process is monitored by site team members from WSM who have the authority to “stop work” in case of any deviation from established green procedures. The yards have agreed to be monitored against a set of Key Performance Indicators that will activate a previously agreed bonus incentive scheme for them.

WSM offers a complete turn-key solution including brokerage services, direct quotes from yards, drawing up contracts, ship pre-planning, ship advisory and on-site monitoring services, complete with a weekly report and a final demolition certificate.

**INVENTORY OF HAZARDOUS MATERIALS/GREEN PASSPORT**

In 2010, WSM also rolled out its Inventory of Hazardous Materials (IHM), which is a requirement of the Ship Recycling Convention as adopted in May 2009.

When the Hong Kong Convention on ship recycling enters into force, (expected 2013-2015) every ship greater than 500 gross tonnes will be required to maintain an IHM. This inventory identifies, locates and lists out all hazardous and potentially hazardous material onboard a vessel.

In preparation for the large demand that is expected, WSM has built an in-house expertise for developing IHM for their managed fleet as well as for independent owners. This is carried out by WSM’s group of trained experts (trained and certified by class societies), sailing onboard for 2 - 3 days where records and manuals are consulted in detail and samples collected. After analysis results are received, the IHM is prepared and submitted to class for obtaining a statement of compliance - popularly known as the Green Passport.

For more information, see www.wilhelmsen.com/shipmanagement.
USEFUL LINKS

Wilh. Wilhelmsen Holding environmental pages
Wilh. Wilhelmsen ASA environmental pages
Wilhelmsen Maritime Services environmental pages