

# ENVIRONMENT



With the world's largest maritime services network, Wilhelmsen Maritime Services can provide shipyards, owners, operators and management companies a comprehensive range of maritime products and services which significantly improve operational efficiency. The network embraces more than 400 offices all over the world reaching 2 200 ports and some 200 yards in 115 countries.

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# TOWARDS A ZERO EMISSION OPERATION

Shipping is regarded as the most environment-friendly way of transporting commodities around the world. None the less, the industry must address a number of challenges in order to limit its environmental impact wherever possible.

As a shaper of the maritime industry, WW is pursuing several major initiatives aimed at reducing its environmental footprint.

As a shipowner, WW aims to reduce the impact of its cargo carrying operations. It continuously improves operations in seeking to achieve a zero emission vision, and thereby contribute to a cleaner global environment.

WW also has a substantial role as an environmental product, services and solutions provider to the merchant fleet, through the wholly-owned subsidiary Wilhelmsen Maritime Services.



## 1:

### Fuel

WW's overall goal is to reduce the amount of fuel consumed by its fleet. Several initiatives are being pursued to reduce fuel consumption and emissions.

In 2009, WW's goal was to reduce the fuel consumption measured in g/tonnes/nm by 4% compared to 2008. The total fuel consumption went down by 20%. However, as a consequence of less cargo to transport, consumption went up by 25%.

The fuel-saving initiatives included:

- choosing optimal speed whenever possible
- environmental awareness training for our offices and vessel managers
- energy management systems that help the crew to identify optimum sailing conditions
- installing weather routing systems on board all our vessels to ensure efficient route planning and safe sailing
- an extensive newbuilding programme with fuel efficient vessels (new design with improved propulsion systems)
- installing homogenisers for more efficient utilisation of the fuel by improving combustion and reducing the amount of sludge extracted from the fuel

## 17:

### Carbon dioxide (CO<sub>2</sub>)

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 2009, WW's goal was to reduce CO<sub>2</sub> emissions measured in g/tonnes/nm by 4% from 2008 level in line with the reduction in bunkers consumption. The total CO<sub>2</sub> emissions went down 20%. Due to the global economic recession, less cargo was transported and the g/tonnes/nm emissions went up with 25%. No regulations currently govern CO<sub>2</sub> emissions from shipping.

However, WW is engaged in work being pursued by the International Maritime Organisation (IMO) to create an Energy Efficiency Design Index (EEDI) and an Energy Efficiency Operational Indicator (EEOI). WW is also comparing its environmental management system with IMO's Ship Energy Efficiency Management Plan (SEEMP). The three projects aim at having more efficient vessels in the future.

## 16:

### Nitrogen oxides (NO<sub>x</sub>)

WW aims at reducing NO<sub>x</sub> emissions through technical improvements and fleet renewal.

In 2009, WW's vessels reduced NO<sub>x</sub> emissions measured in g/tonnes/nm by 4% compared with 2008 and 31% compared with 2000.

New vessels are designed with lower NO<sub>x</sub> emissions from its engines compared with existing tonnage. In addition, WW has equipped some engines with more efficient fuel valves which optimise combustion and reduce NO<sub>x</sub> emissions.

Yarwil, a joint venture owned 50% by Wilhelmsen Maritime Services, has developed a new technology that reduces NO<sub>x</sub> emissions by 95%. WW runs a project aiming at testing the system on WW owned or controlled vessels.

## 2:

### Innovation

As part of reaching its zero emission vision, WW is constantly exploring opportunities to reduce the impact of its cargo carrying operations.

The group's concept vessel Orcele is a zero-emission car carrier using only wind, solar and wave power. The ideas behind Orcele provide WW's long-term vision for future vessel design. WW is constantly exploring opportunities for taking advantage of existing technologies inside and outside the industry. Supporting projects related to alternative propulsion systems and fuels are also part of the steps being taken towards realising its vision.

## 3:

### Environmental training

WW is developing courses in environmental awareness.

WW has together with a group of environmentally conscious Norwegian shipowners and the Norwegian Training Center in Manila (NTC) started to develop courses in environmental awareness. The first pilot is expected to be conducted during the second quarter of 2010. The next step is to roll out the programme for all WW officers and superintendents.

## 15:

### Sulphur oxides (SO<sub>x</sub>)

Vessels operated by WW's operating companies hold sulphur content policies below international regulations.

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

Currently, the sulphur content limit is 4.5%. From 2012, the IMO has set a 3.5% limit for sulphur content worldwide. In addition two Sulphur Emission Control Areas (SECAs) have been established covering northern Europe and the Baltic region, where bunkers with a sulphur content higher than 1.5% is prohibited. The number of such areas is expected to increase in the future.

Using low-sulphur fuel incurred an additional cost of USD 2.7 million (WW's share) in 2009.

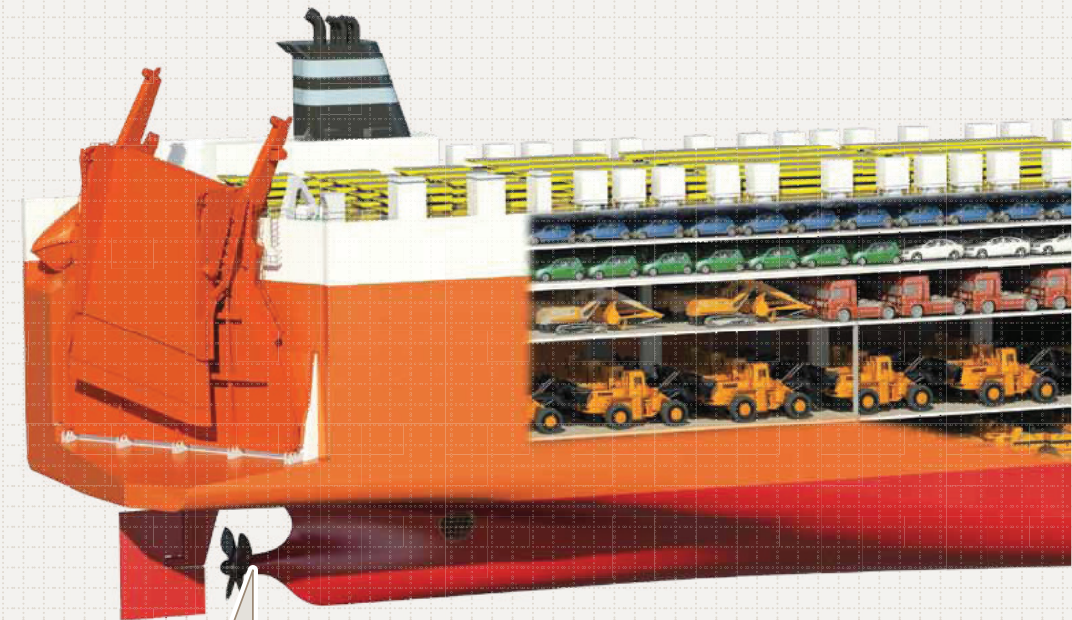
## 14:

### Ballast water

WW's fleet satisfies applicable regulations for ballast water exchange. One WW vessel is currently testing a state-of-the-art ballast water treatment system offered by Wilhelmsen Ships Equipment.

The system, the Unitor Ballast Water Treatment System, has very low energy consumption and footprint compared to its competitors and can be installed while the vessel is in operation. It is anticipated that the system will have all necessary IMO approvals in place during the first half-year 2010.

The system is also being tested on a large gas carrier owned by BW Gas.



**4:** **Chemicals and refrigerants**  
 WW is concerned to use the least harmful chemical products and to reduce consumption of refrigerants.

In cooperation with the Norwegian NGO Bellona, WW established an improved list of greener chemicals in 2007. The list is being used on all vessels owned or controlled by WW. WW also aims to reduce the volumes of chemicals and refrigerants used, and keep statistics of purchases and consumption.

**5:** **Ship recycling**  
 Three WW vessels were recycled in 2009 at a green yard in China.

It is important for WW to find a safe and environmentally sound recycling yard which operates in a way acceptable to and in line with its values. China's Yangyin yard lives up to its requirements for safe and healthy working conditions and operates with a limited impact on the environment.

The European Commission and Bellona have endorsed this recycling facility as being in the spirit of corporate social responsibility.

**6:** **Weather routing**  
 To reduce fuel consumption and ensure safer sailing, WW has installed a weather routing system on all its vessels.

This solution assists crew in route planning in order to optimise a voyage with the assistance of weather forecasts and information on currents, which again contributes to reduced fuel consumption and ensures safer sailing.

The weather forecast provider is also part of a high-performance reporting tool which enhances our understanding of when to clean the vessel hull and makes it easier to compare sister vessels.

**7:** **Energy management system**  
 With real-time decision support, an energy management system is able to guide the crew in identifying the optimum sailing conditions.

WW has installed a decision-support tool developed by Marorka on one vessel. The system provides the officers with real-time decision support and guidance in identifying the trim, speed and energy consumption for optimum sailing as well as monitoring fuel consumption and savings. The system also serves as an excellent reporting tool and information bank for the vessels.

In 2010, WW intends to have the system installed on board four additional vessels.

By using this system WW expects to cut fuel consumption and associated emissions by 3-5%.

**8:** **Future vessel design**  
 WW's ambitious newbuilding programme focuses on efficient vessels prepared for the future. The first vessel will be delivered in 2011.

To secure more advanced vessels, WW has performed extensive tests using models of ro-ro carriers 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 turbo generator on these vessels will also convert exhaust heat into electricity.

Installing a ducktail on its latest generation of car carriers and forthcoming ro-ro vessels will improve the hydrodynamic performance of the hull when the vessel is heavily loaded. Model tests confirm a 1-5% fuel saving, depending on the ship's draught.

**9:** **Solar power**  
 WW took delivery of its first vessel equipped with solar cells in 2008.

Solar cells have been installed on one WW vessel. This is part of an R&D project being pursued with Mitsubishi Heavy Industries to gain experience with and learn more about operating a solar power system and the fuel-saving potential it can give.

**13:** **Ballast water**  
 WW's new vessels have separators reducing the oil content in the ballast water down to five parts per million (ppm).

International regulations require that less than 15 ppm oil remain when ballast water is discharged into the sea, and WW's fleet is thereby exceeding existing regulations.

**12:** **Waste**  
 All waste on WW vessels will be sorted and recycled.

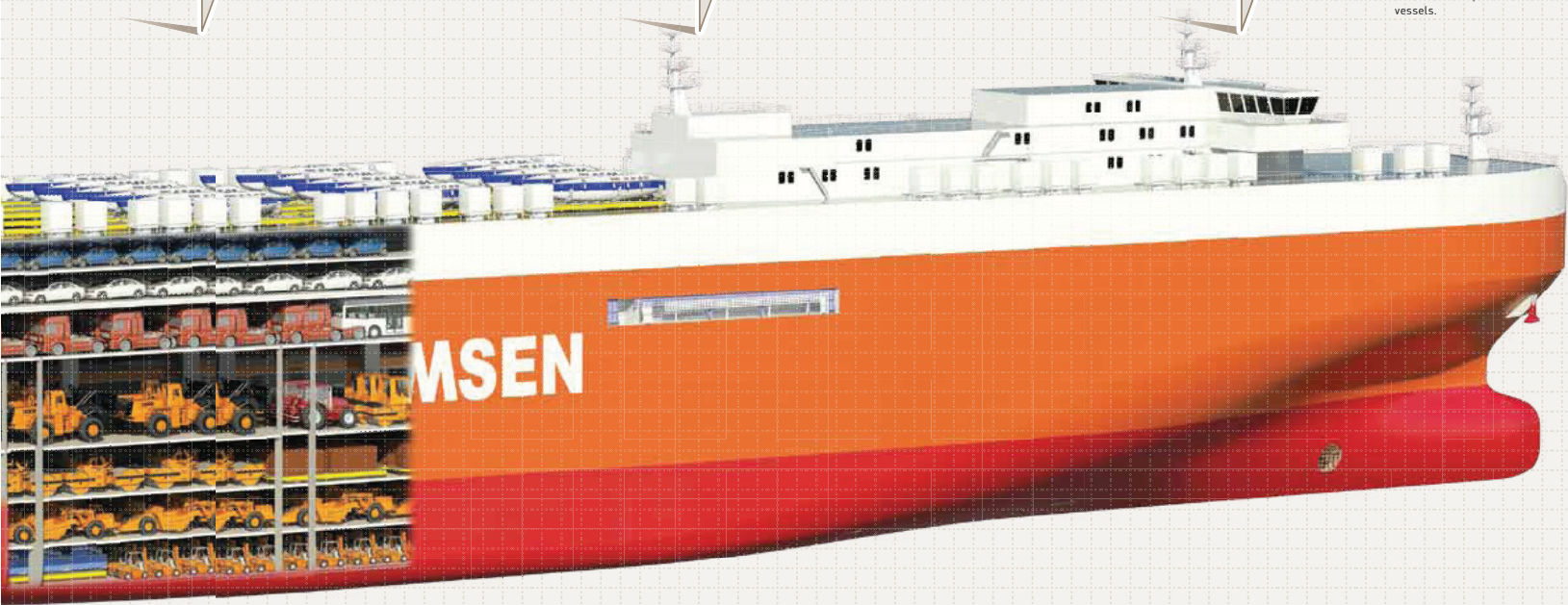
WW launched a waste management programme during 2006 in cooperation with Bellona, a Norwegian NGO. A number of trash compactors have been installed onboard. Land-based facilities for receiving the waste need to be developed in order to get full benefit from this initiative.

**11:** **Oil spills**  
 In 2009, no oil spills were reported from vessels owned or controlled by WW.

Oil spills from WW vessels are not acceptable, and the group continuously improves solutions to reduce the likelihood of oil spill incidents.

**10:** **Antifouling**  
 All WW vessels use tin-free antifouling. To ensure a smooth and efficient hull, all vessels have their underwater surfaces cleaned at least once a year.

WW also tries out 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 2009, 13 WW vessels were coated with advanced antifouling systems.



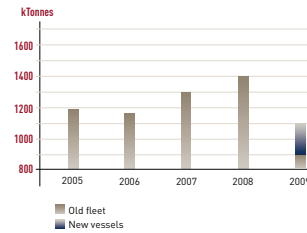
# ENVIRONMENTAL ACCOUNT

For vessels wholly and partly owned by Wilh. Wilhelmsen and operated by Wallenius Wilhelmsen Logistics or EUKOR.

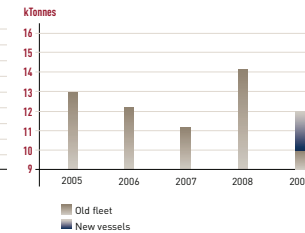
## Fuel consumption and emission

	2006	2007	2008	2009
Number of vessels in the accounting <sup>1</sup>	24 1/2	24 1/2	30	35
Number of ro-ro vessels	8	8	8	8
Number of LCTC vessels	-	-	-	2
Number of PCTC vessels	16	14	19	22
Number of vessels owned 50%	5	5	6	6
<b>Fuel consumption metric tonnes:</b>				
Old fleet <sup>2</sup>	405 073	430 279	459 324	<b>305 182</b>
Including new vessels, total 35	-	-	-	<b>360 446</b>
<b>Fuel consumption gram/tonne nm:</b>				
Old fleet <sup>2</sup>	18.72	18.23	19.25	<b>24.91</b>
Including new vessels, total 35	-	-	-	<b>24.04</b>
<b>Fuel consumption reduction gram/tonne nm<sup>2</sup>:</b>				
Old fleet <sup>2</sup>	0.9%	[1.7%]	3.8%	<b>29.4%</b>
Including new vessels, total 35	-	-	-	<b>24.8%</b>
<b>Average percentage sulphur content of fuel<sup>1</sup></b>				
Old fleet <sup>2</sup>	1.55%	1.36%	1.60%	<b>1.73%</b>
Including new vessels, total 35	-	-	-	<b>1.75%</b>
<b>SO<sub>x</sub> emission metric tonnes:</b>				
Old fleet <sup>2</sup>	12 520	11 673	14 658	<b>10 583</b>
Including new vessels, total 35	-	-	-	<b>12 583</b>
<b>CO<sub>2</sub> emission based IMO voluntary metric tonnes<sup>4</sup></b>				
Old fleet <sup>2</sup>	1 195 149	1 318 199	1 403 668	<b>948 201</b>
Including new vessels, total 35	-	-	-	<b>1 119 905</b>
<b>NO<sub>x</sub> emission metric tonnes:</b>				
Old fleet <sup>2</sup>	36 801	36 411	39 227	<b>25 520</b>
Including new vessels, total 35	-	-	-	<b>30 330</b>
<b>Refrigerants leakage reduction (basis 2004)</b>	0.8%	27.6%	46.2%	<b>41.9%</b>
<b>Other environmental aspects</b>		2007	2008	2009
Ballast water treatment system (BWT)		Selected	One test installation	IMO tests being carried out in 2008
Bilge water treatment system, max five ppm replace oily water separators		Replaced one	No replacement in 2008	No replacement in 2009
Global waste management project		Implementation launched	Awaiting Wilhelmsen Ships Services' project development	Project postponed
Inventory list for hazardous materials		Two vessels got Green passport	No vessel got green passport in 2008	Three vessels being recycled in 2009 received list of hazardous material
Alternative antifouling coating types tested		Tested Inter 900 on 2 vessels	Three vessels painted with Inter 900, awaiting further experience	13 vessels got advanced anti-fouling coating
Cooperation with Bellona Foundation (NGO)		Ongoing	Contract renewed	Contract taken over by Wilhelmsen Maritime Services
Ship dismantling and recirculation – business case			Dismantling policy draft ready	Business idea taken over by Wilhelmsen Ship Management

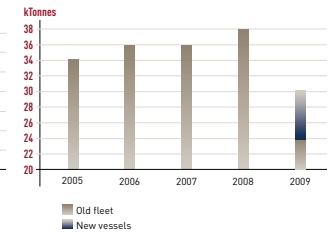
## TOTAL CO<sub>2</sub> EMISSION ▼



## TOTAL SO<sub>x</sub> EMISSION ▼



## TOTAL NO<sub>x</sub> EMISSION ▼



## Future targets

Future targets	Target 2009	Target 2010-2020
Maximum sulphur in fuel	1.5% average for the WWL fleet requirements towards 0.5% in 2020	Further development to meet IMO regulations
Fuel consumption and CO <sub>2</sub> emissions reduction g/tonnes/nm	4% reduction from 2008	30% reduction by 2020
Ballast water treatment (BWT) unit	All LCTCs delivered after 2009 and all new ro-ro vessels (MarkV) to have BWT	All newbuildings to have BWT installed
Bilge water treatment system max 5 ppm	When replaced, new oily water separator to have 5ppm	All new buildings to have oily water separator with 5ppm
Global waste management project	Install compactors on all new vessels	Have compactors on all vessels, and all waste and sludge delivered ashore
Recycling of vessels	Develop recycling procedure	Have recycling policy ready and being used for vessels being recycled

### NOTE 1

Together with partners, WW's operating companies controlled 136 vessels at 31 December 2009, of which WW owned or controlled 35 vessels. The following vessels are included in WW's environmental account:

- Mark II (ro-ro vessels) 3 vessels
- Mark III (ro-ro vessels) 1 vessel
- Mark IV (ro-ro vessels) 4 vessels
- Large car and truck carriers 2 vessels
- Pure car and truck carriers 22 ½ vessels
- 50% of Mark I (ro-ro vessels) 2 ½ vessels

### Vessels not included:

- American Roll-on Roll-off Carrier (ARC) vessels, externally owned and chartered by ARC
- Vessels operated by Wallenius Wilhelmsen Logistics, but not controlled by WW
- Vessels owned by and controlled by EUKOR

### NOTE 2

Old fleet refers to fleet owned or controlled by WW in 2008 (for comparison).

### NOTE 3

The reduction in fuel consumption is measured against an average consumption in 2005-2006, which was 18.55 g/tonnes/nm for 24 ½ 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 the specific vessels had a higher consumption per g/tonnes/nm.

In 2009, the consumption measured in g/tonne/nm increased. The reason for the increase was the substantial drop in volumes as a consequence of the global economic recession. For WW this meant lower fleet utilisation and less cargo transported per nm.

### NOTE 4

In 2009 the average sulphur content for vessels operated by WWL was 1.49% in line with the company's 1.5% sulphur policy. In EUKOR, the average sulphur content was 2.47%. In sum, the average for the vessels in the account was 1.75%. The average for the industry is approximately 2.7%, while the target set by IMO is currently 4.5%.

### NOTE 5

The reduction in CO<sub>2</sub> emissions are equivalent with the reduction of fuel consumed by the fleet. The target was to reduce CO<sub>2</sub> emission in g/tonnes/nm by 4% compared with 2008. The total emission was down. However, as a consequence of the global economic recession and the drop in volumes, the emissions in g/tonnes/nm went up as the fleet utilisation was down.

# INDUSTRY PARTNERSHIPS

WW is taking a step closer to its zero emission vision and the concept vessel Orcella by partnering with the oil company Shell Marine Fuel and the classification society Det Norske Veritas (DNV) in a joint industry project named Sustainable propulsion.

The objective with the projects is to build an industry cluster with a common understanding of future drivers and measures to arrive at a cost efficient and viable solution for sustainable shipping.

The projects include studies, measurements and communication of technical, operational and commercial findings in an innovative, goal-oriented approach that will optimise the use of existing pure car and truck carriers (PCTCs).

The project targets are ambitious: 30% CO<sub>2</sub>, 50% NO<sub>x</sub> and 90% SO<sub>x</sub> reduction to be demonstrated to be achievable for our fleet of vessels by 2020 provided that equal playing field can be established.

WW's ten PCTCs in the Mitsubishi class will act as a test laboratory. New solutions will be tested, and their environmental impact will be discussed with charterers

and cargo owners. Experiences gained will be shared with the other vessels in the same class.

The next phase intends to verify the potential for new Post Panmax design and will aim for further reductions.

WW has also taken the initiative to cooperate with major Norwegian shipowners to cooperate on common R&D projects (Grieg, Klavness, Høegh and BW Gas). The project, named energy management in practice (EMIP), was kicked off in January 2010 after a pre-study conducted in 2009. It has received support from The Research Council of Norway.

WW will use three of its vessels as demonstrators of good energy management with respect to monitoring, recording and decision support systems. This will also be followed up with environmental awareness courses for its crew.

# FROM A ZERO EMISSION VISION TO PRACTICAL SOLUTIONS

Increased environmental consciousness combined with present and upcoming legislation represents a major emerging opportunity for compliant solutions to environmental challenges.

Progress has been made to reduce shipping's impact on the environment, but there is still potential for further improvement through the use of practical solutions.

With the industry's most advanced global network, innovative environmental solutions and resources to act, Wilhelmsen Maritime Service (WMS) is well positioned as a solution provider to capture a significant share of this emerging market.

Under the slogan "It's our environment, ACT now!" WMS is offering the best available technologies to help the maritime industry overcome environmental challenges, reducing the industry's overall environmental impact, while reducing total operational cost.

From design to recycling - the environmental solutions cover the ship's entire life cycle and are covering four areas; emissions to air, waste management, water treatment and energy management.

Solutions that help reduce emissions to air include change-over programs to environmentally harmless refrigerants and fire extinguishing media. Additionally, treatment of fuel reduce exhaust gases and visible soot, while treatment of nitrogen oxide gases from exhaust and cold ironing in port reduce emissions.

Waste management solutions range from reduction and disposal of shipboard waste to project management of ship lay-up and recycling.

Water treatment solutions include ballast water treatment, the use of environmentally sustainable chemicals in day-to-day operations, reduction of sludge and preventing oil spills.

Optimising the vessel's total energy consumption and onboard power systems such as heating, ventilation and air conditioning systems is part of the energy management solutions.

ACT is our contribution, and together we can make a difference in reducing the environmental impact of the maritime industry.

## Visit the Act web page

For more information on the individual solutions and services, visit the Act web page.

[www.wilhelmsen.com/act](http://www.wilhelmsen.com/act)