

Technology to make ships green

By Tracey Logan
BBC World Service's Discovery programme

Green engineering could help protect the sea as marine trade expands.

Ships use less fuel per kilo of cargo than road or air transport. So by at least one environmental measure, shipping has good green credentials.

But as shipping grows, environmentalists worry that the marine life beneath them may suffer.

Areas of concern include the transfer of invasive species from one region to another, either attached to a ship's hull or carried in ballast water tanks.

Another worry is underwater noise and its effects on marine mammals, particularly whales and dolphins.

And there is also the issue of air emissions from ships' exhausts containing sulphur and nitrogen oxides and the greenhouse gas carbon dioxide.

The marine industry is looking to engineering innovations to help.

Clean flushing

Currently, ships attempt to clean up their ballast tanks of coastal water by emptying and refilling them once in open ocean. But this is a risky procedure and in stormy conditions it can be too dangerous to carry out.

Sterilising ballast water with ozone, ultra-violet light or even heating is an alternative, but the ever cost-conscious shipping industry is on the lookout for a cheaper system.

Perhaps Aubaflow might fit the bill. Developed for the oil company Saudi Aramco, whose tankers carry enough ballast water to fill 4,000 swimming pools, it would prevent coastal species from travelling further than a mile in ballast tanks.

"The Aubaflow system works by having a big opening in the front of the ship and it's connected with pipes to the ship's various ballast water tanks," said Ahmed Al Babtain of Vela International, the company that has patented the system.

"The ballast water comes from the opening into the tanks, fills up the tanks and then overflows out into the open ocean from the back of the ship"

Although still in the early stages of development, Mr Al Babtain told the BBC their system would flush out all the ship's ballast tanks within 24 hours.

Reducing pollutants

Minimising polluting air emissions from ships is the aim of Europe's Project Hercules, an initiative combining shipping industry and academic expertise.

Nicolaos Kyrtatos, professor of marine engineering at the National Technical University in Athens, is co-ordinator of Project Hercules. He told the BBC that cleaning up ships' exhausts in the future would require more efficient engines.

This would mean they use less fuel and so produce fewer pollutants and, importantly, less carbon dioxide.

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Lena Blomqvist, Walenius Wilhelmsen

Professor Kyrtatos believes ships' engines could be adapted to meet impending legislation which, he predicted, would require emissions of nitrogen oxides from ship exhausts to be cut by 30% by the year 2007. These are relatively mild targets in his estimation.

The shipping company Walenius Wilhelmsen had more stringent targets in mind when it produced its design for a zero emissions car ferry for the year 2025.

Unusually for a car ferry, this ship would use three, massive computer-controlled sails to harness the maximum wind energy. And on the sails, a coating of solar panels would trap energy from the sun.

A pentamaran structure - a long, thin, main hull stabilised by four side hulls, or sponsons - would cut power consumption by reducing friction on the ship in the water. The ship would also harness wave energy, which is normally the force slowing down ships.

"On each of its four sponsons, we would place three fins," explained Lena Blomqvist, Walenius Wilhelmsen's environmental chief.

"These fins mimic the movement of a dolphin and both propel the ship forward and generate electrical energy which we can store in batteries and use for systems on board the ship."

Fuel cells which produce electricity from the combination of hydrogen and oxygen, would supplement other energy sources and release only water vapour into the environment.

Balance sheet

So with technologies like these, and many others, the environmental future of shipping need not be all doom and gloom, according to the environmental consultant Steve Raaymakers, formerly of the UN's International Maritime Organization.

"There's been a significant improvement in many areas of shipping over the last 15 years," he said.

"We've seen the number of accidents and oil spills steadily decreasing over time while, simultaneously, there's been a steady increase in shipping. So that's a remarkable achievement.

"But what we've got to bear in mind is that the amount of shipping is increasing - various studies predict a three to five fold increase in shipping activity globally in the next few decades.

"And what this brings with it is the risk that, while the environmental performance of individual ships may significantly improve, the overall environmental impact may steadily get

worse because we just have such a significant increase in shipping, overall, in the world. "

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/4545494.stm>

Published: 2005/12/21 09:05:17 GMT

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