

Making Ships Green, in Port and at Sea

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The Dutch ship Schieborg, employed by Stora Enso, uses the shore-side electrical plug at the Port of Gothenburg.

Something unusual is happening in Swedish waters. Crews docking at the Port of Gothenburg are turning off their engines and plugging into the local power grid rather than burning diesel oil or sulfurous bunker fuel — a thick, black residue left over from refining oil.

"I always knew these extremely dirty bunker fuels were helping produce acid rain that falls so heavily over this part of Sweden," said Per Lindeberg, the port's electrical manager and an avid fisherman. "I was very happy when we could switch off the ships."

Similar high-voltage technologies have been introduced at Zeebrugge in Belgium, and in Los Angeles and Long Beach in California. But as at Gothenburg, only a small fraction of ships are equipped with plugs, so the benefits from shore-side electricity so far have been limited.

And despite the growing availability of cleaner technologies, the shipping industry has made little progress toward becoming greener, even as traffic grows heavier on existing routes and new routes open up in the Arctic. Indeed, the most recent efforts to tackle the problem have met resistance — less from the shipping industry, however, than from the big oil companies that supply the dirty fuel.

Shipping is responsible for about twice the emissions of carbon dioxide as aviation — yet airlines have come under greater criticism. Particles emitted by ships burning heavy bunker fuel, described by some seafarers as "black yogurt" for its consistency, also contain soot that researchers say captures heat when it settles on ice and could be accelerating the melting of the polar ice caps.

Health experts say the particulates worsen respiratory illnesses, cardiopulmonary disorders and lung cancers, particularly among people who live near heavy ship traffic.

Ship engines also produce large quantities of nitrogen, which contribute to the formation of algal blooms at sea. Those use up oxygen when they decompose and create so-called marine dead zones in heavily trafficked waters, like the Baltic Sea.

"The sheer volume of pollutants from shipping has grown exponentially along with the growth of our economies and of global trade," said Achim Steiner, the executive director of the United Nations Environment Program. "Shipping is just less visible than other industries, so for too long it has slipped to the bottom of the agenda."

James J. Corbett, an associate professor of marine policy at the University of Delaware, is the co-author of a study published in December that attributed 60,000 cardiopulmonary and lung cancer deaths each year globally to shipping emissions and forecast an increase to nearly 85,000 deaths by 2012 under current trends.

With the harm growing increasingly evident, this month the International Maritime Organization, a United Nations body, proposed reducing the sulfur content of marine fuels starting in 2010 on all ships. It also proposed steps reducing nitrogen oxide emissions from engines on new ships from 2011, with the organization intending to adopt all the measures in October.

The organization is continuing to work on separate measures to deal with the more difficult issue of carbon dioxide emissions.

The European Commission, the executive arm of the 27-nation European Union, has said that if the International Maritime Organization fails to make concrete proposals on carbon dioxide by the end of the year, it would consider regulating the matter itself, perhaps by including shipping in the European carbon trading system. That could oblige ship owners to buy pollution permits from other sectors.

The European Parliament this week passed a nonbinding resolution urging the commission to act "urgently."

The shipping industry has supported the organization's recommendations because they would apply globally and be introduced gradually. But the fuel industry immediately called for a review of the most important element: a global cap on sulfur content of marine fuels of 0.5 percent by 2020 from the current maximum level of 4.5 percent.

That target poses "risks to security of supply and to shippers and truckers," said Isabelle Muller, the secretary general of Europa, an industry group representing BP, Exxon Mobil and other oil companies.

Ms. Muller said the fuel industry would not be able to build refining operations quickly enough and that oil companies would be penalized for doing so, because refining contributes heavily to greenhouse gas output.

According to a study last year for the American Petroleum Institute, it would cost the fuel industry \$126 billion over 13 years to invest in equipment and chemicals to replace polluting bunker fuels with sufficient amounts of cleaner diesel to supply the shipping industry.

The study also indicated that the industry would pass on those costs at about \$13 to \$14 a barrel directly to the ship operators.

Already, Wallenius Willemssen Logistics, based in Norway and Sweden, uses fuels that contain less than half the amount of sulfur that would be required under the proposed International Maritime rules.

"We know customers want greener shipping companies as part of their overall supply chain," said Lena Blomqvist, an environmental and operations expert for Wallenius, explaining why the company was prepared to pay more for cleaner fuel.

Some shipping companies are investing in more efficient marine engines that capture and convert waste heat into more energy, cutting down on fuel use and on emissions at the same time. But of the hundreds of ships currently under construction around the world, only a handful of them include that technology.

Some shippers are running vessels at slower speeds to cut fuel consumption and emissions, carbon dioxide in particular. Other companies are even testing sail power. But those initiatives may be at odds with ever greater levels of speed and reliability.

In Gothenburg, ship crews hook up vessels using the shore-side electricity system with a single giant plug within about 10 minutes of docking. The technology cuts emissions of sulfur, nitrogen and particulate emissions by berthed ships to nearly zero, and cuts engine noise, too.

The system was pioneered in Gothenburg eight years ago after Stora Enso, a Swedish company in the energy-intensive paper industry, asked the port for help to improve its environmental profile. Costs for the system run from 70,000 euros (about \$109,000) to 640,000 euros for each outlet and largely depend on how easy it is to connect to a nearby power grid.

In Gothenburg, the costs of the system were shared by Stora Enso, the port and the Swedish government. The electricity comes from the local grid but Stora Enso pays slightly more for "green" electricity generated by windmills.

One factor hindering expansion of shore-side power is the difference in the electrical frequencies of ships. Another factor is the higher cost of electric power compared with bunker fuel, which is not taxed.

So far, calls by the port for tax breaks for on-shore power have failed, disappointing port officials in Gothenburg. But Mr. Lindeberg, the port manager who developed the technology, said the rewards would be as much personal as professional.

Acid rain from sources like shipping has turned many of Sweden's white sandstone riverbeds black over the last 15 years, he said, and fish no longer thrive as they once did.

"In the past all we needed to do was to throw a net into the river to catch the salmon," he said. "It's especially when I'm fishing that I think about the damage."

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