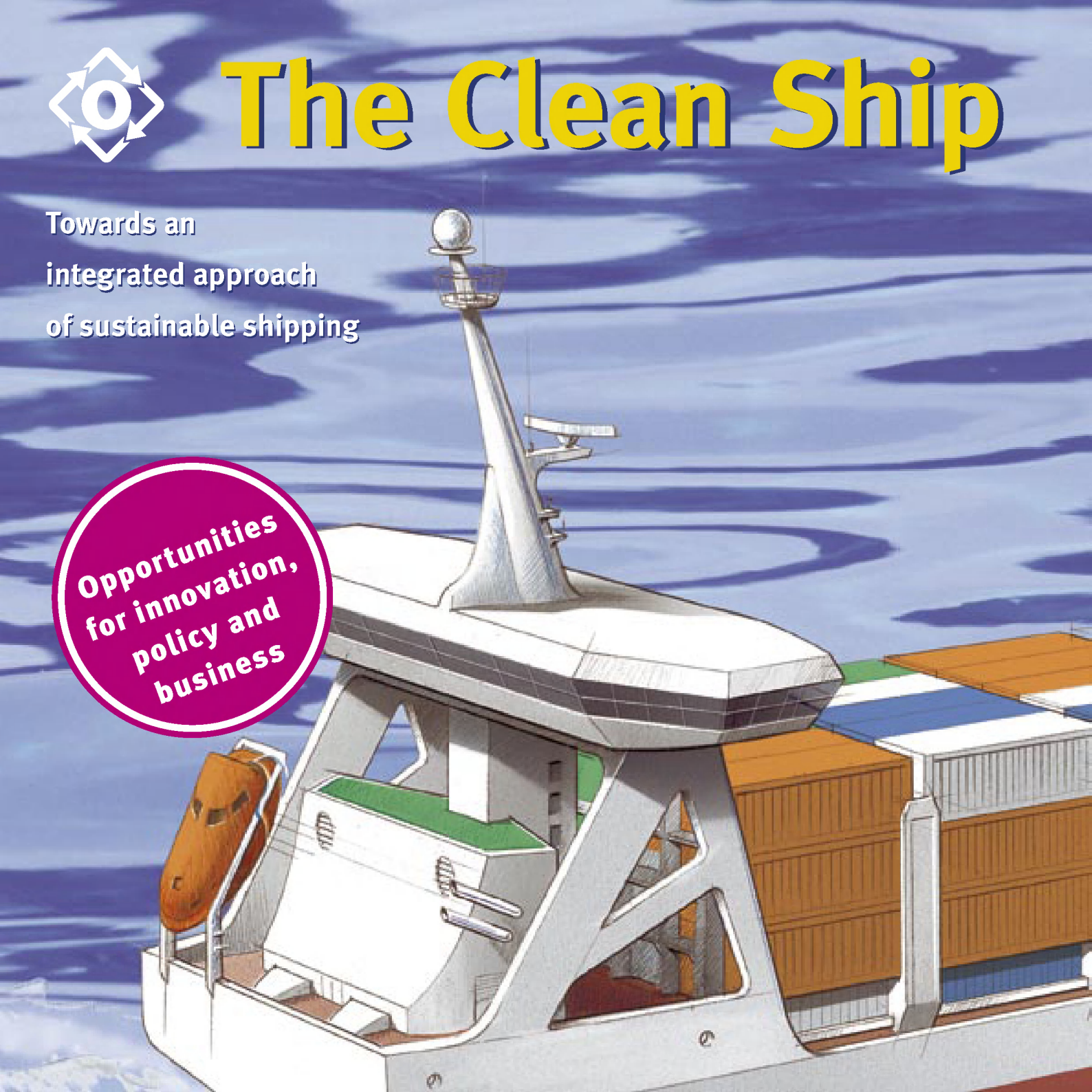
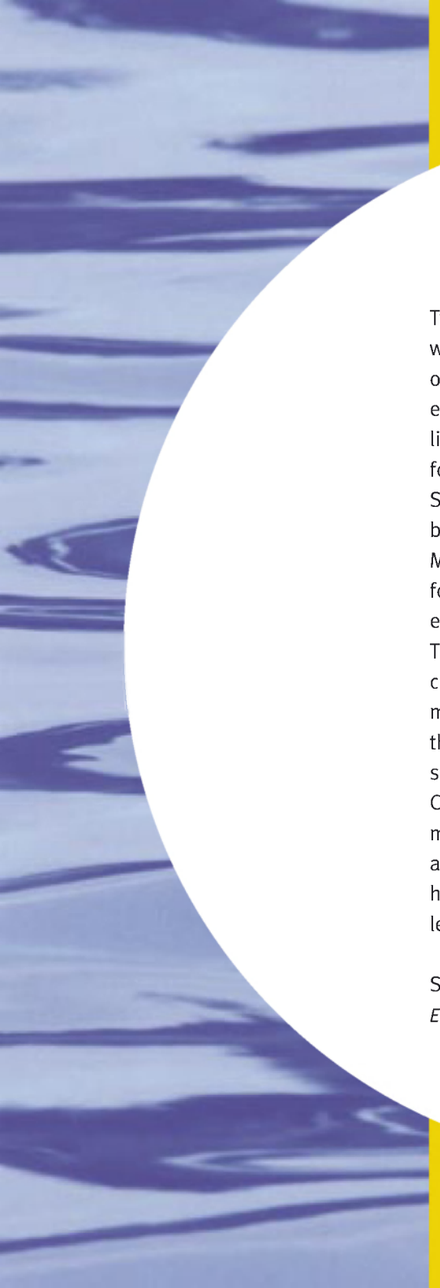
The Clean Ship

Towards an integrated approach of sustainable shipping

Opportunities for innovation, policy and business





Transport of passengers and goods - both within the EU and between Europe and other parts of the world - is increasing. Congestion, air pollution, energy demand and environmental and safety risks are linked to the growing demand for mobility, making the need for sustainable transport ever stronger.
Shipping is often seen as a solution for those (European) problems. This is reflected among others in the promotion of Sea Motorways. However, with this modal shift from land to sea, the focus should be on sustainable transport and not just shifting the environmental problems to the marine environment.
The Clean Ship is a visionary approach aiming to develop the concept of vessels designed, constructed and operated in an integrated manner to eliminate harmful discharges and emissions throughout their working life. The concept of the Clean Ship was originally suggested by environmental NGO's. However, implementing the Clean Ship approach requires commitment and support from many different stakeholders. DG Environment supports the approach wholeheartedly and wants to encourage stakeholders in the maritime industry to develop initiatives leading towards truly sustainable shipping.

Stavros Dimas
EU Commissioner for the Environment

Clean Shipping

Shipping is a crucial, but highly invisible activity in delivering all sorts of products to consumers. Most people are unaware that almost every product has been transported by sea at some stage. Ships will remain a key mode of transport for moving objects and people. However, the negative side effects of shipping both environmentally and socially are considerable. This brings in the need for a revolution in ship design and operation.

The Clean Ship is an integrated approach towards sustainable shipping. Integrated has a double meaning. First of all, it means tackling all social and environmental costs from 'cradle to grave'. Secondly, it means that a participatory process is needed to bring together various stakeholders who have a role to play in making this vision a reality.

This 'sketchbook' gives the reader an idea of what the Clean Ship approach is about. The long-term target is 'zero-emission'. Environmental problems are identified. Directions for solutions are suggested. We want to discuss this with relevant stakeholders, not just ship owners and crew, but also charter parties, cargo owners, insurers, financiers, class societies and policy makers. These stakeholders may have valuable ideas about technologies that fit in with the long-term perspective or about incentives or possible actions that need to be included in the Clean Ship approach.

We invite you to become one of the navigators!

the North Sea FOUNDATION

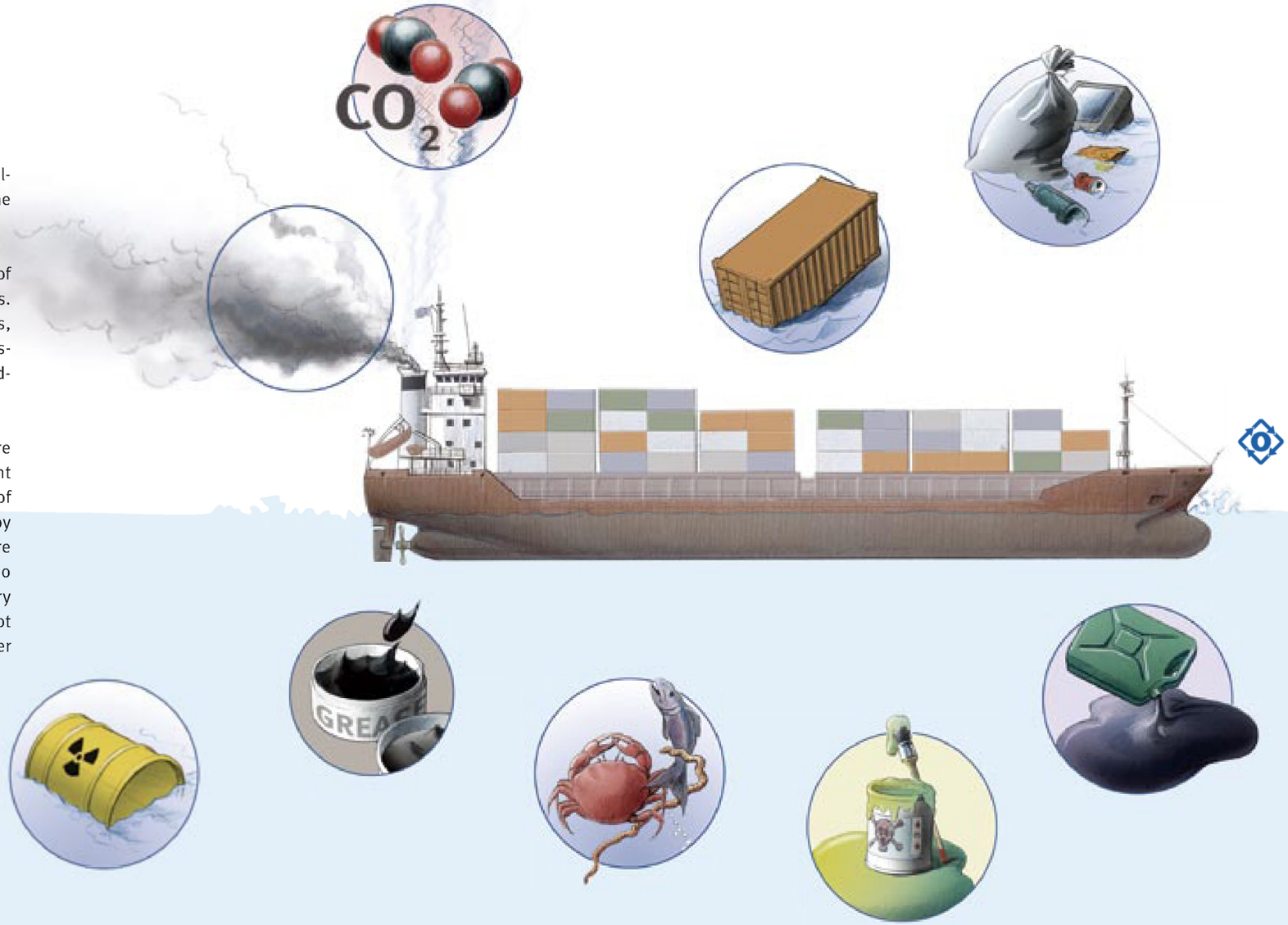
T&E European Federation for TRANSPORT and ENVIRONMENT

Today's situation

Shipping causes a wide range of effects on the marine environment. Well-known disasters with tankers like Erika (1999) and Prestige (2001) come directly to mind.

These accidents only form the tip of the shipping pollution iceberg. Most of the harmful emissions come from the daily release of various substances. Intentional and unintentional discharges of oil, chemical cargo residues, garbage and cleaning agents, anti-fouling paint, exhaust and other air emissions and non-indigenous species from ballast water have an ongoing adverse impact on life in the world's seas.

Pollution by shipping has an impact on land too. Of particular concern are the exhaust emissions, which have detrimental effects on the environment and the health of people in coastal and harbour areas. The emissions of sulphuric oxide (SO_x), particulate matter (PM) and nitrous oxide (NO_x) by the shipping industry are constantly increasing while emissions on land are going down. Greenhouse gas emissions (CO_2) from ships are on the rise too and it is estimated that total carbon emissions from the shipping industry are equivalent to the carbon emissions of Australia. Since shipping is not covered by the Kyoto climate change treaty, there are no incentives under this treaty for the shipping industry to lower its emissions.



Work in progress

Thinking about a Clean Ship started in 2002. 70 maritime specialists gathered at the Delft University of Technology in the Netherlands and agreed that a Clean Ship could be possible in fifteen years time. Two months later, the ministers of the North Sea Countries decided to adopt the Clean Ship approach in the Declaration of the Bergen Conference. The vision is gaining importance step by step. The approach is a major topic on the agenda of the next minister's conference in Sweden in 2006...

The concept of the Clean Ship has now become a well-known way of working towards sustainable shipping. Three years after the first blackboard drawing, it is now time for a first sketch, one that triggers stakeholders to contribute.

Driving Forces

It is all to clear that we should alter course. Dominant trends in the maritime sector constrain this. Legislation will probably remain a tool to improve environmental performance but other driving forces are needed:

Influencing logistic chains

Many actors are involved in distributing goods. At one end of the chain there is the producer, at the other the consumer, with a range of stakeholders in between. Any of these is able to influence the distribution system. Cargo owners, for instance, may demand environmental specifications for marine carriers. Consumers can persuade firms to transport goods in a clean transport system only.

Financial instruments

Governments or port authorities can create a financial bonus or tax cuts for clean ships and install fines for polluters – in line with the polluter pays principle. Current incentives for 'substandard' operators will cease to exist.

Stimulating technical developments and innovation

Technology may show the way out of some persistent environmental problems. Stimulating innovation in the maritime sector is crucial, keeping in mind that a technical solution to one problem should not lead to others. There is a cross-link between innovation and environmental policy: once technologies are available, this allows more ambitious policy instruments.

Education and public awareness

Most ships' officers are well trained: they know everything about navigating their ship. For them, the sea is like a road, yet there is a valuable marine ecosystem under water. Environmental awareness of the crew is of vital importance to stimulate clean shipping. Educating stakeholders not directly involved in operating a ship may also help the implementation of environmental measures.

Regulation

Existing Marpol rules are the bottom line for shipping, new rules should make it more difficult for offenders to stay in business. Strengthened enforcement remains important: if polluters don't get caught or if the fines are too low, environmental offences will remain a minor business risk. New regulations should encourage innovation, not only setting a standard for now, but also one for over 5 years.

Sustainable construction materials

Air lubrication

Non-friction paint

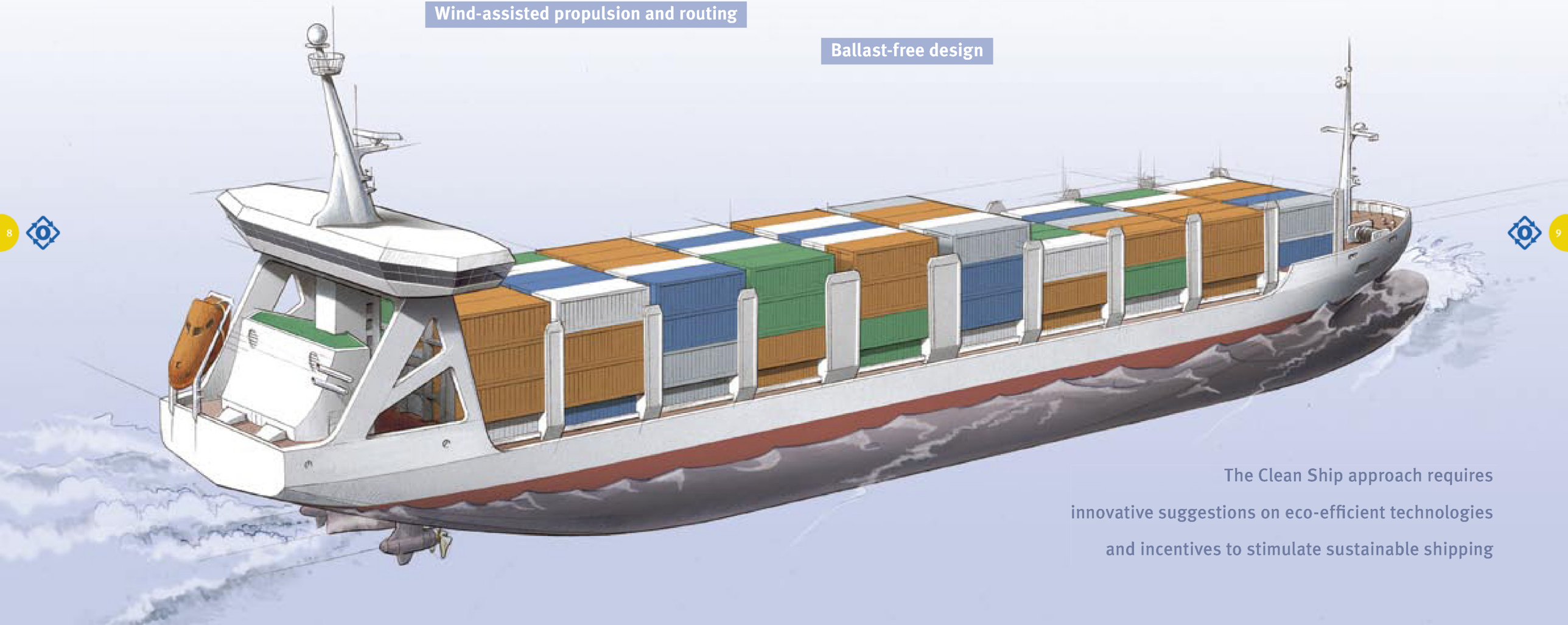
Fuel cells

Advanced propulsion system

Optimised routing system and cargo handling

Wind-assisted propulsion and routing

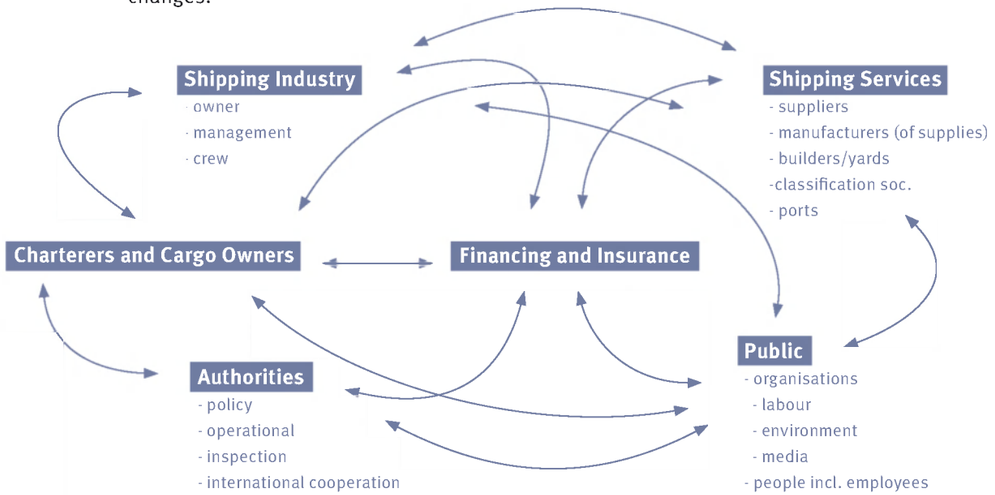
Ballast-free design



The Clean Ship approach requires innovative suggestions on eco-efficient technologies and incentives to stimulate sustainable shipping

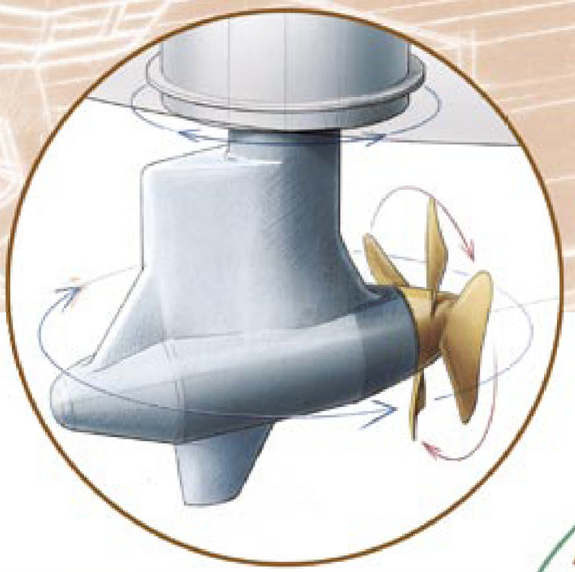
Stake-holders

A Clean Ship is not a simple, technical innovation that can be implemented by one smart company. The maritime industry is a complex sector with stakeholders engaging at all levels. These interdependencies between fuel suppliers, ship owners, cargo owners and financing and insurance companies make that the implementation of a concept like a Clean Ship requires not only technological, but also social and organisational changes.



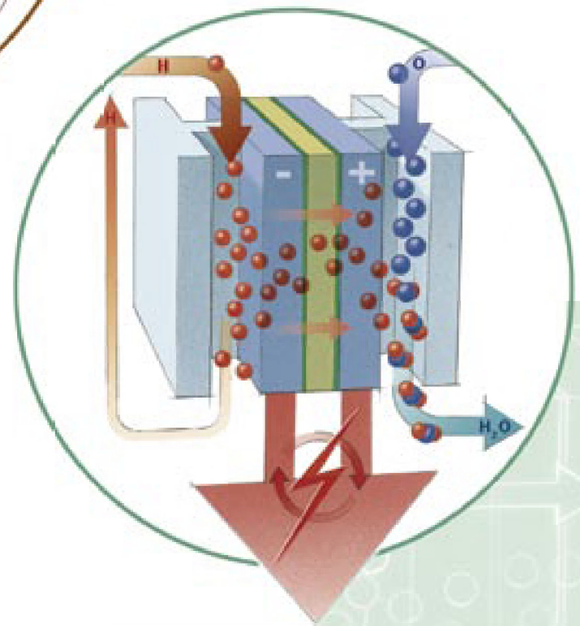
Realising clean shipping calls for a multi-stakeholder approach. Not just crew or ship owners: many others in the maritime industry have to be involved. When thinking about incentives or possible actions that are to be included in the Clean Ship approach, they have to be well targeted to actors that can and are willing to make a difference.

EXAMPLES OF CLEAN SHIP DEVELOPMENTS



Propulsion

Conventional propulsion by propellers has been in existence for more than a century, but in terms of efficiency, this is not the optimum method. POD propulsion – in combination with an improved hydrodynamic hull shape results in a drastic improvement. An even more energy-efficient method of propulsion is wind energy. Sails have been used for ages, and new options are in development such as the revolutionary Skysails technology.

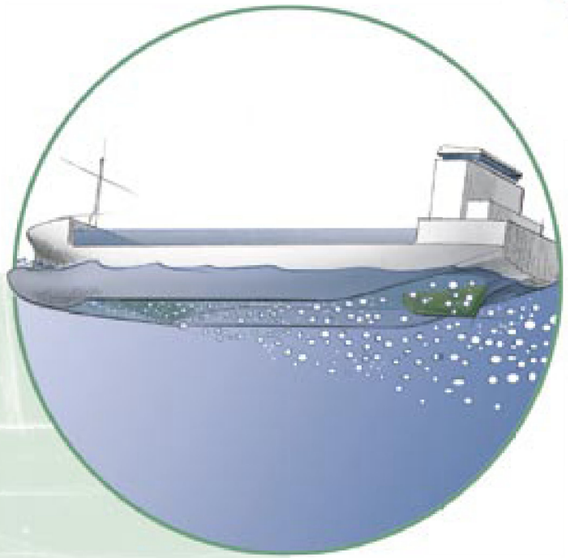


Clean engine

The engines that are built nowadays are able to burn any kind of hydrocarbons – the fuel doesn't even have to be fluid at room temperature. Bunker fuels contain many polluting substances like PAH and PCB. A drive towards the use of clean combustion engines and clean(er) (bio)fuels is a first step towards clean engines. The next step should be much bigger, for instance by using hybrid engines and – ultimately – fuel cells.

Human element

Crucial to clean shipping is commitment of officers and crew on board; they have to act with respect for the environment. Waste should be avoided and not be thrown over board. Investing in the human factor is an essential element in achieving sustainable shipping. A first step should be to train officers and crew members about the marine environment. Educating stakeholders not directly involved in operating a ship is an additional step.

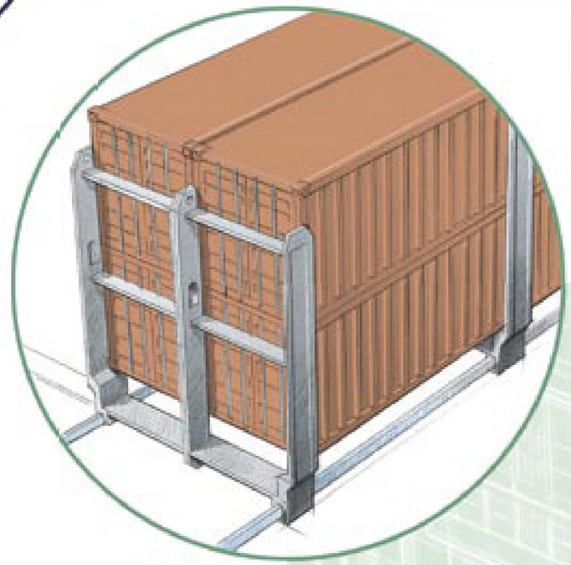


Air lubrication

Reducing the friction of a vessel through the water is a very effective way to reduce fuel consumption and thus emissions. A very promising method for this is air lubrication: the introduction of millions of tiny air bubbles underneath the ship. Innovative hull design can improve the sustainability of shipping substantially.

Logistics

Environmentally sound operation of a ship involves looking at logistics as well. A lot of products are being 'overtransported': from a to b, further on to c and, sometimes, back to a again. Optimised logistics operations often lead to lower emissions. Another element is adjusting the ship's speed according to weather (weather routing). This is of even greater importance when ships use wind-propulsion.



Cargo handling

Loss of cargo is a major source of marine pollution. Not just oil, but also chemical cargo residues and containers have an adverse effect. This should be tackled by improving the stripping capacity of tankers and by securing all deck cargo as best as possible. Innovative solutions for cleaning residues on board are required.

Antifouling

The use of organotin antifouling will be phased out, but most of the alternatives on the market contain harmful biocides as well. These antifoulings are just an interim measure: future hull paint should be active by way of physical properties, for instance extremely smooth surfaces, or paint with a special structure which makes it difficult for organisms to attach.

Ballast water

The introduction of exotic species is threatening ecosystems. Once introduced, opportunistic expansion can often not be reversed. Ballast water is therefore a top priority. Current solutions are all focused on the treatment of ballast water. The ultimate solution is however to develop ballast-water-free ships.

What ideas do you have?

This 'sketchbook' is not a blue print dictating how future shipping must look like, but an invitation to participate and co-design. We are interested to hear your ideas on eco-efficient technologies; which technologies are not only environmentally preferable but also generate added-value for the maritime industry? Are you aware of any smart ideas or technologies from other sectors that can be applied in the maritime industry? Do you have suggestions for incentives to stimulate stakeholders involved in the sea transport chain to invest pro-actively in the future of a sustainable industry?

We have given some of our ideas in this sketchbook. We are interested to hear your suggestions that are beneficial to the maritime industry as well.

Please, share your views on how to realise a sustainable future in shipping together.

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COLOFON

This sketchbook is produced by the North Sea Foundation (Utrecht, the Netherlands) in co-operation with the European Federation for Transport & Environment (T&E, Brussels, Belgium).

The North Sea Foundation is a Dutch professional environmental NGO that stands up for the North Sea. The North Sea Foundation chooses for a constructive approach and open dialogue that enables us to influence marine environmental policies, politicians and important user groups (such as fishermen and ship owners). When required, action is taken, whether that be legal, media pressure or raising public awareness.
www.noordzee.nl

T&E is Europe's principal environmental organisation campaigning specifically on transport. Members are drawn from NGOs in nearly every European country, all of whom promote a more environmentally sound approach to transport.
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