

Research maritime transportation

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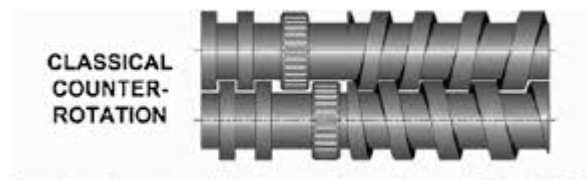
1. Can we make maritime transportation of food more ecological? And how?

Yes, we can. There are a few things that can make it more ecological. The most important one is the speed of a ship. If the speed of the ships would be lower, they wouldn't pollute as much. The ecological benefit is really big. A ship that lowers its speed from 22.2 to 20.4 kilometres per hour, reduces its fuel consumption by 18%. Secondly, weather-dependent routing is very important. Ships sailing in bad weather conditions, such as a storm, will pollute more.

Maritime transportation can also become more ecological if we would develop new ships that can run on less-polluting liquefied natural gas.

Lastly, counter-rotating screws can also help.

These are two screws placed coaxially that rotate in the opposite direction. The advantage of this design is that the second screw achieves efficiency from the rotation energy of the first screw.

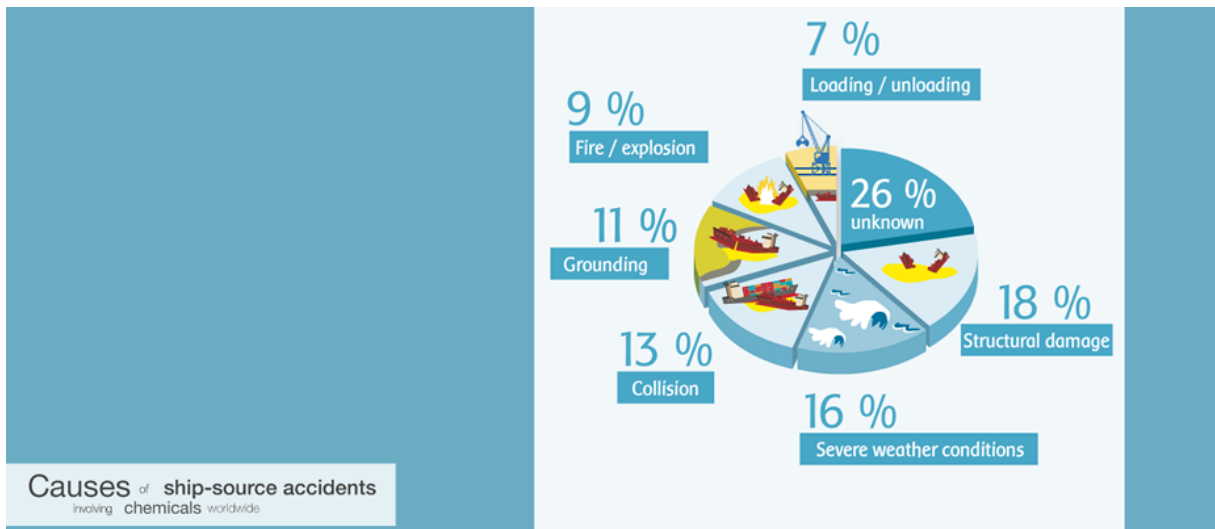


We can conclude that we can do a lot of things to reduce the pollution of maritime transportation.

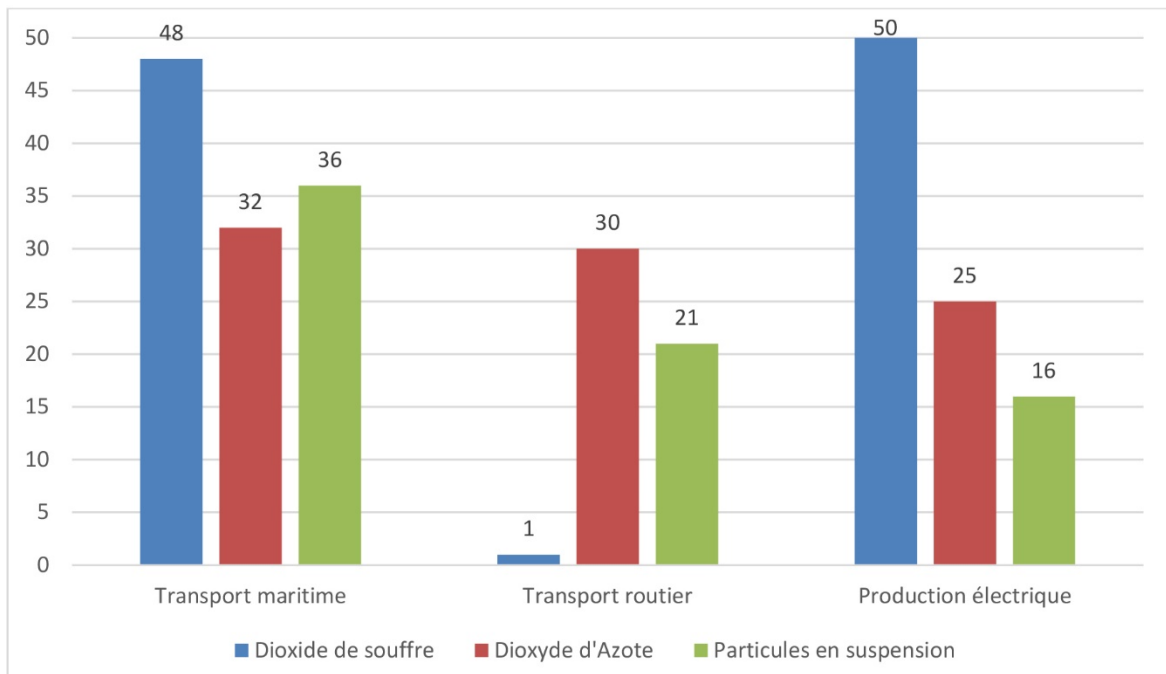
- **How much pollution is produced by maritime food transportation?**

There are multiple environmental impacts caused by maritime transportation, those causes include air pollution, water pollution, acoustic and oil pollution. This pollution also includes greenhouse gas emissions. The International maritime organization predicts that the global human-made emissions will rise to from 2.2% to 50 or even 250% by 2050

There are also other causes that can impact the pollution of the sea. For example; fire or explosions, grounding and collisions which can cause spills. Structural damage and severe weather conditions can also serve as a cause for maritime pollution.



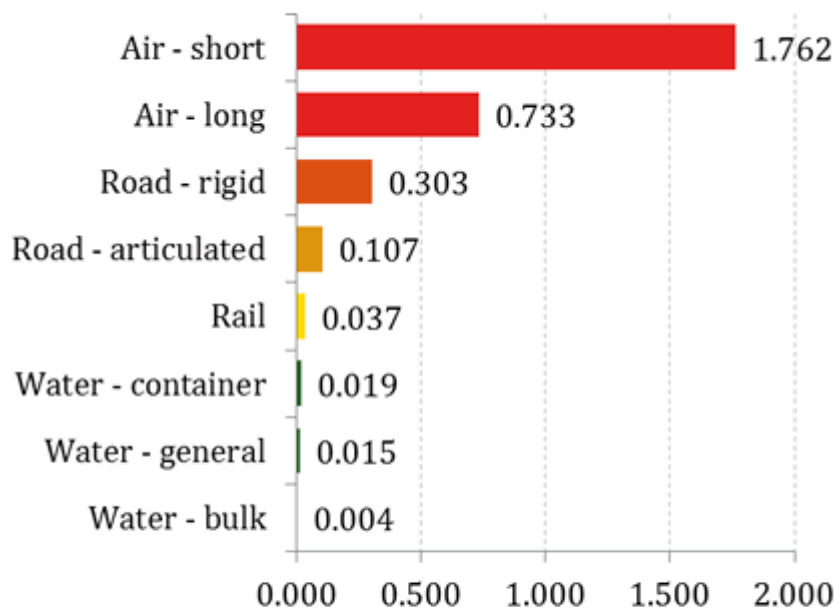
Maritime transportation now provides 3% of the greenhouse gas emissions, but this number can rise to over 17% of the greenhouse gas emissions by 2050. This is something we have to acknowledge and take into consideration when we talk about pollution. It is very possible that at this moment the numbers or the percentages aren't that high but if we don't act now, they will rise until we can't fix them anymore.



- **What are possible alternatives to transport food that are better for the environment?**

In the following graph we can see that out of all the means of transportation, maritime transportation is the least polluting option. Water transport only provides 0.019 kg co2/t.kg, which is about 1.743 kg co2/t.kg less than air transportation.

Freight Transport Emissions: kg CO₂e/t.km

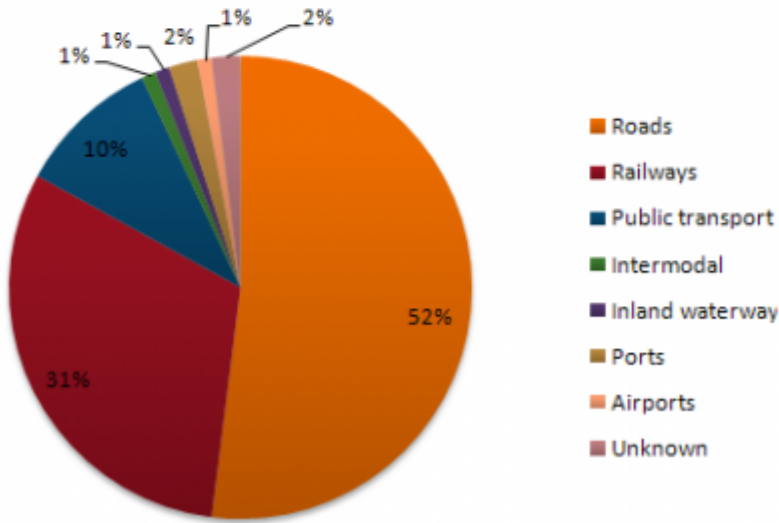
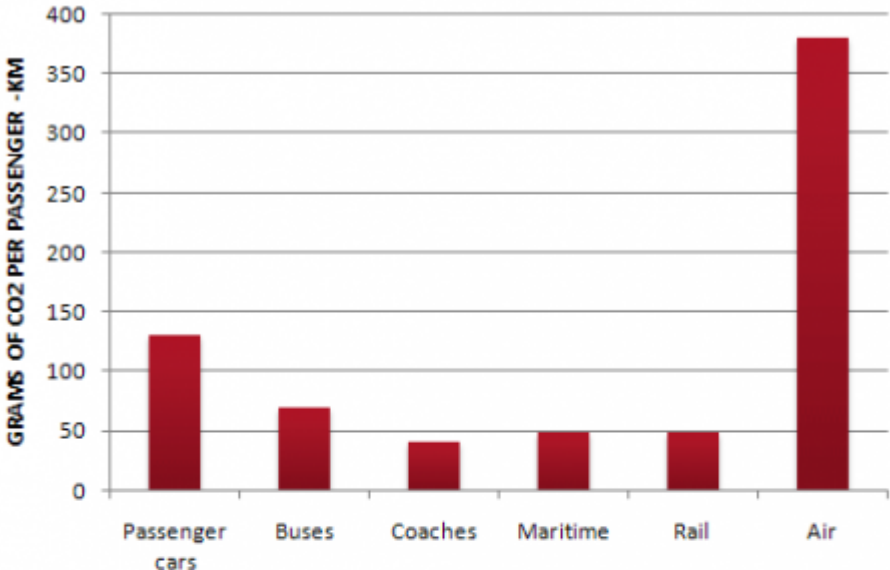


Note: All figures are kilograms carbon dioxide equivalents per tonne kilometre (kg CO₂e/t.km). Figures based on a well-to-wheels analysis of fuel used and average loading per vehicle. For air freight long is greater than 3,700 km while short is less than it, no RFI multiplier is used. Road vehicles are based on UK diesel truck averages. Rail based on UK diesel and electric trains. All water vessels are ships, not ferries.

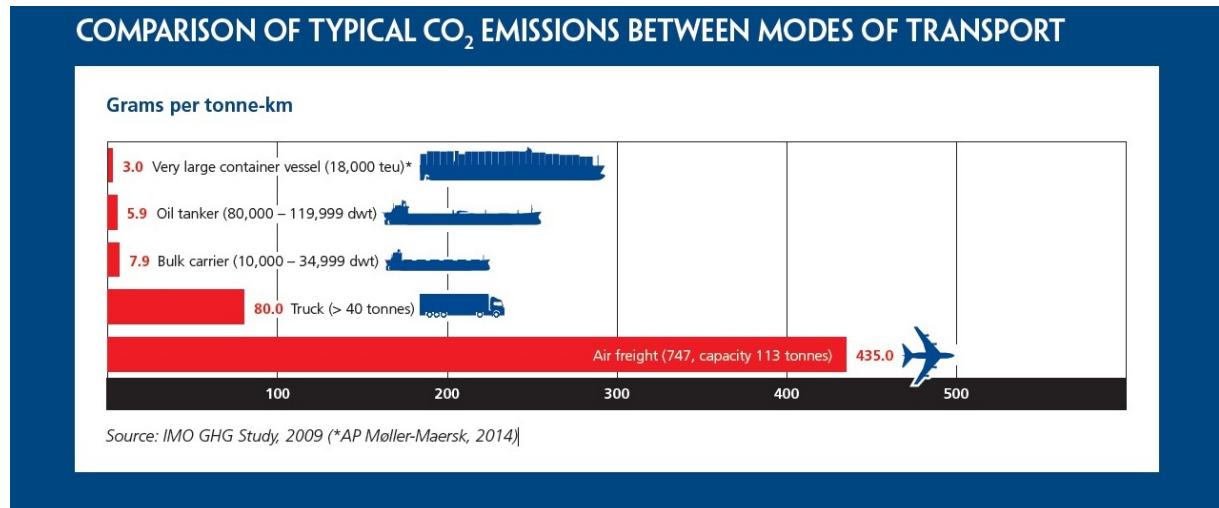
Sources: DEFRA Emissions Factors



The only alternative that is less polluting than maritime transportation are Coaches, which can be seen on the graph down below.



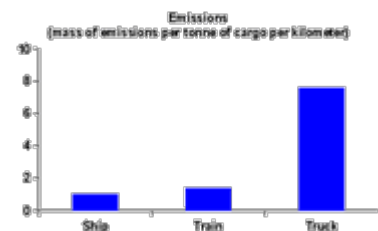
the one thing that we can advise against is the use of air transportation. It is one of the most polluting means of transportation.



2. What are the benefits of maritime transportation of food?

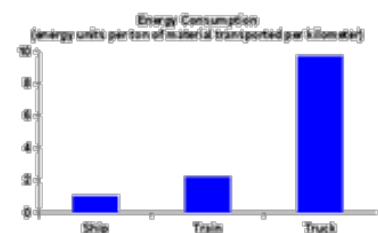
Fewer air pollutant emissions

Ships use less fuel than trains, planes and trucks, so they produce less carbon dioxide. They also emit less other air pollutant gasses.



Less energy consumption

A ship is fuel-efficient compared with trucks, planes and trains because there isn't so much fuel needed to transport a lot of (heavy) goods.



A safer mode of transportation

Serious cargo spills and accidents are rare when it comes to ships.



(Less costs because of containerization)

With one cargo ship, you can transport many goods because of the use of containers. With planes, trucks and trains, the space you can use to store the goods is more limited.

- **What are the disadvantages of maritime transportation of food?**

Release of oil and chemicals in the sea

This happens because of accidental spills or operational discharges. Operational discharges is dumping oil in the sea on purpose. Because, for example, it's cheaper to discharge fuel illegally before entering a port than to disposing the fuel of legally at the port.

The consequences are very bad. The animals living in the sea suffer from it and when the oil reaches the coast, it's impossible to fish.



Transfer of foreign species

This happens through ballast water and on ship hulls. Ballast water is loaded with marine species like plankton. Most of these species don't survive in their new environment, but the ones who do are dangerous for the local fauna and flora. It can be dangerous for the local species and some can pose a risk to human health by contaminating seafood.

Dumping of waste

Dumping of garbage and sewage. This is dangerous for the animals who live in the sea and it pollutes our coasts.

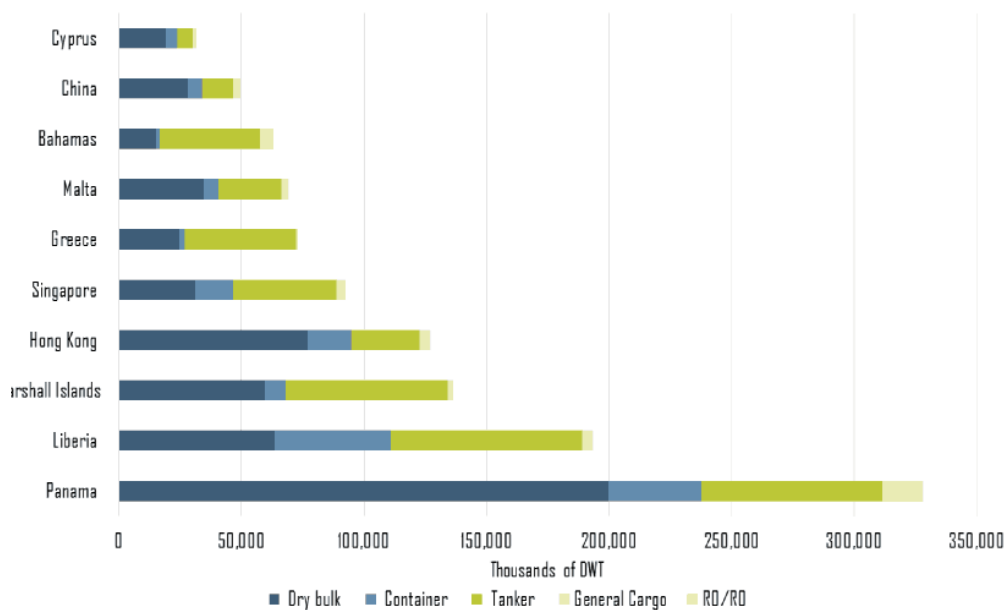


Noise

Underwater noise is bad for marine life (especially for marine mammals). Because studies have proven that this is indeed dangerous, the IMO Marine Environment Protection Committee (MEPC) agreed to develop non-mandatory technical guidelines to minimize this noise.

Continuous noise on board of ships can have an adverse impact on human health. IMO adopted, in 2012, a regulation in the International Convention for the Safety of Life at Sea (SOLAS) to require ships to be constructed to reduce on-board noise and to protect personnel from noise.

- **Which countries use maritime transportation for food the most?**



This diagram shows the tonnage ship transportation by country of registry in 2013. Panama, Liberia and the Marshall Islands used maritime transportation the most. But this diagram doesn't show which countries use maritime transportation of food the most

Countries that have easy access to seas and rivers (Italy, Belgium, ...) use more maritime transportation to transport food than countries that don't have direct access to waters like Switzerland, Bolivia, ... These landlocked countries have to make agreements with neighbouring countries to have access to port facilities. But automatically they have higher shipping transportation costs and so it's less interesting for those countries to use maritime transportation to transport food.

- **How can they improve the maritime transportation of food?**

There are a lot of delays and obstacles due to the lack of infrastructure in certain ports. In general cargo handling operations in ports cost a lot of time and money. The EC Shipowners' Association (ECSA) concluded that ships spend only 40% of their time on the sea and 60% in ports.

- ➔ Solution: The government has to invest money in the improvement of the infrastructure of certain ports so that ships don't lose so much time and can transport food faster.

Short sea shipping has problems to deliver their products on time.

- ➔ Solution: Shipping companies should improve their 'just in time' concept by using smaller ships with less and smaller stocks, because it's faster than large ships that transport many goods. So there has to be more frequent and smaller consignments. Or they need to invest in the increase of the speed of large ships, so that they are more reliable and can deliver the food on time. That reduces the risk of food spoilage.

3. How long and how much money does it take to ship food internationally?

It's very expensive to transport across seas. Most container ships have a capital outlay of 190 million euro. They have to buy new vessels and containers often to avoid any health hazards. This costs a lot of money.

- **In which ways can they reduce costs?**

The fuel and port charges are the biggest cost. It would be difficult to cut these costs without a negative influence on the whole maritime transport economy.

We could find a better way to conserve food so that we don't have to keep buying new containers every time.

- **How are the products stored and held fresh on the ships?**

There are different types of ships for transporting food overseas. For example: a reefer or cooling ship is used to transport products that can go bad very quickly if you don't keep them cool. Fruit, vegetables, meat and fish are all transported with reefers. They have refrigerated containers to put the products in. Other ships that often carry food products are the bulk carriers. They can carry grain with their tankers and containers.

Sources :

The Great Lakes Maritime Research Institute, Other Benefits of Maritime Transportation, internet, 2019

<http://techalive.mtu.edu/glmri/Benefits.htm>

WWF, Marine problems: shipping, internet, 2019

https://wwf.panda.org/our_work/oceans/problems/shipping/

International maritime organization, Ship noise, internet, 2019

<http://www.imo.org/en/MediaCentre/HotTopics/Pages/Noise.aspx>

ANONIEM (EU), Vermindering van de emissies van de scheepvaartsector, internet, s.d.

https://ec.europa.eu/clima/policies/transport/shipping_nl

ANONIEM, Maritime industry seeks solutions to limit pollution, Internet, The business times, 21 oktober 2019

<https://www.businesstimes.com.sg/transport/maritime-industry-seeks-solutions-to-limit-pollution>

ANONIEM, Environmental impact of shipping, internet, s.d.

https://en.wikipedia.org/wiki/Environmental_impact_of_shipping

ANONIEM, Comparison of typical Co2 emissions between modes of transportation, internet, s.d.

<https://www.bing.com/images/search?view=detailV2&ccid=Ev4I3nKK&id=3810E05AC9F980C7B5760E6D5CA5B4E83F18A3EC&thid=OIP.Ev4I3nKKNeT-u8ywR9NnxwHaDH&mediurl=http%3A%2F%2Fnorthernhoot.com%2Fwp-content%2Fuploads%2F2015%2F08%2FComparison-of-typical-Co2-Emissions-Between-Modes-of-Transportation.jpg&exph=535&expw=1271&q=means+of+ecological+transportation&simid=608007827421006308&selectedindex=44&ajaxhist=0&vt=0&sim=11>

HEALEY B., Everything You Should Know About Reefer Shipping, internet, 17 January 2018
https://www.porttechnology.org/news/everything_you_need_to_know_about_reefer_shipping/

RODRIGUE J., NOTTEBOOM T., Maritime Transportation, internet, s.d.
https://transportgeography.org/?page_id=1762

A.G. BLONK, W., Short Sea Shipping and Inland Waterways as Part of a Sustainable Transportation System, internet, Marine Pollution Bulletin, 1994.
<https://www.sciencedirect.com/sdfe/pdf/download/eid/1-s2.0-0025326X94906599/first-page-pdf>