



Dutch
Sustainable
Growth
Coalition



Information Document

Clean Ocean
Shipping Pilot Project

24 March 2019 – 20 June 2019

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1. Project

There is a large potential and an even greater urgency to decarbonize the global shipping industry. Shipping accounts for 90% of transported goods worldwide. The global shipping sector emitted around 870 megatons of carbon dioxide (MtCO₂) in 2018, accounting for about 2.2% of total human-made CO₂ emissions. This is more than the total emissions of the country of Germany, the world's sixth highest emitter.

Further facts:

| | |
|---|---------------------------|
| Fuel oil used by seagoing vessels per year: | 250 million tonnes |
| Total number of seagoing vessels: | around 20,000 |
| Number of container ships: | 5,000 |
| Number of very large container ships: | 120 |

Convinced of the urgency to act on climate change, a group of Dutch multinationals – FrieslandCampina, Heineken, Philips, DSM, Shell, and Unilever, all members of the Dutch Sustainable Growth Coalition (DSGC) – joined forces with A.P. Moller-Maersk to take a tangible step towards the decarbonization of ocean shipping.

What is unique is the starting point. The DSGC members, customers of ocean carriers, played a critical role by initiating and sponsoring this biofuel pilot project. For the first time ever, a collective of shippers took a clearly collaborative approach to accelerating the decarbonization of ocean shipping. This resulted in a request to the carriers to support sustainable innovation. Maersk became the selected carrier and together, they chose biofuel as a short-term, market-ready, sustainable solution. Shell acted as the biofuel supplier.

The pilot project ran from 24 March 2019 until 20 June 2019 and entailed the use of up to 20% sustainable, second-generation biofuels in a large,

triple E-class ocean vessel called the Mette Maersk, which sailed 25,000 nautical miles from Rotterdam to Shanghai and back. This was the first pilot project at this scale on the world's busiest and most critical trade lane between Europe and Asia to reduce CO₂ and sulphur emissions.

After negotiating the scope and conditions of the biofuel pilot project with the coalition of seven companies, the composition of the biofuel and the effects on the marine engine were tested extensively in laboratories. The use of the second-generation biofuel was set up in two stages: the longest part of the route, the Mette Maersk would sail on a mixture of bunker oil and 7% biofuel. As no major issues arose, the ship switched to a blend with 20% second-generation biofuel.

Apart from the technical implementation, the reduced emissions were allocated to 2000 containers, allowing the shippers potentially to credit the emissions reduction to their own sustainability programme.

About the ship Mette Maersk

| | |
|---------------------------|---|
| Length: | 400 metres |
| Capacity: | 18,000 containers |
| Fuel: | mixture of regular fuel with 7 to 20% second-generation biofuel |
| Biofuel: | 540,000 litres |
| | reduction of 80 to 85% CO₂ emissions compared to regular fuel |
| Regular fuel: | 1,460,000 litres |
| CO ₂ -neutral: | 2,000 containers |

About the biofuel

The biofuel used in this pilot project is a so-called 'second-generation' biofuel, produced from waste sources, in this case used cooking oil (UCOME oil). This biofuel is ISCC-certified.

About Maersk

A.P. Moller-Maersk is an integrated container logistics company working to connect and simplify its customers' supply chains. As the global leader in shipping services, they operate in 130 countries and employ roughly 76,000 people. Maersk's mission is to enable and facilitate global supply chains and provide opportunities for their customers to trade globally.

About DSGC

The Dutch Sustainable Growth Coalition (DSGC) is a CEO-led coalition of eight Dutch multinationals (AkzoNobel, DSM, FrieslandCampina, Heineken, KLM, Philips, Shell, and Unilever). VNO-NCW supports and Accenture facilitates the coalition.

Coalition members all develop and implement sustainable growth business models that combine economic profitability with environmental and social progress. In that way, they aim to contribute to the achievement of the UN Sustainable Development Goals in 2030.

More information: <https://www.dsgc.nl/en>



1. DNV GL: www.dnvgl.com/expert-story/maritime-impact/Forecasting-the-effects-of-world-fleet-decarbonization-options.html
2. Emissions Database for Global Atmospheric Research (EDGAR) report: edgar.jrc.ec.europa.eu/booklet2019/Fossil_CO2andGHG_emissions_of_all_world_countries_booklet_2019report.pdf
3. Global Carbon Atlas: <http://www.globalcarbonatlas.org/en/CO2-emissions>

2. Results

The Mette Maersk container vessel has returned safely to Rotterdam after a three-month round trip from Rotterdam to Shanghai. It sailed the entire route on a fuel blend with second-generation biofuel.

2.1 Technical

Mette Maersk, one of the largest container vessels in the world, sailed on a blend with 7 to 20% biofuel from used cooking oil. This was the first time ever in history that such high blend percentages were used in an ocean container vessel of this scale.

Initial tests showed that the fuel mixture would work well in the engine of the Mette Maersk, with just some minor modifications to the engine settings. Interestingly, the technicians didn't expect to encounter so few problems. The virtual absence of technical difficulties has convinced Maersk that decarbonized solutions for shipping can

already be implemented today, both from a technical and operational point of view. The crew and the technical fuel team underlined the excellent performance of the fuel.

Maersk had even set aside a substantial financial reserve beforehand to cover possible repair costs, but these funds have not been used. In addition, the supplier of the Mette Maersk engine supplied a formal letter of support for using the fuel before sailing, based on the tests done by Maersk and Shell.

2.2 Environmental

On this round trip, the Mette Maersk sailed on a 7% and on a 20% biofuel blend, which led to a total reduction of 1500 tonnes of CO₂ and 20 tonnes of sulphur emissions. The CO₂ reduction corresponds to the annual emissions of over 200 households or 12 million car kilometres (approximately 300 times around the world).

2.3 Economic

One highly significant outcome of the pilot project is the clear signal that shippers sent that they are interested in more sustainable (ocean) transport options. They are willing to consider paying a higher price per container temporarily to encourage the development of innovations for greener transport. Additionally, they are eager to develop a model of a collaborative approach with all of the chain partners to adopt cleaner shipping innovations in the industry on a cost-effective basis.

Apart from the technical implementation, the reduced emissions were allocated to 2000 containers, allowing the shippers potentially to credit the emissions reduction to their own sustainability programme. The business model provided insight into the extra costs involved, including the higher price of biofuel and the costs of second-generation fuel certification. Benefits are the CO₂ savings, which can be registered in the international carbon credits scheme or set off in the company's carbon accounting system. All participating DSGC members have an internal CO₂ cost accounting system.

Maersk recognizes both the need for cleaner transport and the business opportunity it entails. Maersk COO Søren Toft stated that: 'We are not under the illusion that this specific solution will be able to serve the entire industry or even our entire fleet. While it is not yet an absolutely final solution, it is certainly part of the solution.' Thanks to the pilot project, Maersk has decided to work on a commercial offer: shipping goods in containers using biofuel. Maersk calls it 'ECO Delivery'.

Higher price

While a higher percentage of biofuel would further reduce shipping's ecological footprint, biofuel is currently still significantly more expensive than regular shipping fuel. However, Shell identified possible supply chain improvements to increase cost efficiency. These include optimizing upstream processes (for example through larger volumes, different grades of refinery, lower logistics costs, seasonal trading or improved annual planning) and using lower-quality (biomass) waste or biocrude as input.

3. Lessons learned by collaborating

3.1 Lessons for DSGC **The Clean Ocean Shipping project was the first large-scale initiative of DSGC in which multiple members collaborated to drive sustainable innovation in specific markets. Based on this initiative, several lessons can be defined for future DSGC initiatives.**

The coalition as an accelerator

DSGC can help its members to target sustainability issues in which single coalition members have relatively small stakes and power. Shipping accounts for a relatively modest share of the CO₂ emissions of the various coalition members. However, combined, the shipping industry has a large CO₂ footprint. Given the relatively small share of CO₂ emissions within the company and the market characteristics of large-scale service sharing (which means combining containers of many companies on ships), it is difficult for a single coalition member to drive change in the shipping industry.

'DSM is a big company, but not a big shipper on a global scale,' according to Kim van Neer, Manager of

Global Distribution. 'With only a few containers on a ship, you cannot make shipping sustainable. We will have to make a fist together.'

By acting as a coalition, the companies were able to coordinate collaboration with supply chain partners more effectively, to create a significant demand by their shipping volumes, share the required pilot project investments, and make the targetable emissions more tangible at the level of a specific ship or container. Even more importantly, the collaboration of companies of this size resulted in a significant market incentive further to spur sustainable innovation by carriers and (fuel) solution providers.



The need of DSGC experts

Without the intrinsic drive of the involved procurement professionals from the DSGC companies, the clean shipping initiative would not have been a success. The professionals are key to bringing in the required market expertise and connections to the wider ecosystem of stakeholders.

In return, a similar DSGC initiative can help the professionals to:

1. Build internal and external support and exposure for their sustainability-related efforts
2. Support their efforts by sharing programme management investments, and
3. Connect them to other experts within the other coalition members.

Non-coalition members

There is a great willingness among non-coalition members to join and this is possible with clear and transparent collaboration agreements. The involvement of Maersk in the Clean Ocean Shipping initiative was pivotal to its success, not only given the available expertise but also because of the generous investment of resources.

A collaboration should focus on trusted, transparent, and effective collaboration in which a joint innovation approach with a common goal (but with different interests and values) is the aim. This requires defining clear collaboration agreements upfront regarding issues including data sharing, cost sharing, and branding.

3.2 Lessons about innovation in the shipping industry

Several cross-sectoral platforms are in place to accelerate innovation in the shipping industry further, such as the Clean Cargo Working Group, of which Heineken is a member, or the BICEPS Network, of which FrieslandCampina and DSM are members. This specific DSGC initiative can be seen as a kind of smaller spin-off (or a temporary coalition to drive innovation) of the BICEPS Network and Clean Cargo

Working Group platforms. Working together with a smaller number of companies helps to focus on tangible action.

The results of the DSGC initiative have been shared in a separate DSGC event in Scheveningen, in the Clean Cargo Working Group in their biannual event in Europe, and within the BICEPS Network in one of their innovation workshops.

'The response was very enthusiastic,' said Anne Dubost, Senior Global Lead Logistics & Sustainability at Heineken, about the Clean Cargo Event. 'Mads Stensen of Maersk and I presented our Clean Ocean Shipping project and shared the first results on our three key objectives: a promising technology that works in practice on a container ship, successful collaboration between many stakeholders involved, and a message to innovators that we are eager to try new solutions to decarbonize ocean freight.'

Represented in the audience of around 100 participants were carriers like Hapag-Lloyd, MSC, and CMA CGM, as well as shippers like Ikea and Nike. Their enthusiasm for the project confirms the Clean Cargo Working Group in their direction towards creating a matchmaking platform for promising sustainable ideas for container shipping.

Key in the DSGC initiative was the involvement of companies across the entire supply chain, from fuel suppliers to shippers and cargo owners. This allows for the innovation to be aligned to the interests of all supply chain partners, which makes it easier for innovations to be implemented. Additionally, the availability of experts and resources from all supply chain partners is, needless to say, an accelerator of the innovation process.



4. Next Steps

4.1 Technical

The used cooking oil is of very high quality, but biofuel of other qualities could be tested. In this regard, Shell committed to develop second-generation biofuels based on various waste streams, like straw, wood, reeds, and bamboo. Maersk and Shell decided to test and

validate such technical improvements together. They also have the intention to try blends consisting of up to 50% of second-generation biofuel instead of 20%. Furthermore, Maersk will continue to test and validate the use of biofuels for marine application.

4.2 Environmental

Biofuel is seen as a bridge fuel; a temporary but necessary solution to use until sustainable alternatives are fully available on a large scale. Other innovations, therefore, need to be

explored when it comes to more environmentally friendly shipping. Electrification does not yet appear to be an option for ocean shipping, while other fuels can be used as a temporary solution.

Other innovations, therefore, need to be explored when it comes to more environmentally friendly shipping. Electrification does not yet appear to be an option for ocean shipping, but there are interesting recent developments when it comes to (bio-)LNG, (bio)methanol, ammonia, and fuels based on lower-value

In the short term, biofuel is an attractive alternative as it can, to a certain extent, blend with conventional fuels without substantial technical adaptations to engines. A completely new engine isn't necessary.

4.3 Economic

Based on the pilot project, Maersk developed the commercial product 'ECO Delivery'. Fashion retailer H&M has already agreed to ship a large number of its containers using this more environmentally friendly method, which will support Maersk to develop the commercial proposition further.

Shell has started several pilot projects with different ocean carriers and shipowners like MSC, CMA CGM, and Van Oord, while several other shipowners have expressed an interest. Several of these tests are based on blends with over 30%, which could lead to further cost-effectiveness and environmental improvements.

With the rising demand for sustainable shipping options, DSGC expects that the free market mechanism will drive up the supply of used cooking oil and other (lower-value) waste streams as feedstocks for biofuels for maritime use.

In addition, the price differences between regular fuel and more sustainable alternatives are expected to change in favour of the latter, due, among other things, to pending regulation. For instance, the new IMO regulation that took effect on 1 January 2020 introduced a 0.5% global sulphur cap for marine fuels, leading to the use of low-sulphur fuels in shipping around

the world. This effect has already impacted the comparison between the cost of the various fuel alternatives. Additionally, more and more large companies are driving more sustainable business models by internally implementing a carbon shadow price, which allows them to value CO₂ emission reductions in investment decisions.

The members of DSGC who distribute their products globally via ocean shipping will investigate how they can further stimulate these developments. They will continue to generate exposure for and draw attention to the urgency and the opportunities in relevant international networks and platforms, such as the Clean Cargo Working Group and the BICEPS Network. The BICEPS Network will further investigate the development of a future-proof business model, to see how CO₂ emission savings on shipping a container can be allocated to the company using that container and to analyse how the application of carbon credits and/or carbon pricing will influence the model.

One of the directions is to translate a commercial surcharge for a CO₂-neutral shipping unit (TEU) into 'Cost per Tonne of CO₂ saved'. This will enable comparison with carbon pricing incentives and other potential investments to reduce emissions.

5. Appendix

5.1 DSGC on CO₂ emissions

If we want to achieve the Paris objectives in 2030 and 2050, CO₂ emissions must be reduced drastically. When the current Dutch government of Prime Minister Rutte took office, DSGC had already insisted on proactive climate diplomacy aimed at introducing an effective international system for CO₂ pricing. DSGC also asked the Dutch government to speed up the implementation of the Paris Agreement in our country.

All members of DSGC (eight Dutch multinationals) have formulated objectives for reducing their own CO₂ emissions and achieving a climate-neutral supply chain. Besides, they work with an internal price to value each tonne of CO₂. The eight Dutch multinationals are also developing methods for mapping transparent climate-related risks and CO₂ emissions.

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