# Methanol Marine Fuel

methanex
the power of agility

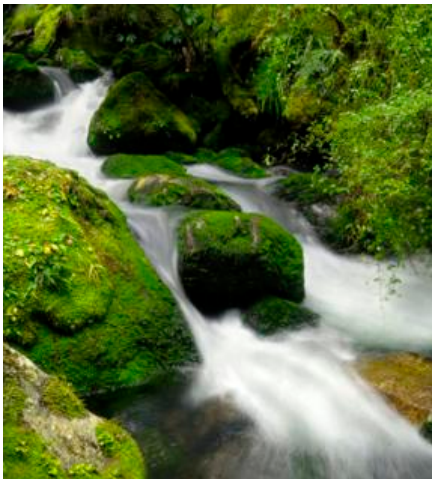
A RESPONSIBLE CARE® COMPANY

## Methanol is a clean-burning marine fuel that can cost-effectively meet the shipping industry's increasingly stringent emissions regulations.

With governments and stakeholders around the world seeking to reduce their dependency on conventional fuels, improve air quality and decrease greenhouse gas emissions, methanol has emerged as an attractive, economically viable alternative fuel.

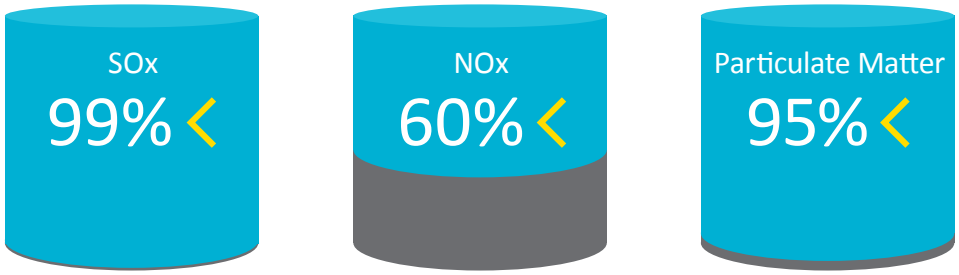
New environmental regulations from the International Maritime Organization (IMO) – the global standard-setting authority for the safety, security and environmental performance of international shipping – require ships to decrease emissions of sulphur oxides (SOx) and nitrogen oxides (NOx). With its clean-burning qualities, methanol can reduce or eliminate these smog-contributing emissions, which can help improve air quality and related human health issues.

As one of the world's most widely shipped chemical commodities, methanol now has a historic opportunity to move from ships' cargo tanks to their fuel tanks. Methanol marine fuel provides shippers and port facilities with a practical fuel solution that meets today's and tomorrow's emission requirements.



Methanol is a clear, colourless liquid that dissolves in water and biodegrades rapidly. Methanol naturally occurs in the human body and in the environment during the decomposition of plant and animal life.

## Emission reductions using methanol




By using methanol as a marine fuel, the emissions of SOx are reduced by approximately 99 per cent, nitrogen oxides by 60 per cent and particulate matter by 95 per cent.

Source – Stena

**Methanex Corporation is the world's largest producer and supplier of methanol to major international markets in North America, Asia Pacific, Europe and South America.** In 2015, our sales volume of 8.5 million tonnes represented approximately 14 per cent of global methanol demand. As the global leader in methanol, we support the development of new applications for methanol to provide innovative solutions for the world's energy needs.

# The Benefits of Methanol Marine Fuel

## It's a low-emission fuel that can help ships meet environmental fuel regulations

Methanol is a clean-burning fuel that produces fewer smog-causing emissions than conventional fuels — such as sulphur oxides, nitrogen oxides and particulate matter — and can improve air quality and related human health issues. Methanol marine fuel complies with the most stringent regulations in Emission Control Areas (ECAs) and would comply with even the most stringent future emissions regulations currently being considered.

## Methanol is biodegradable

Methanol is a clear, colourless liquid that quickly dissolves in water and biodegrades rapidly. The environmental effects of a large methanol spill would be much lower than those from an equivalent oil spill.

## It can be made from a variety of sources, including renewables

Methanol is most commonly produced on a commercial scale from natural gas. It can also be produced from renewable sources such as biomass and recycled carbon dioxide and anything that is, or ever was, a plant!

## It's available around the world

Methanol is one of the top five chemical commodities shipped around the world each year. Unlike some alternative fuels, it is readily available through existing global terminal infrastructure.

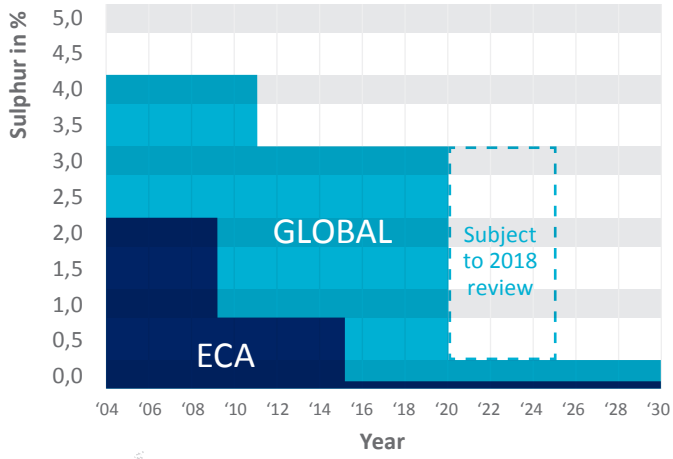
## It's economical, with low infrastructure costs and engine conversion costs

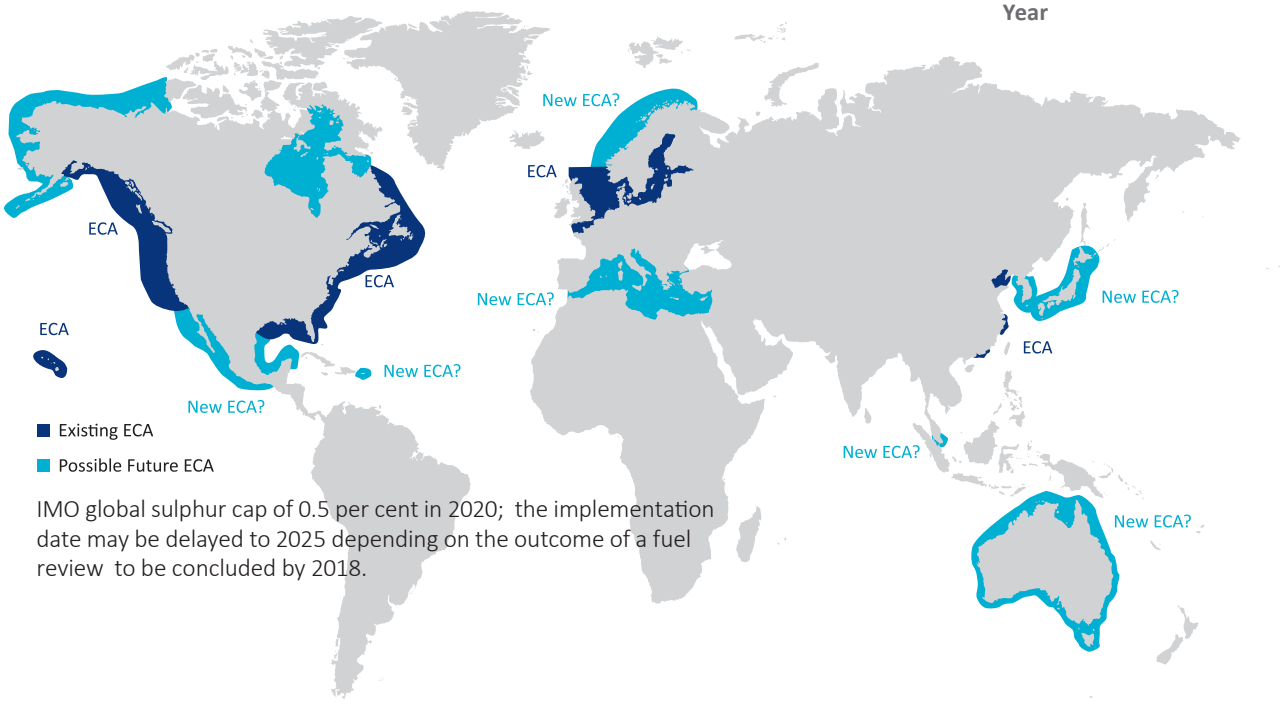
Methanol has been cost competitive on an energy-equivalent basis with competing fuels such as marine gas oil (MGO). It is also an economical alternative marine fuel in terms of fuel storage and bunkering infrastructure costs. As a liquid fuel, only minor modifications are needed for current bunkering infrastructure to handle methanol. Similarly, the cost to convert vessels to run on methanol is significantly less than alternate fuel conversions.

## The shipping industry has a long history of safely handling methanol

For over 100 years, methanol has been shipped globally, handled and used in a variety of applications. Risk classification societies have developed standards for methanol as a marine fuel.

## IMO Regulations

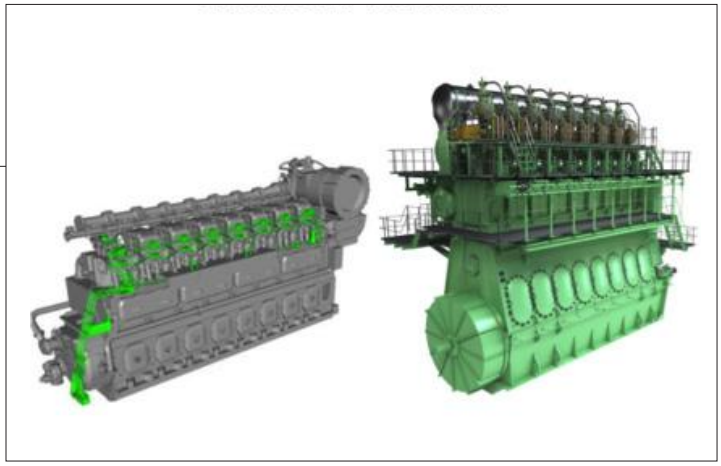



IMO global sulphur cap of 0.5 per cent in 2020; the implementation date may be delayed to 2025 depending on the outcome of a fuel review to be concluded by 2018.

# Successful Use of Methanol as Marine Fuel around the World

**Interest in methanol as a marine fuel is growing globally and methanol is being used in a number of projects and commercial activities around the world.**



## Methanol-compatible engines for ships

Engine manufacturers including MAN Diesel and Wartsila have developed efficient methanol dual-fuel engines. Other engine manufacturers and stakeholders are also advancing projects to commercialize methanol as a marine fuel. These include the MethaShip project in Germany, which is focused on methanol-powered cruise ships and ferries, and the EU-supported LeanShips project, which is developing solutions for the smaller marine engine market.


## Stena Germanica: the world's first methanol-powered ferry

In 2014, Methanex collaborated with industry partners to complete the SPIRETH ("Alcohol (spirits) and ethers as marine fuel") demonstration project. This led to the development of the world's first methanol-powered ferry, the Stena Germanica, which operates in the Baltic Sea. By running on methanol as its main fuel, the ferry will see emissions of sulphur reduced by 99 per cent, nitrogen oxides by 60 per cent, and particulate matter by 95 per cent compared to traditional marine fuel.


## Investing in sustainable technology for our shipping fleet

Methanex's wholly owned subsidiary, Waterfront Shipping, has invested in seven new ships with more efficient design features that can run on methanol, resulting in lower emissions than engines burning conventional fuel. The ships that joined our fleet in 2016 use MAN ME-LGI dual-fuel engines that can run on methanol, heavy fuel oil, marine diesel oil or marine gas oil.

## Methanol Marine Fuel: A "Future Proof" Alternative

Over the past number of years, methanol has been cost competitive with competing fuels such as marine gas oil (MGO) on an energy-equivalent basis. With the decrease in the price of oil, the price of MGO has declined rapidly; however, methanol remains competitive in many key shipping regions and it is expected that over the cycle will remain competitive with MGO.

To hedge the risk of fuel price volatility, shipping companies may choose to diversify their fuel mix to operate on flex-fuel methanol/diesel engines. This would allow ships to switch between fuels, depending on fuel availability, operate cost-effectively and also meeting increasingly stringent air pollution emissions regulations.

Methanol is an ultra-clean burning marine fuel that is future proofed against increasingly stringent air quality emissions regulations. For example, legislation from the International Maritime Organization (IMO) mandates that all new ships built after 2015 must use fuels that emit much lower nitrogen oxides (NOx) or install NOx abatement equipment when operating in North American waters. Looking ahead, this legislation is expected to be adopted in other regions. Methanol substantially reduces NOx emissions, thereby reducing or potentially eliminating the need for NOx abatement equipment on ships. Methanol also produces no particulate or sulphur emissions so it is future proofed against any lower SOx regulations in the future.

In addition to air quality legislation, the IMO continues to push for improvements in energy efficiency and lower greenhouse gas emissions in the shipping industry. Methanol, which can be made from renewable resources such as biomass and recycled carbon dioxide, is an ideal path to a sustainable future in which ships can be powered by renewable fuels with a lower carbon footprint.

## Other Uses of Methanol

The energy sector is methanol's fastest growing market. Approximately 40 per cent of the world's methanol is used in energy-related applications.

In addition to being a clean-burning, biodegradable fuel, methanol is an essential ingredient of modern life that is used to produce hundreds of everyday industrial and consumer items, including paints, carpets, fabrics and building materials.

## Safety and Sustainability in the Shipping Industry

Methanex adheres to Responsible Care®, a sustainability initiative recognized by the United Nations. Through our wholly owned subsidiary, Waterfront Shipping, Methanex has a long history of supporting a strong culture of safety on board our vessels. Waterfront Shipping is a recognized industry leader for its development of safer vessel operational practices.

As a responsible product steward, Methanex strives to maintain the highest safety standards, protect the environment and share methanol safe-handling knowledge with stakeholders throughout our supply chain. Recently, Methanex supported the release of the Methanol Institute's Methanol Safe Handling and Safe Berthing Technical Bulletin, which sets new marine industry standards for loading and unloading methanol cargo vessels to support best practices for shippers, port operators and methanol producers.

Learn more about the safe handling of methanol at: **www.methanex.com**.

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