

# Methanol for Power Generation

## Methanol - A clean-burning, cost-effective and widely available fuel to help meet the world's growing energy needs.

The energy sector is methanol's fastest growing market. As governments and stakeholders around the world look to reduce their dependency on conventional fuels, lower fuel costs, improve air quality and reduce greenhouse gas emissions, methanol has emerged as an economically viable and accessible fuel alternative.



Methanol is a clear, colorless liquid that is water soluble and biodegradable. In addition to being a clean-burning 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.

## The benefits of methanol for power generation:



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

Methanol is a cost-effective, liquid fuel alternative for power generation, particularly for island nations and other areas that are not situated near natural gas pipelines. Only minor modifications and expenditures are needed to adapt existing power plants and associated infrastructure to accommodate the use of methanol as a fuel for power.



### It's a flexible, low-risk alternative

Methanol for power generation offers utilities fuel flexibility. Power plants operating on diesel that convert to methanol can operate on either fuel, mitigating the risk of fuel-price volatility.



### 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 supply chains.



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

Methanol is a clean-burning fuel that can reduce maintenance and eliminate airborne emissions, helping to meet environmental regulations and improving air quality.



### Methanol is a safe, biodegradable fuel

Methanol is a clear, colorless liquid that quickly dissolves in water and biodegrades rapidly. For over 100 years, methanol has been shipped globally, handled and used safely in a variety of applications.



### 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 to reduce CO2 emissions.

## Responsible Care® & Sustainability at Methanex

Methanex adheres to Responsible Care, a United Nations recognized sustainability initiative. 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. Learn more about the safe handling of methanol at [www.methanex.com](http://www.methanex.com)

**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.

## Successful uses of methanol as a fuel around the world

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

### Israel Electric Company converts power plant to methanol

In 2014, Israel Electric Company invested approximately US\$5 million to convert a 50MW Pratt & Whitney turbine at a power plant in Eilat, Israel to run on methanol. Israel's motivation for switching to methanol was to comply with new clean air requirements at the lowest possible cost. The technology has proven successful and reported significant emissions reductions.

### Emissions reduction using methanol in power generation



Source: Dor Chemicals. Emissions reduction compared to light fuel oil #2.

## Methanol to Power: Sustainable Development for the Caribbean Region

Methanol is a reliable, cost competitive and clean burning energy source that can support sustainable development of the Caribbean region.

### Reliable power for the Caribbean market

Trinidad and Tobago has the world's largest single methanol production site with multiple plants to reliably and expediently supply the Caribbean Islands. Methanol can be easily transported between the Caribbean islands using a range of vessel sizes and requires no specialized storage facilities. As the islands continue to develop and energy needs grow, infrastructure can be quickly expanded.

### Cost-competitive alternative fuel to meet growing energy demand

Historically methanol has been competitive with or lower cost than diesel. In addition, methanol can be shipped cost-effectively in smaller quantities making it economical for the small power markets in the Caribbean. Power plants converted to methanol would also have the flexibility to operate on diesel or methanol and mitigate fuel price volatility risk.



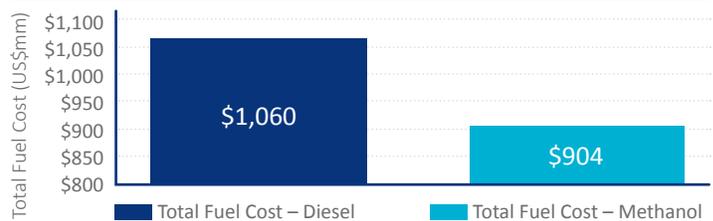
### Methanol compatible engines for ships

In 2015, Stena partnered with leading engine manufacturer, Wärtsilä, Methanex and other industry partners and converted one of the world's largest ferries, the Stena Germanica, to operate on methanol. In addition, Methanex's wholly owned subsidiary, Waterfront Shipping, welcomed seven new ships in 2016 with MAN ME-LGI dual-fuel engines that can run on methanol, heavy fuel oil, marine diesel oil or marine gas oil.

### Methanol as a Vehicle Fuel

Methanol's popularity as a clean-burning, cost-competitive transportation fuel continues to grow worldwide, particularly in China. China has more than 100 million passenger vehicles in its vehicle pool and is the largest user of methanol for automotive fuel. Other countries, including Australia and Israel, have conducted fuel blending trials and introduced standards to support the commercialization of methanol fuels.

### 10 Year Total Fuel Costs – Methanol vs. Diesel (2006 – 2015, per 100MW of power generation)



Over the past decade, a hypothetical 100MW power plant in the Caribbean, operating on methanol vs. diesel, would have saved ~US\$156 million in fuel costs. Sources: Methanex, public data from Anguilla, St Lucia, and Grenada electricity generation utilities

### Commercial-ready technology for the Caribbean market

In 2015, Wärtsilä engines on the Stena Germanica ferry were converted to operate on methanol. The Germanica ferry employs similar engine technology to Wärtsilä power plants operating in the Caribbean, where Wärtsilä is the leading engine supplier for the power generation market. Wärtsilä can build new engines for Caribbean power plants or convert existing engines to operate on methanol. In addition, methanol can be used as a complement to Wärtsilä's solar upgrade technology to help customers meet increasing renewable energy targets and reduce CO2 emissions.

