

# ICS 7th Annual Dry Bulk Commodities Conference

Vancouver, B.C.

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## Methanol

A Clean, Cost-Effective  
Marine Fuel Solution

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# Agenda

1. Methanex Corporation
2. About Methanol
3. Methanol Marine Fuel

Introductory Video:

<https://vimeo.com/636706299>

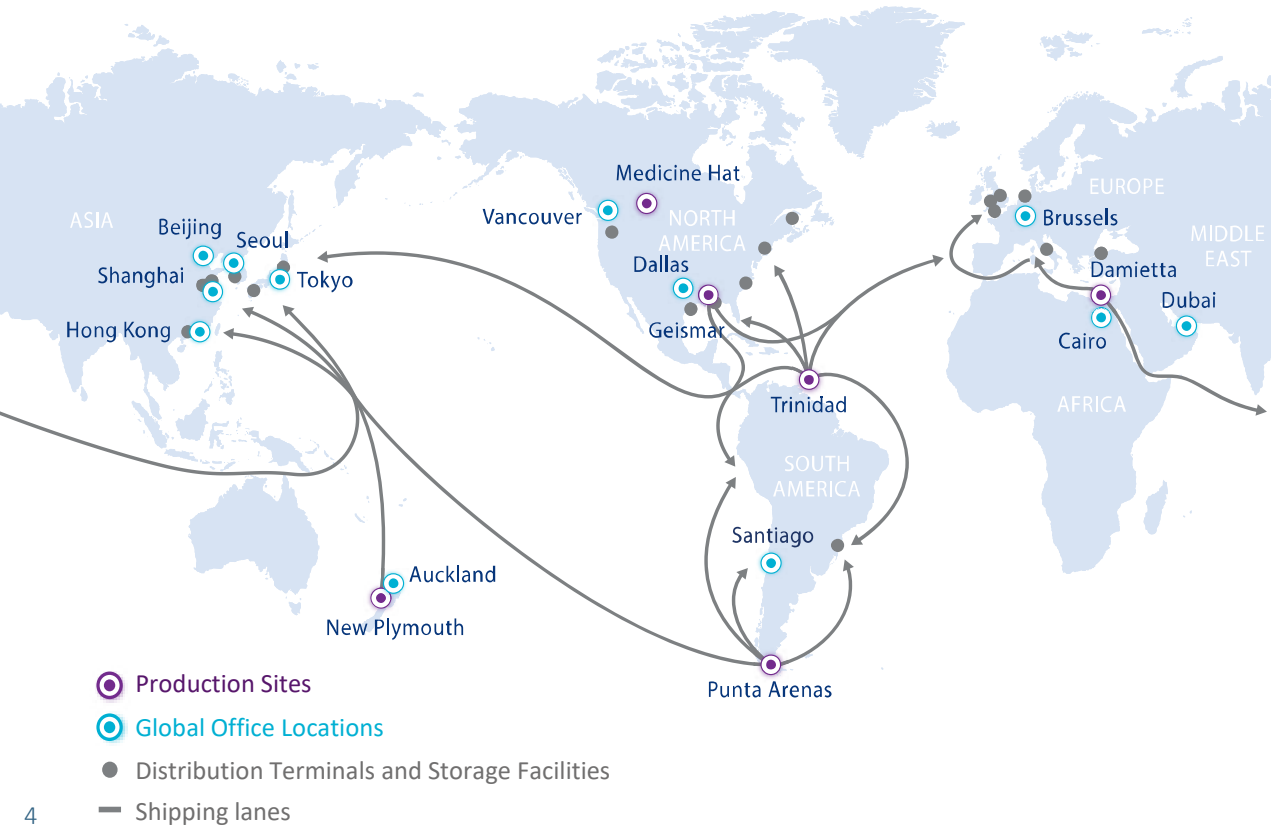


# Methanex Corporation



# Methanex

The world's largest producer and supplier of methanol to major international markets



Headquartered in Vancouver, Canada, Methanex operates production sites in Canada, Chile, Egypt, New Zealand, the United States and Trinidad and Tobago.

Our global operations are supported by:

- an extensive global supply chain of terminals and storage facilities
- Waterfront Shipping - the world's largest dedicated fleet of methanol ocean tankers.



# About Methanol

# Methanol

*An essential ingredient of modern life*

## Traditional Chemical Market

Essential ingredient used in countless industrial and consumer products

*Slightly over 50% of global demand*



## Clean and Economic Alternative Fuel

Represents a growing demand segment for methanol

*Just under 50% of global demand*

### Fuel applications



### Methanol-to-olefins (MTO)



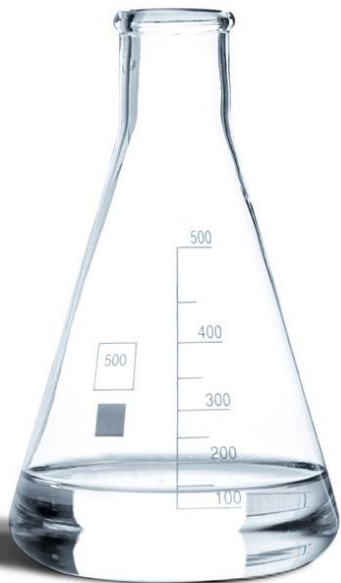
# Methanol Marine Fuel



CREOLE SUN  
PANAMA  
IMO 9650214

# Methanol as a marine fuel

*Methanol is an innovative alternative fuel solution with many benefits*



Methanol

## Environmental

- Low emissions (air quality, CO2 reduction pathways)
- Safe, Bio-degrades rapidly in water

## Available

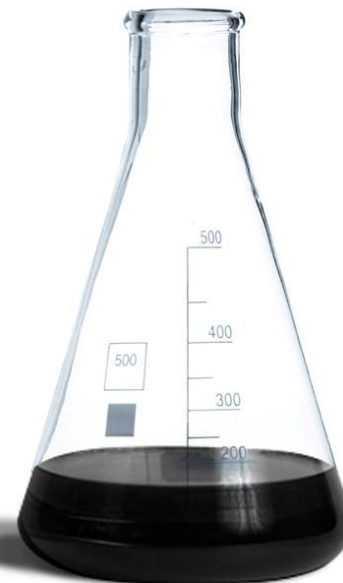
- Available globally
- Long history of safe handling
- Straightforward bunkering with existing infrastructure

## Affordable

- Low incremental investment
- Competitive fuel costs
- Liquid fuel flexibility

## Proven

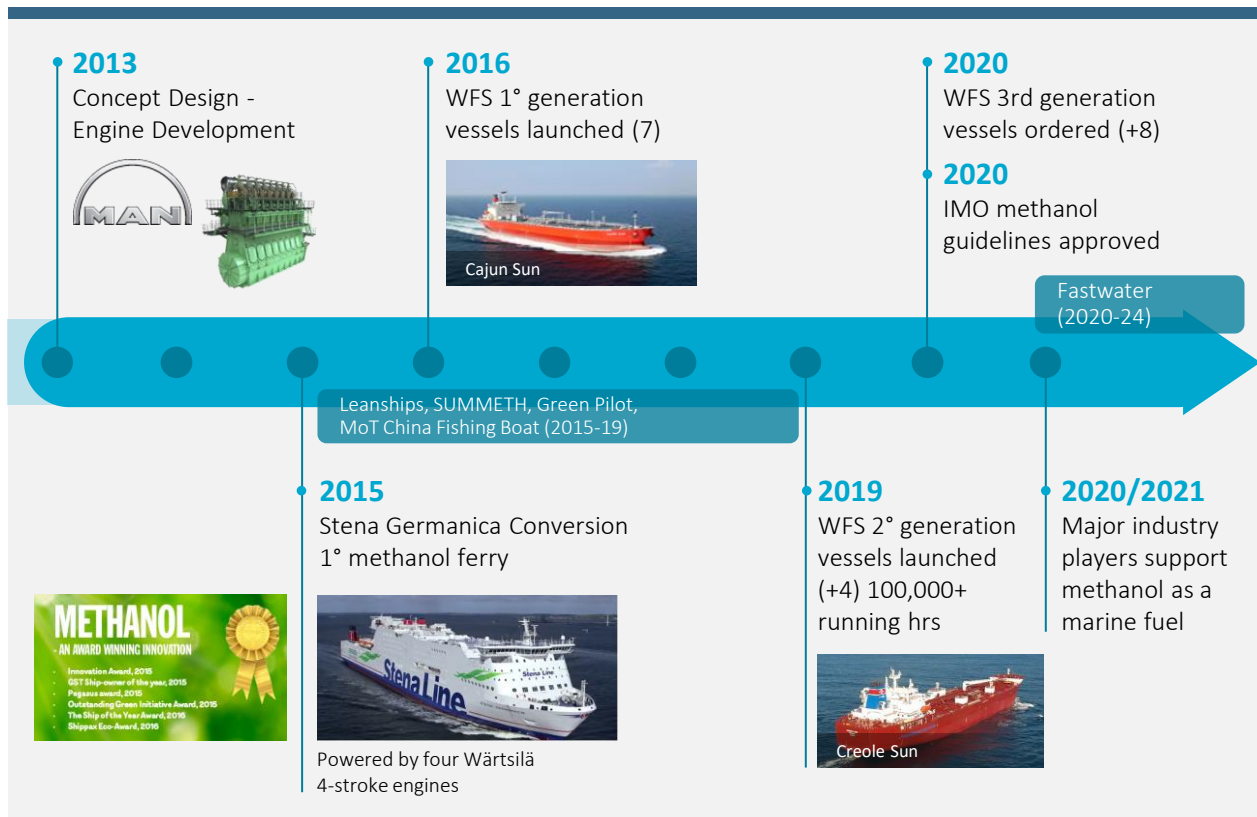
- Successfully in use today
- Mature, straightforward technology
- Commercialization activity expanding



Diesel bunker fuel




# Leading the innovation in the marine industry



## Number of methanol vessels to date:

 19

 1

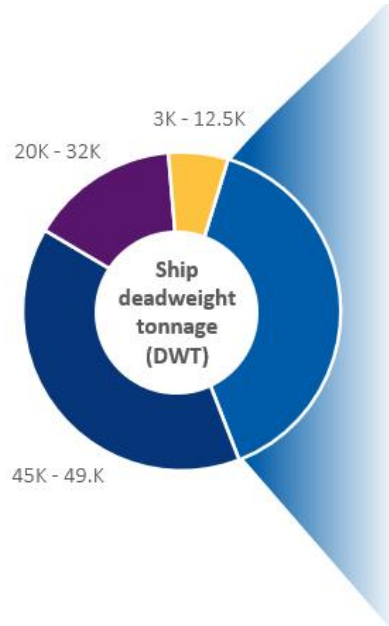
**Stena Proman** 6

 **MAERSK** 9

**Total** 35

# Proven, Mature Technology - Waterfront Shipping

- Currently operating 12 methanol dual-fuel vessels, representing ~40% of the fleet; 7 more vessels on order for delivery in 2021-2023
- Over 100,000 hours & ~5 years of operations; 2-3% improved fuel efficiency
- 3<sup>rd</sup> generation mature technology

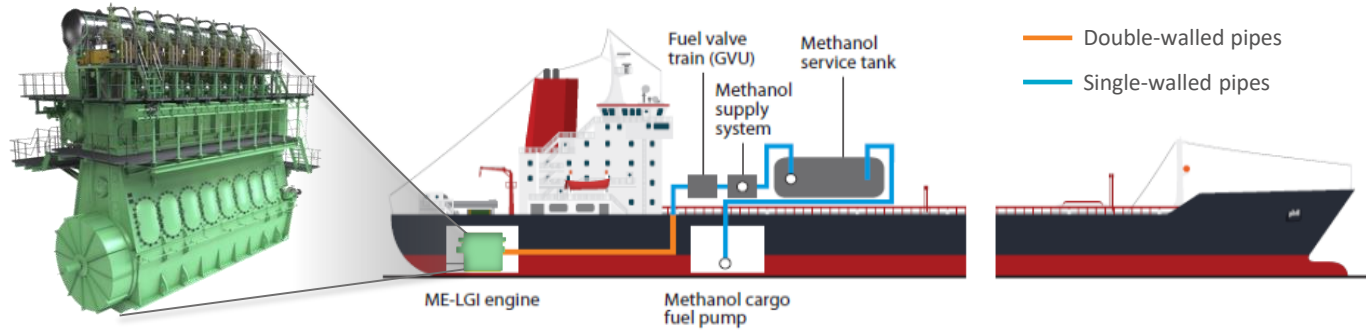


49,999 DWT **methanol dual-fuel engine**



# Straightforward Technology

*Methanol has minor modification requirements and modest incremental cost*

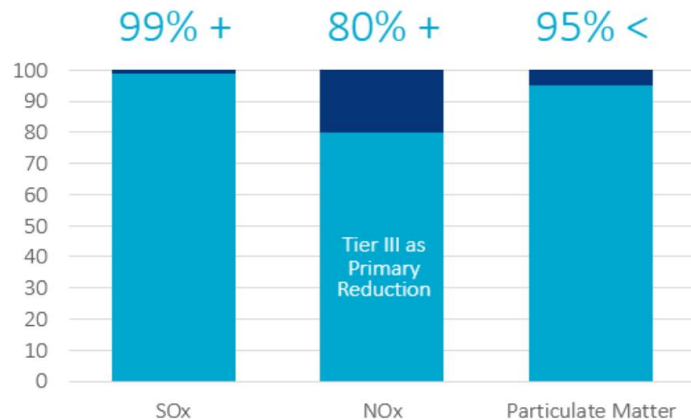


ME-B Engine + LGI-M Technology = ME-B LGI-M



# Emissions Reductions

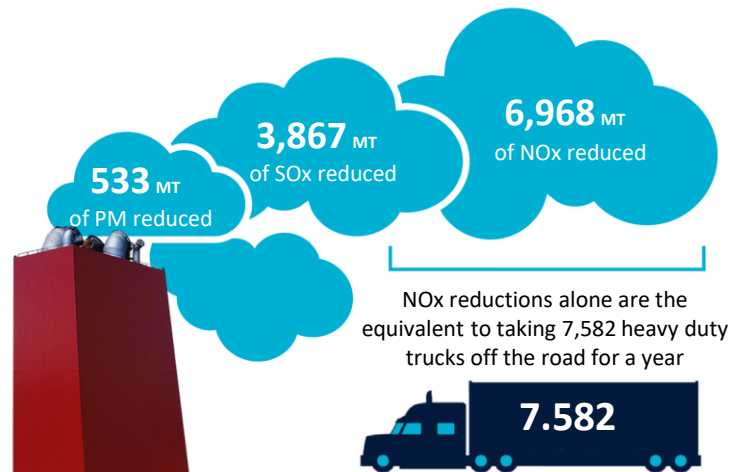
Our methanol-fueled vessels exceed the most stringent emission regulations



Source: IMO, MAN Energy Solutions, Stena Lines  
Emission reductions when compared to heavy fuel oil



Waterfront Shipping's emissions reduced by using methanol as a marine fuel \*

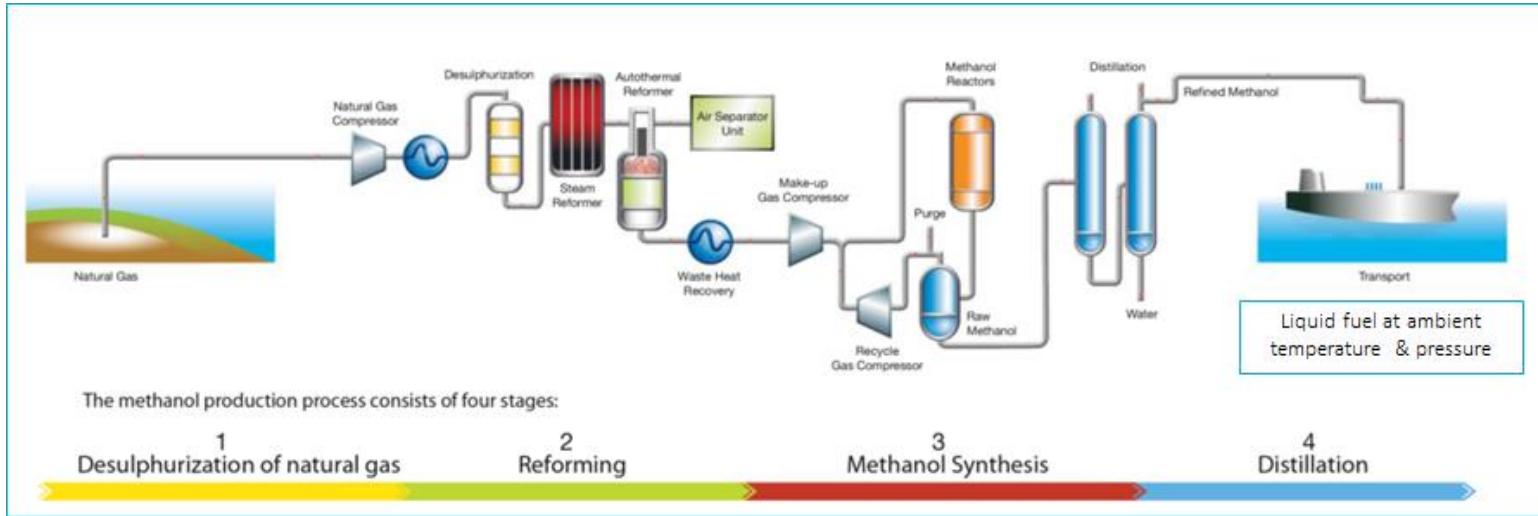


\* Based on data from April 2016 to end of Dec 2020 based on the performance of 11 dual-fuel vessels in Waterfront's fleet

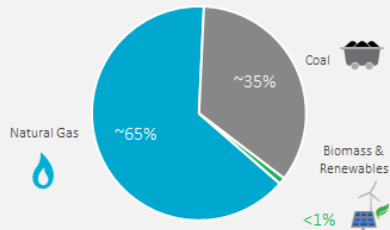


# Methanol Production

Methanol ( $\text{CH}_3\text{OH}$ ) is typically made from natural gas



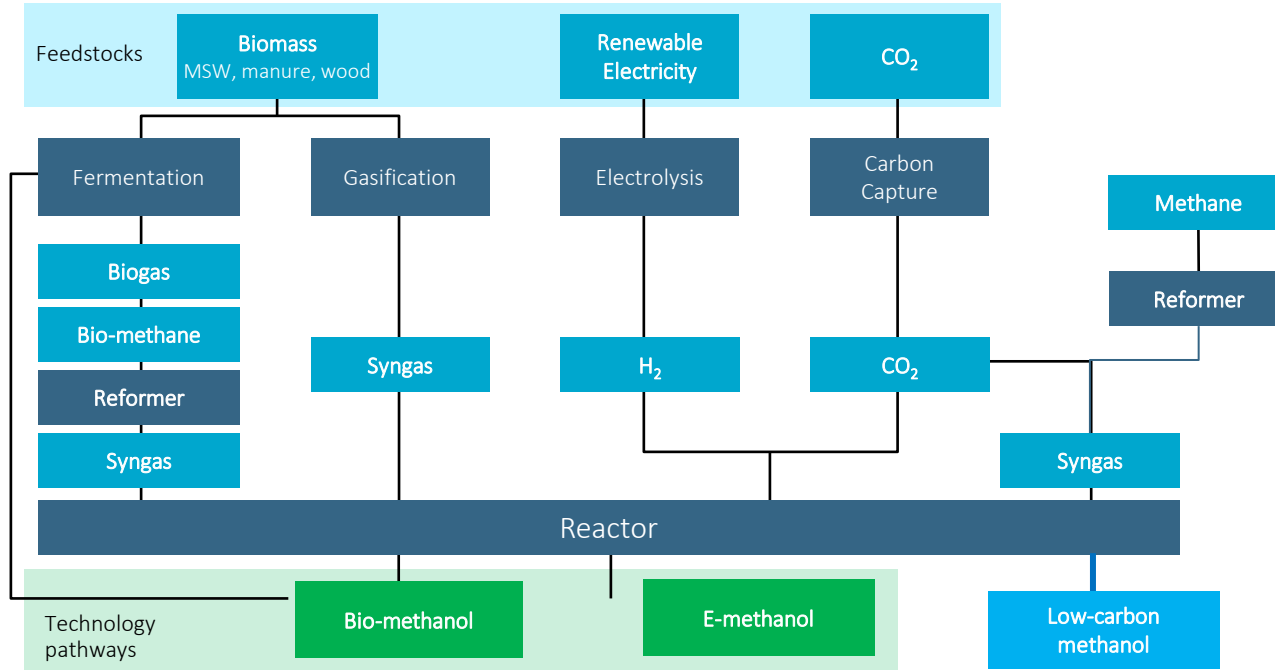
## Current methanol market feedstocks



Source: International Renewable Energy Agency, Innovation Outlook: Renewable Methanol

# CO<sub>2</sub> Reduction Pathway to Meet IMO 2050 Goals

*Green/alternate methanol production pathways to produce methanol can offer significant CO<sub>2</sub> savings*



Source: Methanol Institute

# Methanex investments in alternative methanol production

We continue to invest in renewable and low carbon methanol



Methanex Medicine Hat plant

## Low-carbon methanol

Using recycled/recovered natural-gas to result in lower-carbon methanol

## E-methanol

Produced using green hydrogen obtained from water electrolysis



**CARBON  
RECYCLING  
INTERNATIONAL**



Methanex Geismar plant



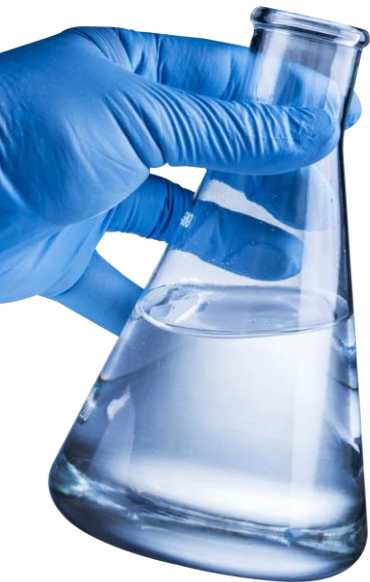
## Biomethanol

Based on renewable natural gas from municipal solid waste & other sources



# Methanol - Environment, Health and Safety

*Methanol is a clear, colourless liquid that quickly and naturally biodegrades*

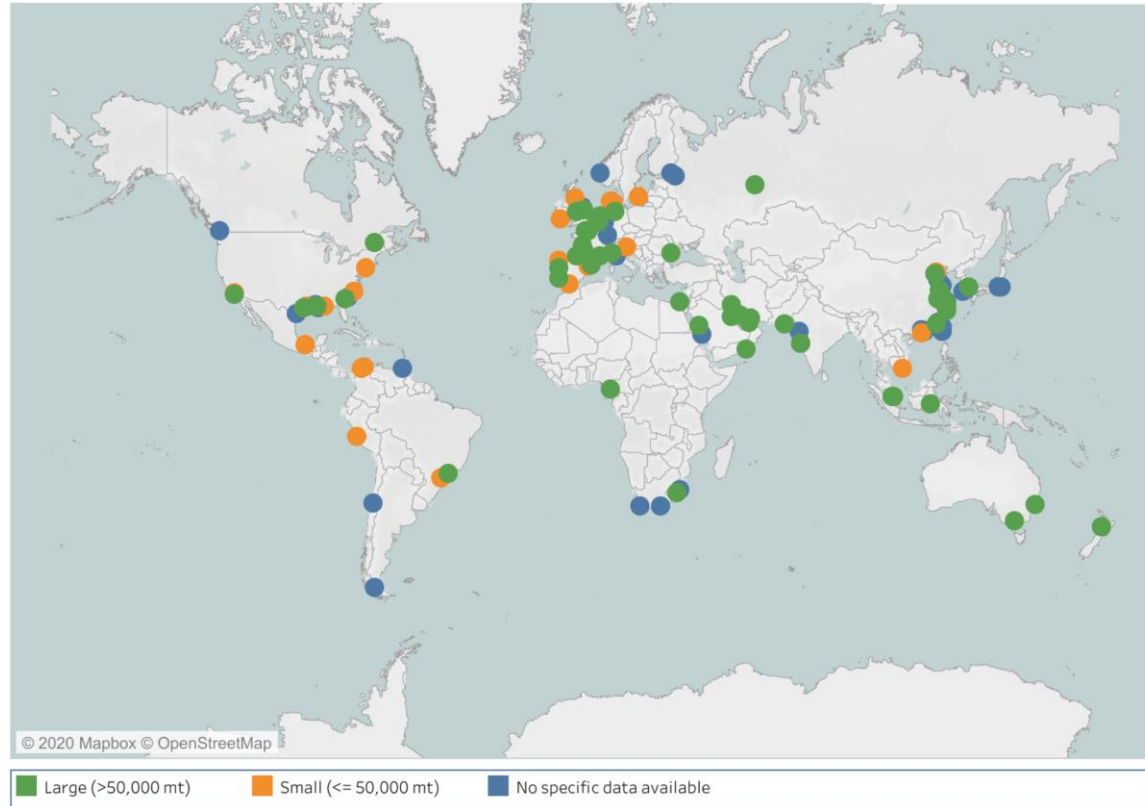


- More environmentally benign than conventional marine fuels
- Long history of methanol safe handling
- Nov. 2020 – IMO approved guidelines for methanol as marine fuel (IGF Code)



# Available at over 88 of the world's top 100 ports

- Methanol is one of the world's top traded commodities and is available at the top ports through existing infrastructure



# Simple to Bunker

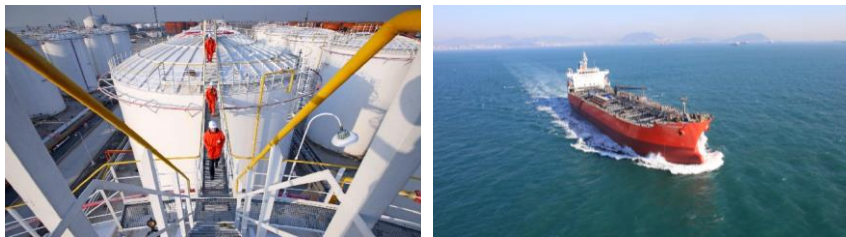
- ✓ It has similar bunkering guidelines and safety standards as conventional marine fuels
- ✓ First barge to ship methanol bunkering was safely done using a standard barge and the existing infrastructure
- ✓ Can easily & safely be replicated at any port



World's first barge-to- ship methanol bunkering operation In partnership with the Port of Rotterdam, Vopak, TankMatch and NYK Shipping

# Low-Cost Infrastructure and Capital Costs

## Utilize existing supply chain/infrastructure



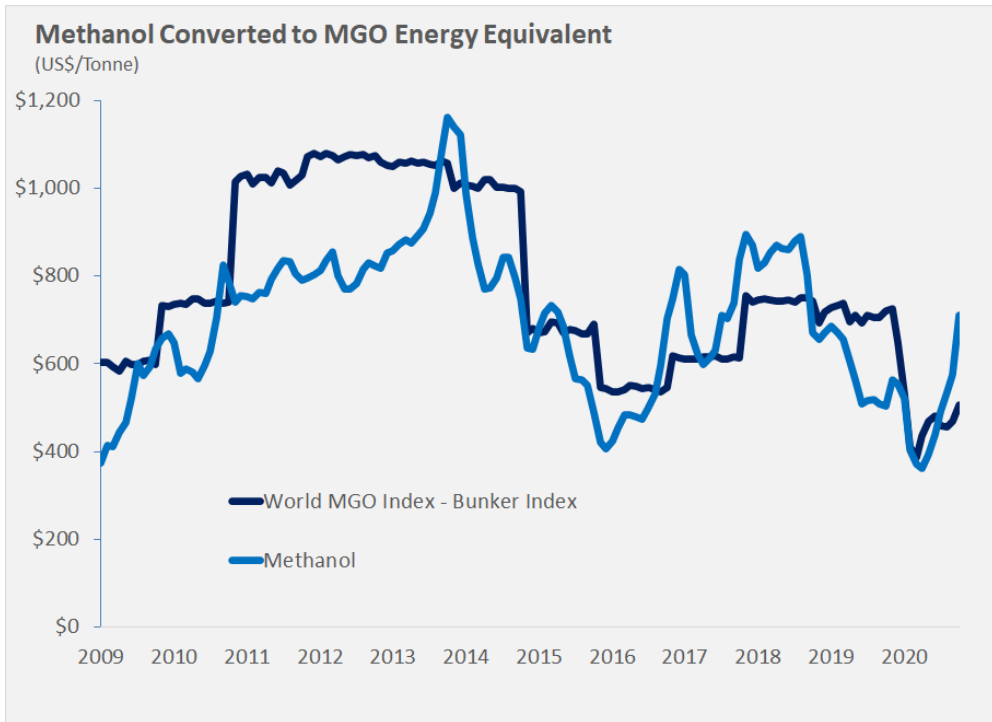
- Liquid fuel at ambient temperature & pressure
- Cost competitive fuel
- Compatible with diesel infrastructure

## Modest incremental cost to build/convert



- Engine technology straightforward/minor modifications required
- Small amount of diesel used as pilot fuel
- Flex fuel (diesel or methanol) maintained mitigating commodity price & technology risks

# Attractive Economics



- Historically ~10% lower cost than MGO on an energy equivalent basis
- Flex-fuel capability
- Tier 3 NOx without aftertreatment (water blending) – cost savings
- Liquid fuel – modest incremental cost for vessels & infrastructure
- Higher energy density versus other alternative fuels (ie; ammonia and hydrogen)

**2-3 year payback on methanol vessels\* – new or retrofit**

Source: Bunker Index and IHS Chemical

<sup>1</sup> Methanol: Average of North America / Europe / Asia spot pricing. Price adjusted to energy equivalent of MGO (2.16 factor)

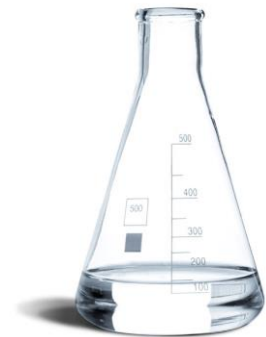
<sup>2</sup> World MGO price based on Bunker Index all port benchmark

\* Source: EMSA – European Maritime Safety Agency

## Summary

*Methanol is a uniquely-positioned future proofed alternative marine fuel*

- ✓ Ultra-clean burning (Low SO<sub>x</sub>, NO<sub>x</sub>, Particulate Matter)
- ✓ Low carbon pathways to meet decarbonization goals
- ✓ Biodegradable
- ✓ Long history of safe handling
- ✓ Globally available
- ✓ Economical – fuel, vessel & infrastructure costs
- ✓ Commercially advanced: in use today, mature technology, IMO Guidelines developed



Methanol



# Thank you

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