



# Low Sulphur Marine Fuel

Michael Lees  
Chief Commercial Officer  
Ultraclean Marine



# Market needs:

- ❖ *To limit SOx emissions from ships, to improve air quality and protect the environment*
- ❖ *A low cost, sustainable solution that can be rolled out at scale to achieve IMO 2020*

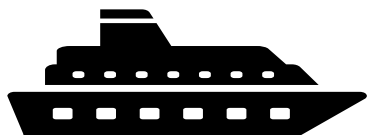
## Problem

### 2020 0.5% SULPHUR LIMIT



One ship emits as much sulphur as 50 million cars

### \$60BN COMPLIANCE MARKET



#### Clean fuels

- +\$250/ton
- \$1-3m per ship
- 40,000 Ships

## Solutions

- OXIDATIVE DESULPHURISATION AT TANK STORAGE
- HYDROCRACKING/HYDRO DESULPHURISATION
- LNG
- MARINE DIESEL
- SCRUBBERS
- OTHER

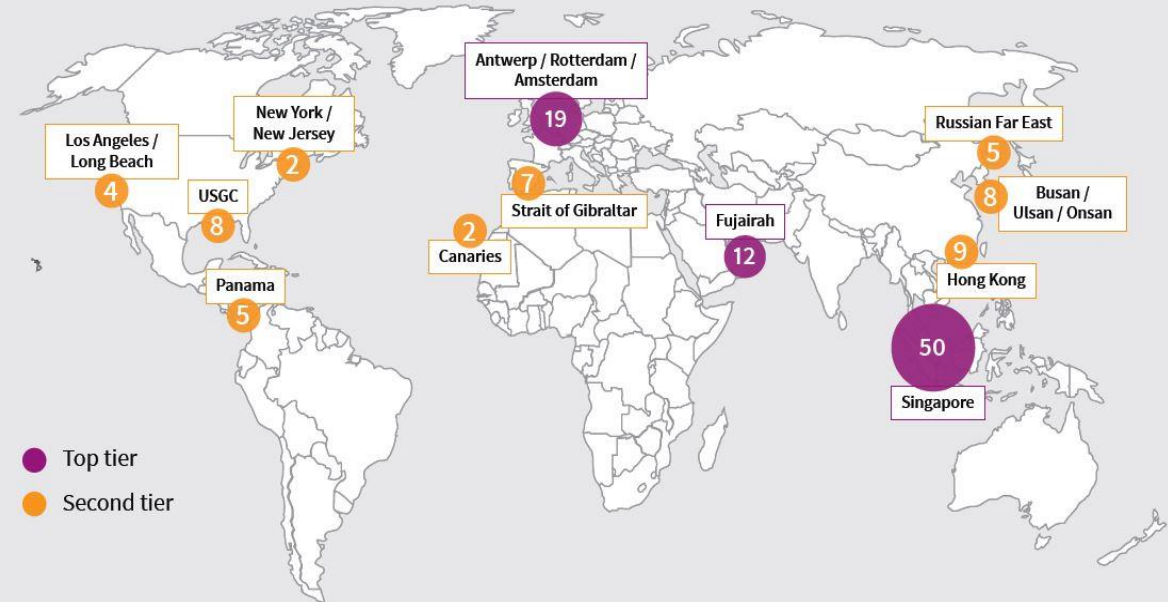
# Marine Clean Fuels Market

Estimate cost of compliance around US\$60 billion a year for the global shipping industry.

## \$60 billion Marine Clean Fuels Market

- +\$250/ton versus current marine fuel
- \$1-3m additional cost per year per ship
- 40,000 ships require compliance solution

Bunker fuel 5% of total oil demand of 94m bbl/day.  
40% of market in Asia.



© 2018 IHS Markit. All rights reserved. Provided "as is", without any warranty. This map is not to be reproduced or disseminated and is not to be used nor cited as evidence in connection with any territorial claim. IHS is impartial and not an authority on international boundaries which might be subject to unresolved claims by multiple jurisdictions.

Source: IHS Markit

# IMO 2020 Industry Solutions and Developments

*An industry solution can only be achieved through the collaborative effort of the different players in the value chain.*

	At Refueling Hub	Refinery	Ship Owners	Ship Owners
<i>Possible Solutions</i>	<i>Ultraclean Process</i>	<i>Hydroprocessing</i>	<i>Scrubbers</i>	<i>LNG</i>
Environmental benefits	• High ✓	• Low ✗	• ?? ??	• High ✓
Capital Cost	• Medium ✓	• High ✗	• Relatively high ✗	• High ✗
Maintenance cost	• Low ✓	• High ✗	• High ✗	• Low ✓
Time to fully Implement	• Less than 18 months ✓	• 3 years	• Per vessel installation ✗	• Primarily newbuilds ✗
Operations impact	• Minimise operational difficulty and cost ✓	• Minimise operational difficulty and cost ✓	• Safe sludge handling and disposal necessary ✗	• Similar operating model to existing process ✓
Progress	• New Innovative solution that desulphurises the marine fuel feed stream ✓	• Blending of low sulphur fuels with high sulphur fuel oil ✓	• Some shipowners have started installing scrubbers ✓	• New infrastructure to be developed ✗

# Disclaimer

This presentation has been provided for general information purposes only. This presentation is not an offer to sell the services of Ultraclean Fuel (Marine) Limited (**Ultraclean**).

The material provided in this presentation is based on current information available and as provided by third parties. Ultraclean is not in a position to be able to advise recipients to their own applications for the Ultrex® Process as each application is different and requires independent advice and due diligence to evaluate such application. Ultraclean or any of its affiliates, staff or consultants take no responsibility for the information relied upon by the recipient or taken from this presentation. The technical specifications contained in this presentation should be independently verified by the recipient and its advisors.

Any legal, tax, accounting or regulatory information contained in this presentation is a summary of some of the relevant issues and is intended for information purposes only. Any such information is not intended as advice and should not be regarded as a substitute for advice. Ultraclean is not acting as a legal, tax, accounting, regulatory or other advisor to the recipient. The recipient must rely on its own analysis and seek its own advice on all aspects of this presentation.

Ultraclean will not be liable for any consequences of the presentation to the recipient including, without limitation, economic, legal, tax, accounting or regulatory consequences, nor for any costs, losses, damages or expenses that may be incurred or suffered by recipient as a result of being a recipient to the presentation.