



Clarksons
Research

Ballast Water Management Update





The Ballast Water Management Convention

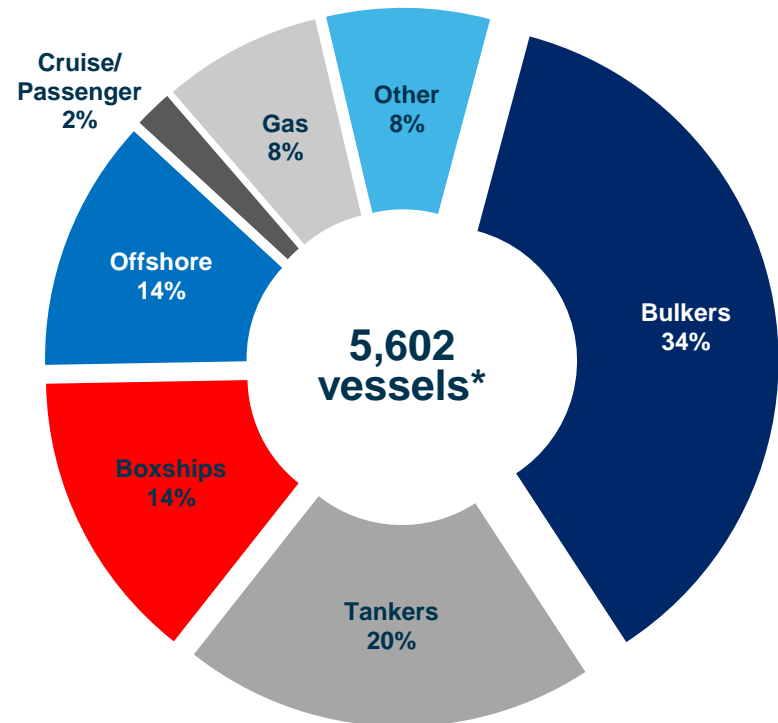
- Implementation schedule of BWMS convention amended, extra 2 years for some owners.
- Recent ABS report suggests only 57% of installed systems on vessels being operated due to being 'problematic' or 'inoperable'
- Some equipment suppliers in financial troubles, due to delays in implementation and an increasingly competitive marketplace. Ocean Saver (one of the first to get US Coast Guard type-approval) recently declared bankruptcy.

Ballast Water Management Systems*, No. Ships

Fleet	5,012
% Total Fleet	5.3%
Orderbook	590
% Total Orderbook	16%

* Based on reported systems.

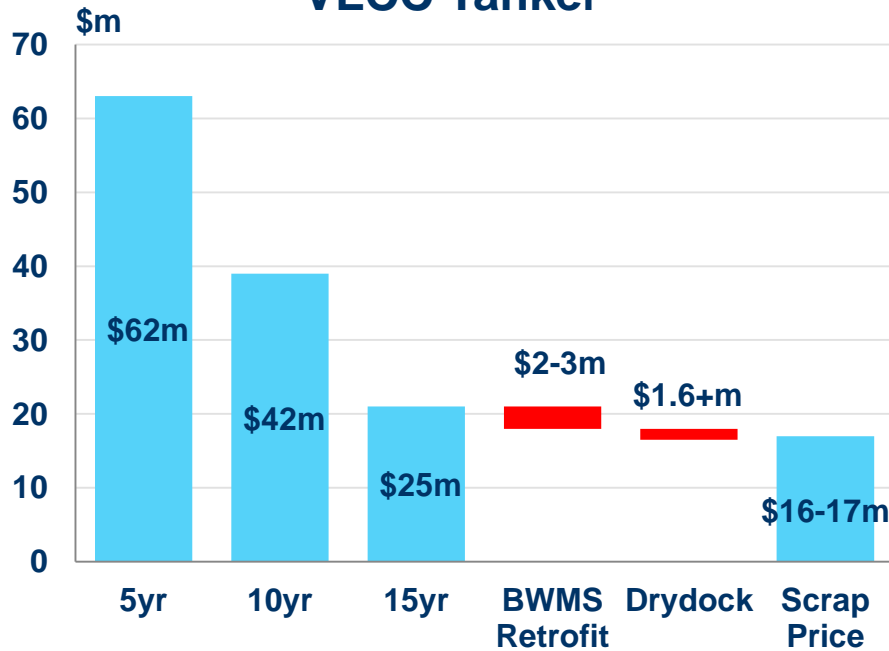
BWMS Equipped Vessels (Fleet & Orderbook)



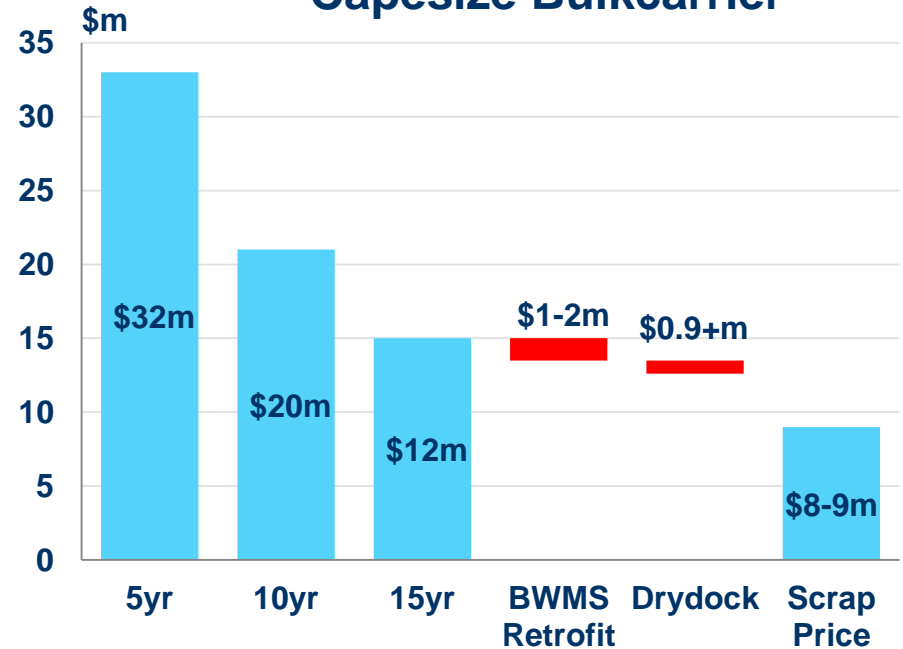


The Economics Of BWMS Retrofit

VLCC Tanker



Capesize Bulkcarrier

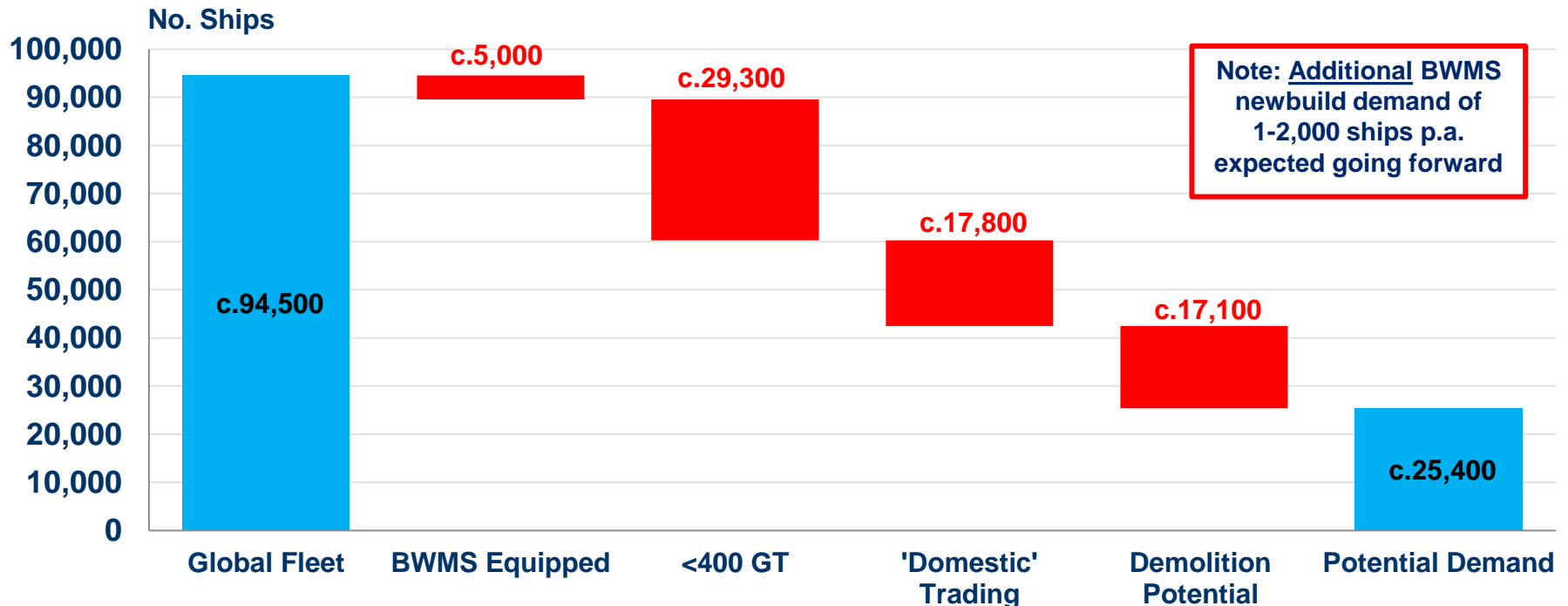




Scenario: How Many Vessels Need to be Outfitted?

Scenario Assumptions:

- Exclude ships below 400 GT and those reported to have a ballast water management system (BWMS) installed
- Exclude ships engaged in domestic trading - proxy for vessels operating in same 'risk area'
- Exclude ships of an age (c.15+ years) where the economics may not support retrofit, these are **scrap candidates**
- This results in a potential retrofit demand for ballast water management systems of around **25,400 ships**
- *Compared to Spring 2017 scenario, we are removing more 'small', domestic trading ships and have lowered a number of demolition age assumptions, increasing scrap potential. This has reduced total potential BWMS retrofit demand.*





Disclaimer

The material and the information (including, without limitation, any future rates and/or forward looking predictions) contained herein (together, the "Information") are provided by Clarkson Research Services Limited ("Clarksons Research") for general guidance and not by way of recommendation. The Information is provided on "as is" and "as available" basis. Clarkson Research and all its Group companies make no representations or warranties of any kind, express or implied about the completeness, accuracy, reliability, suitability or availability with respect to the Information. Any reliance placed on such Information is therefore strictly at the recipient's own risk and no responsibility is accepted for any loss or damage howsoever arising. Please note that future rates and/or forward looking predictions are for illustration purposes only and given without guarantee; the ultimate outcome may be different.

This Information is not for reproduction or distribution without Clarkson Research's prior written consent. Especially, the Information is not to be used in any document for the purposes of raising finance whether by way of debt or equity. All intellectual property rights are fully reserved by Clarkson Research, its Group companies and/or its licensors.

This disclaimer shall be governed by and construed in accordance with English law.

CLARKSON RESEARCH SERVICES LTD, COMMODITY QUAY, ST KATHARINE DOCKS, LONDON, UNITED KINGDOM, E1W 1BF