

Global changes driving international shipping

2nd November 2016
Korean Register



What is unchanged and what has changed ?

What remains unchanged

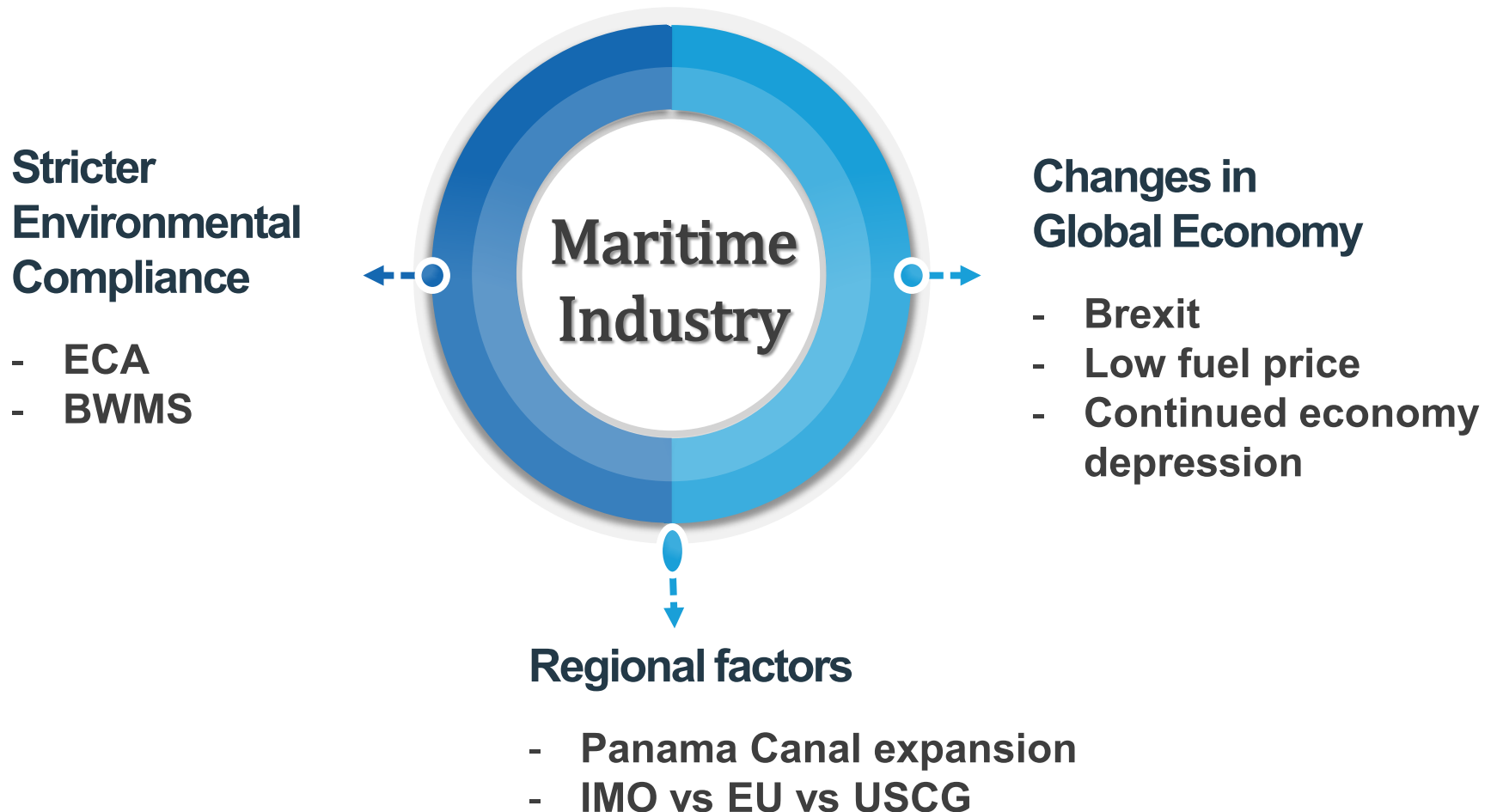
3 unchanged values



Image Source : Shutterstock

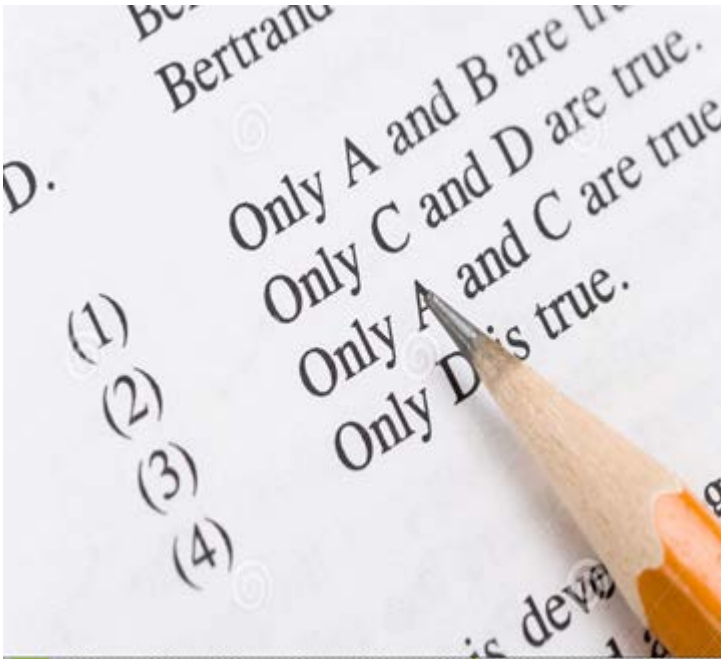


Balancing 3 values has been the first priority of ship owners



Managing these changes has become central to financial and operating priorities of ship owners

Not long ago



Now & Future



Solutions to current complex business environment are not as simple as in the past



*Owners are now
at a crossroad*

Critical changes facing the shipping industry

Critical changes the shipping industry should address

➤ Dramatic business environment changes



Emission Control

**Ballast Water
Management
Convention**



**Panama Canal
Expansion**





0.5% Global sulphur cap to take effect from 2020

TradeWinds

- Friday, 28 Oct 2016 -

LATEST JOBS Marine Publications Manager (Glasgow City (I



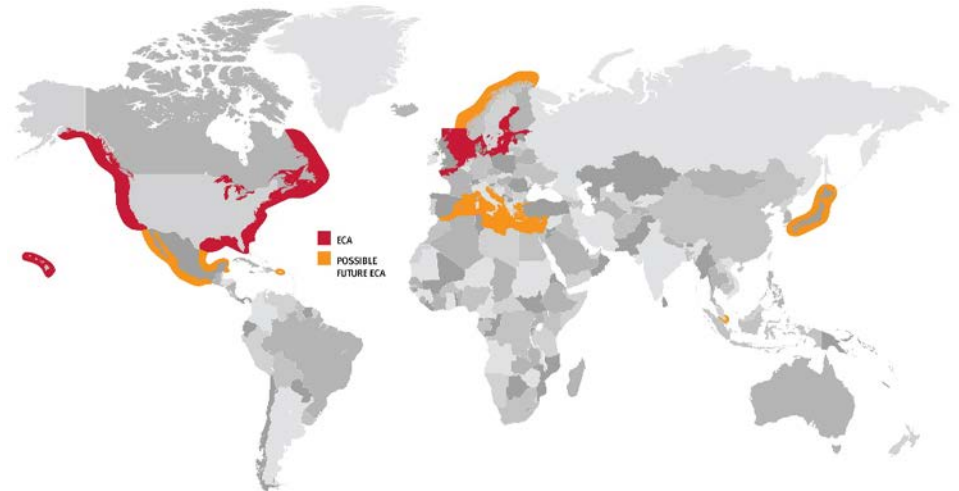
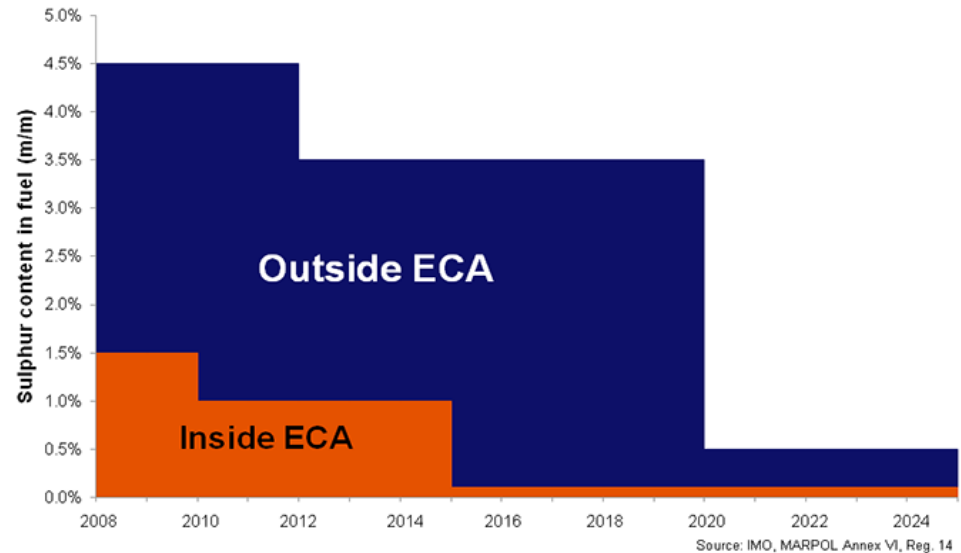
IMO: It's 2020

Shipping to burn only clean fuel within next four years.

October 27th, 2016 14:17 GMT by Adam Corbett in London

Published in **AND ALSO**

The International Maritime Organisation (IMO) has come to a broad agreement to implement a global 0.5% limit on the sulphur content of fuel from 2020.





EGR



SCR



LSFO



Scrubber



LNG



Battery

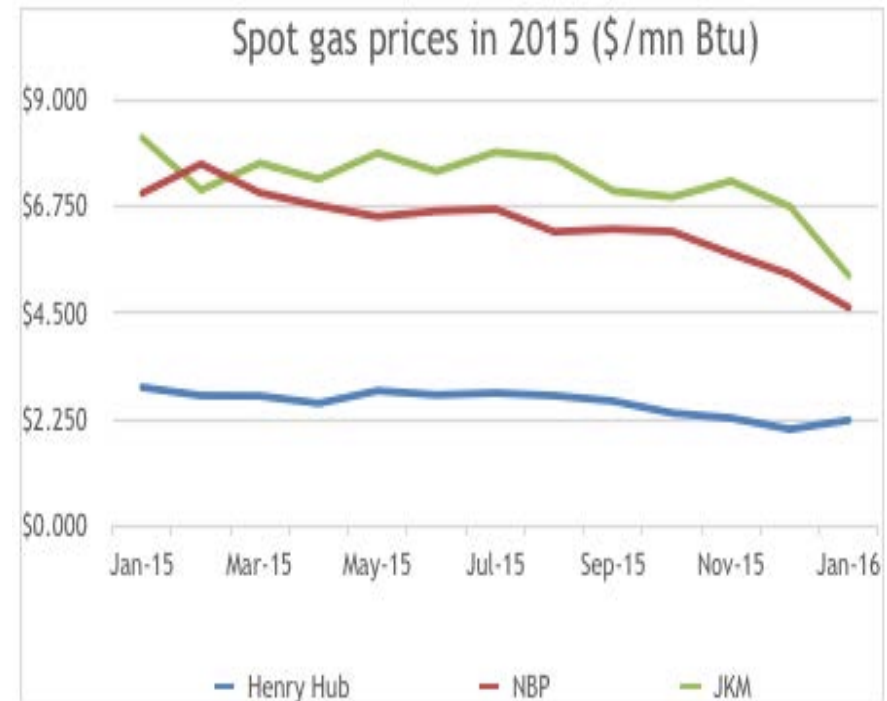
Multiple solutions to a single issue

Too many variables to consider for available solutions

SCR vs EGR

- 1) Capital cost
- 2) Installation cost
- 3) Maintenance cost
- 4) Operating cost
- 5) Fuel efficiency
- 6) Engine performance
- 7) Main voyage areas

LNG price gap between Europe and USA



Henry Hub : US natural gas benchmark price
NBP : UK natural gas benchmark price
JKM : Japan/Korea natural gas benchmark price

Example of cost analysis



115K Tanker

115K Tanker	EGR	SCR	LNG Fueled
Additional CAPEX	3.72m USD	2.61m USD	15.11m USD
Additional OPEX 25 YEARS	33.05m USD	30.95m USD	-8.38m USD
Additional Cargo Loss 25 YEARS	2.11m USD	3.66m	7.67m USD
Total Additional Cost	38.88m USD	37.22m USD	14.4m USD

Calculated based on gas and oil spot price as of Sept 2016

*Maintenance cost not included
ECA operating time : 2,000 hours/year
Total operating time: 7,000 hours/year*

➤ Ballast Water Management Convention

- Will enter into force on 8 Sept 2017
- 60,000 ships need to be retrofitted
- Various ballast water treatment systems





More than 60 IMO approved systems in the market

> Treatment technology type and symbol

Mechanical

1. Cyclonic separation (hydrocyclone)
2. Filtration



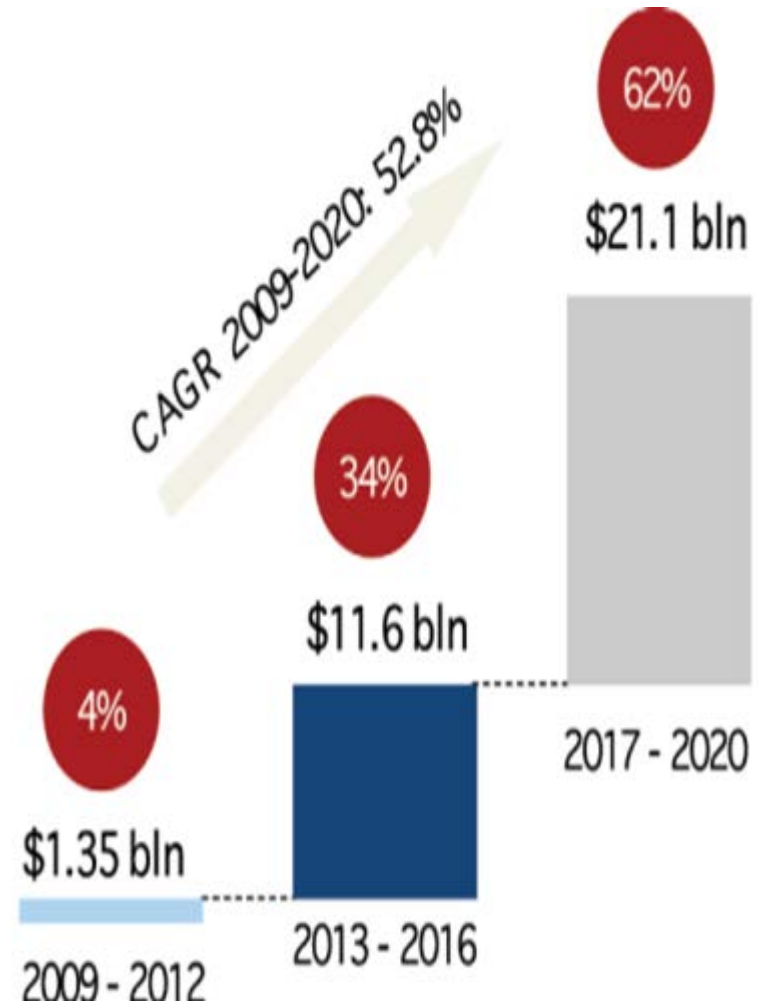
Chemical treatment and biocides

1. Chlorination
2. Chlorine dioxide
3. Advanced oxidation
4. Residual control (sulphite/bisulphate)
5. Peraclean Ocean



Physical disinfection

1. Coagulation/flocculation
2. Ultrasound
3. Ultraviolet
4. Heat
5. Cavitation
6. Deoxygenation
7. Electro-chlorination/electrolysis
8. Electro-catalysis
9. Ozonation



Regional changes

– Panama Canal Expansion



Rise of Neo-Panamax

▶ 62% of the total container ship capacity by 2030



Current Panamax 4,500 TEU

New Panamax 13,000 TEU

Largest Container Vessels 19,000 TEU



Selecting right solution is a key to success

**Various
solutions**

**Technological
complexity**

Pros & Cons

**Vessel
operation
efficiency**

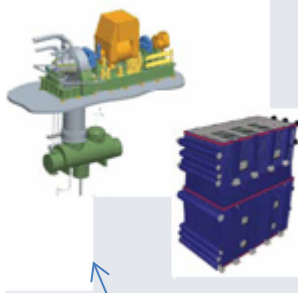
Importance of technical advisory service

What Korean Register can do for shipowners?

Technical Services for Green Technologies



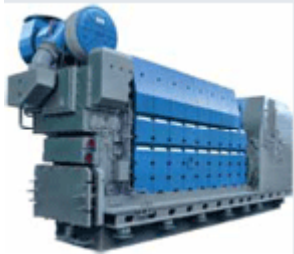
Exhaust gas scrubber system
(98% SO_x, 80% PM)



Waste Heat Recovery system
(WHR) (7~14% FC)



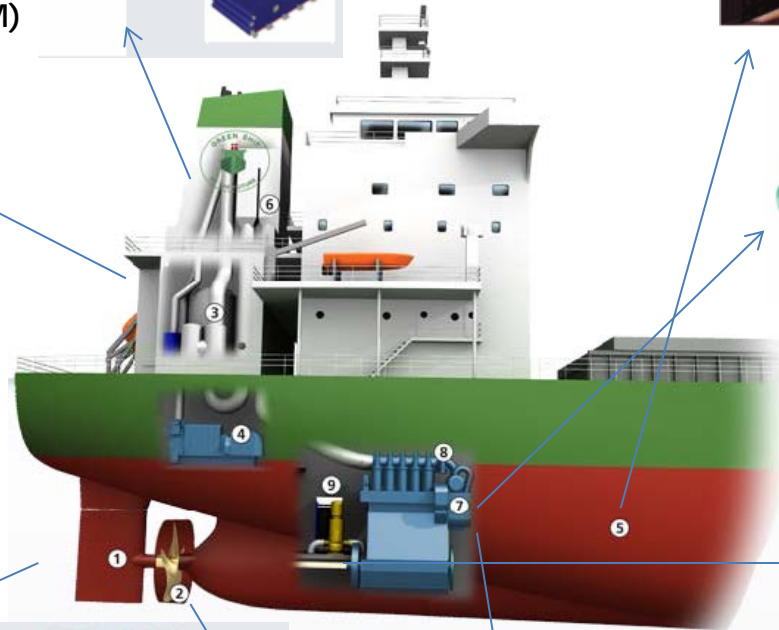
Hull paint
(3~8% FC)



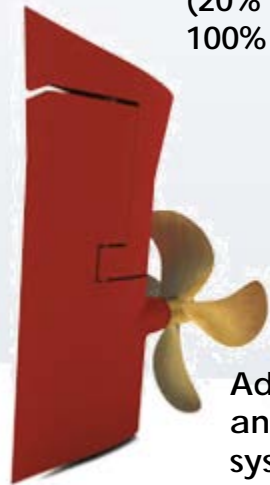
LNG auxiliary engines
(20% CO₂, 35% NO_x,
100% SO_x)



Water in Fuel
system (WIF)
(30~50% NO_x)



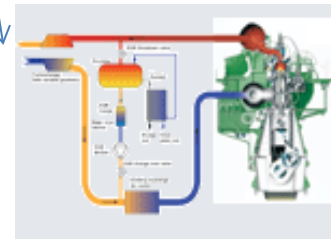
Pump and
cooling water
optimization
(1.5% FC)



Advanced rudder
and propeller
system (4% FC)



Speed nozzle
(5% FC)



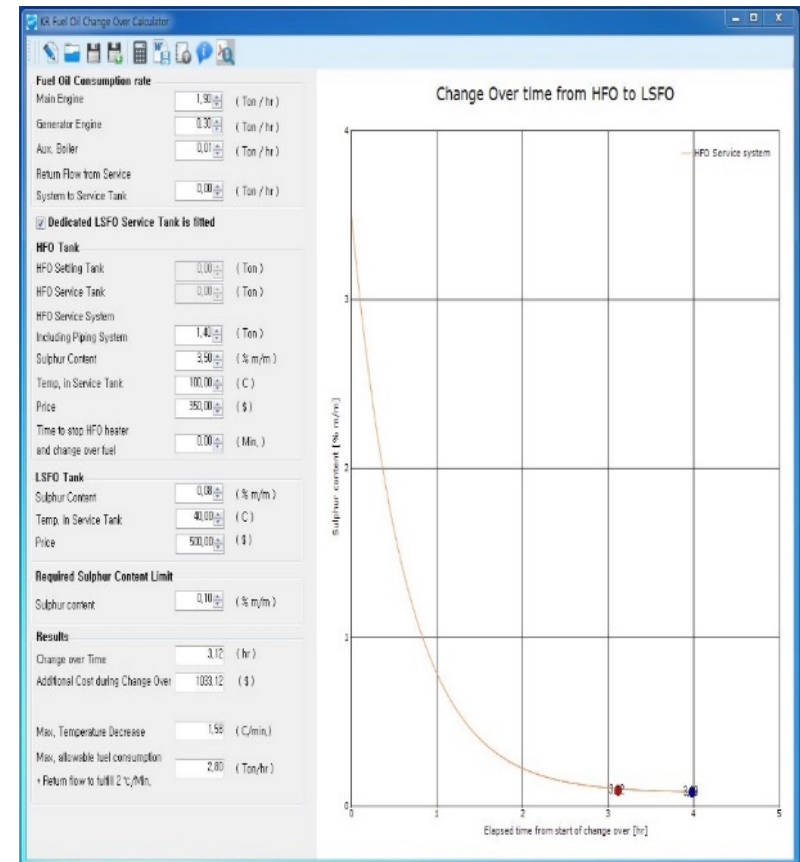
Exhaust Gas
Recirculation system
(EGR) 80% NO_x

Fuel Oil Change Over Program (KR FOCO)

➤ Software for fuel oil changeover to comply with ECA requirements

➤ **Benefits of KR FOCO**

- accurate timing for fuel change to allow cost saving



LNG as an alternative marine fuel

➤ Technical advisory service for LNG fueled ship

- The 1st LNG fuel-propelled ship in Asia
- The 1st LNG fueled bulk carrier
- The 1st small-scale floating regasification unit

➤ LNG ready service

- Feasibility study
- Review of Concept Design
- Risk Assessment



Green ship equipment testing & certification center

④ Testing and evaluation of green ship equipment

- Evaluation of abatement system for emission reduction
- Performance test of SCR (Selective Catalytic Reactor)
- Test and evaluation of marine diesel engines
- Marine fuel quality evaluation



BWMS Testing Facility

➤ BWMS test basin

- Land-based testing for USCG type approval
- Type approval testing for other Administrations

➤ USCG Independent Laboratory for BWMS

- First in Asia and second outside US



➤ Assistance with the selection of the most optimized system



Home / Shipping News / International Shipping News / Korean Register leads testing technology for BWMS

Korean Register leads testing technology for BWMS

in International Shipping News 03/08/2016



The Korean Register (KR) – an IACS member classification society – has announced that it has significantly expanded its land-based test facilities for Ballast Water Management System (BWMS) by opening a brand new specialist facility.

KR has been conducting type approval testing of BWMS since 2004, with a consortium of six different partners. KR and its partners segregate the duties, taking into



insight for marine technology professionals



Home » News » Equipment » USCG certifies Korean Register for BWM testing



USCG certifies Korean Register for BWM testing

27 Mar 2015

The Korean Register (KR) has become the first Asian class society to gain authorisation as an “independent laboratory” for testing ballast water management systems (BWMS).

KR will be able to type approve BWMS in accordance with the US Code of Federal Regulation. Vessels operating in US territorial waters must be fitted with systems that are USCG type approved (or have temporary Alternate Management Systems approval) in accordance with their implementation schedule, separately from the requirements of the forthcoming IMO convention governing BWMS.

**Many
solutions**

**Technical
advice against
changes**

**Improved
Operational
efficiency**

Thank You