

# New regulations to fuel an upswing

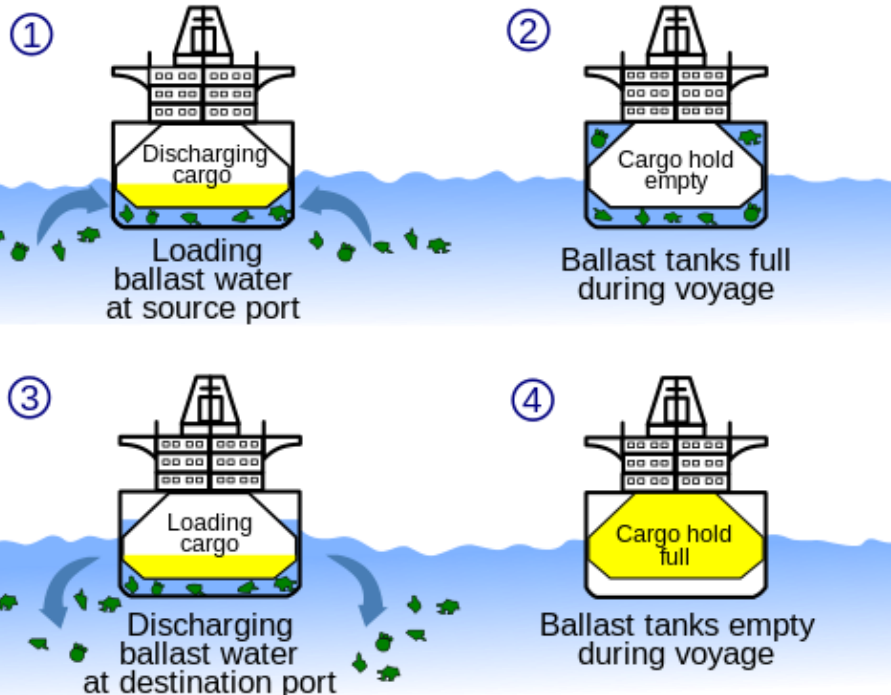
Shipping sector report, 21 Dec 2016

# Agenda

- **Ballast water management convention**
  - What is the problem?
  - What does it cost?
  - Will it drive scrapping?
  - Will implementation be postponed again?
  
- **Lowering the allowed sulphur content in marine fuel from 3.5% to 0.5%**
  - What is the problem?
  - What are the alternatives?
  - What does the market «say»?
  - How, exactly, will this be a positive factor for shipping?
  
- **Very limited ordering now could yield a strong upswing in most segments from 2018/19**
  
- **A short overview of our view on the main segments under coverage**

## Ballast water – the problem

Ballast water is used to stabilize the ship when sailing without cargo...



...but then it carries invasive species



# Ratification of BWM Convention took 12 years; convention adopted 13 February 2004...

## IMO ballast water convention on brink of ratification

Manufacturers jubilant but shipowners concerned as ballast water management convention nears entry into force amid controversy over fleet numbers game

December 3rd, 2015 13:00 GMT by Adam Corbett London  
Published in **WEEKLY**

The Ballast Water Management Convention (BWMC) looks set to go live in 12 months' time following reassessment of the Indonesian fleet size.

Indonesia's ratification is expected to end an 11-year wait to meet the entry-into-force requirement since the convention was first agreed — if the country's fleet is found to be large enough.

As with most International Maritime Organization (IMO) conventions, the BWMC becomes effective one year after meeting the entry requirement.

As TradeWinds went to press, the IMO was adding up the size of the Indonesian fleet, based on IHS Fairplay statistics, to see whether the total number of ratifications so far adds up to 35% of the world fleet.

However, comments from the IMO secretariat that Indonesia's ratification could be enough to bring the BWMC into force has surprised many, as the fleet was presumed to account for no more than 1.2%. Indonesia needs to represent 2.1% of the world fleet to meet the threshold.

"I don't know where the IMO is going to find the extra 12 million gt [gross tons] of ships from," said one source who is watching developments at the IMO closely.

He adds that if the Indonesian fleet does turn out to be larger than expected, it also raises the difficult question of whether the country has been underpaying its contributions to the IMO, which are based on fleet size.

It was also presumed that the size of the fleet of a ratifying country is based on the total at the time of ratification rather than a later assessment.

Two other ratifications announced to the IMO assembly last month — Monaco and Ghana — have already brought it close to the target. And with Bangladesh,

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### Ballast Water

#### Ballast convention in force September 8, 2017

Thursday 08 September 2016 14:10 by Craig Eason

BALLAST WATER

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Shipowner groups call on authorities to complete revision work to give owners confidence in the technologies they are forced to install

THE ballast water management convention will come into force September 8 next year, starting a rush for shipowners to begin installing treatment technology. Shipping groups are now demanding a swift completion of a revision of how treatment technology is approved for use.

As Lloyd's List predicted, Finland ratified the convention on Thursday, pushing the percentage of the world's fleet under the flags of ratified countries beyond the 35% requirement for it to come into force. It has taken 12 years.

Owners will have until the subsequent survey related to the renewal of a ship's International Oil Pollution Prevention certificate after the convention is in force to be compliant. For most vessels, compliance requires a type-approved treatment system being installed at a potentially huge cost.

There is ongoing work at the IMO to strengthen the international guidelines on how treatment systems are type approved. There are concerns, by groups such as BIMCO and the International Chamber of Shipping, that the lack of robust guidelines have led to systems being built that owners can not fully trust. There are more than 50 type approved treatment systems to be chosen from.

In a statement following the official announcement from Finland and the IMO, the ICS said it is now more vital than ever that IMO member states finalise the revision of the type approval process to give shipowners confidence in the systems they choose to install.

There is a strong possibility that owners will send vessels to be scrapped when their surveys are due rather than install systems.

There is also the concerns over the position of the US which has said it will not accept IMO approved systems, only systems approved by the US Coast Guard. While the US regulations are already in force, there are no US type-approved systems. This can currently be dealt with temporary fixes to these systems.



Permanent representative of Finland to IMO Päivi Luostarinen with IMO secretary-general Kitack Lim.

#### Related articles

- ▶ Clearing the water
- ▶ Allow for ballast
- ▶ Scrubbing bottoms
- ▶ Liberia calls for ballast water treatment systems extension
- ▶ Belgium nudges Ballast Water Management Convention closer to ratification
- ▶ Ballast water tonnage recount shows convention still not in force

...and when it actually was ratified in September 2016, implementation was due immediately (i.e. after 12 months)

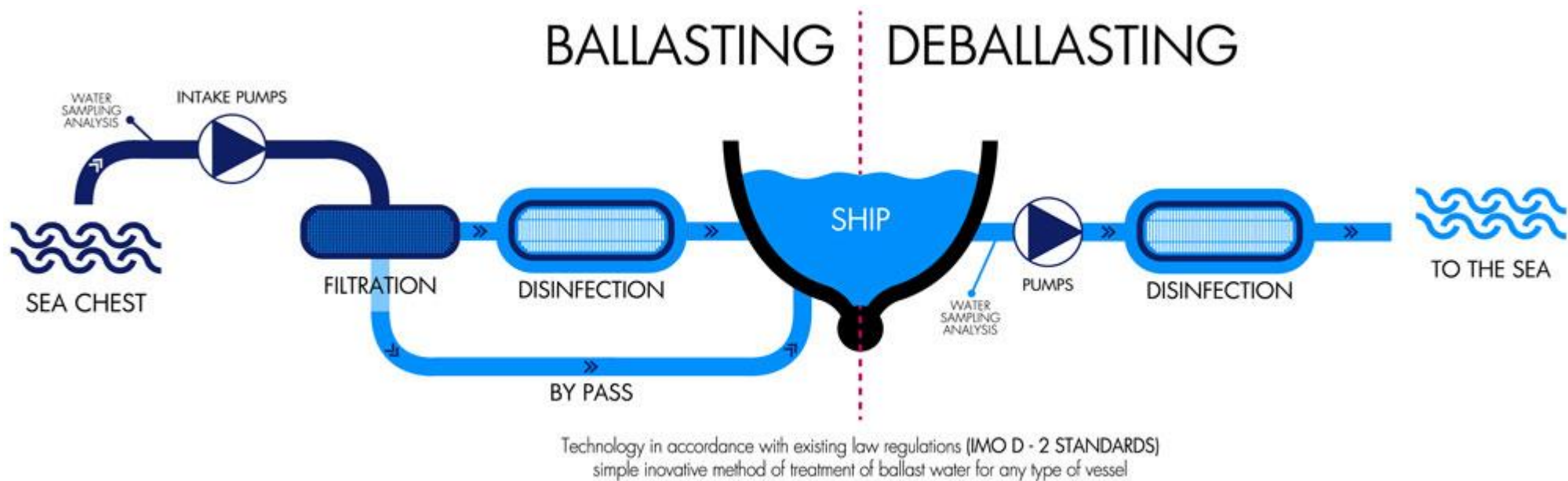
Original implementation schedule below. As the convention was not ratified until September this year, **actual implementation will be the first dry docking (renewal survey, normally 5 years intervals) after 8 September 2017.**

Year of Construction		Ballast Water Capacity (m <sup>3</sup> )	2012	2013	2014	2015	2016
<b>Newly Built Vessels</b>	In or after 2009	< 5.000	D2				
	After 2009 but before 2012	≥ 5.000	D1 or D2				D2
	In or after 2012	≥ 5.000	D2				
<b>Existing Vessels</b>	Before 2009	1.500 - 5.000	D1 or D2	D2			
	Before 2009	< 1.500 or > 5.000	D1 or D2				D2

D1 = Ballast Water Exchange (95% volumetric exchange) or pumping through three time the volume of each tank.

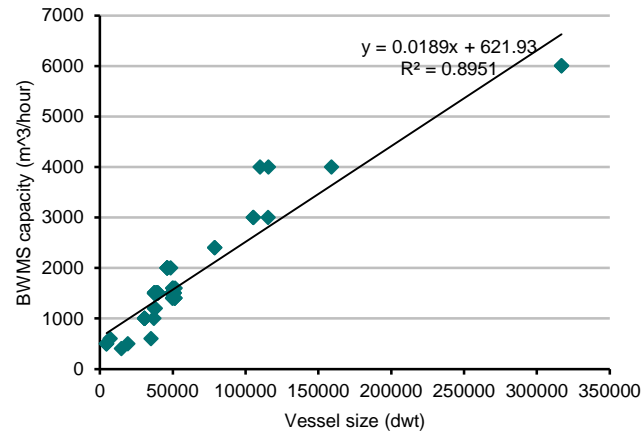
D2 = Ballast Water Treatment systems approved by the Administration which treat ballast water

Tecnically, the concept is rather simple: filtration, then disinfection (either UV irradiation or electrolysis)

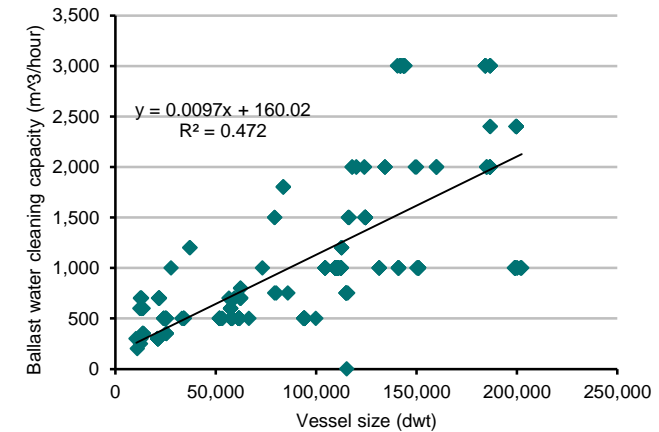


Please note that price lists for ballast water treatment systems (BWTS) are not widespread and data on ballast water systems is scarce

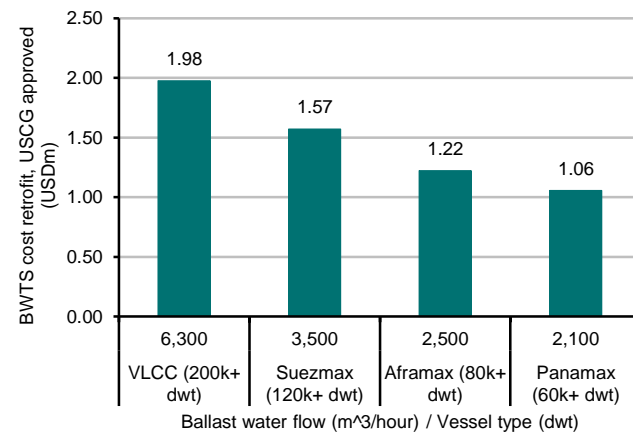
Tankers; vessel size vs ballast water pump capacity



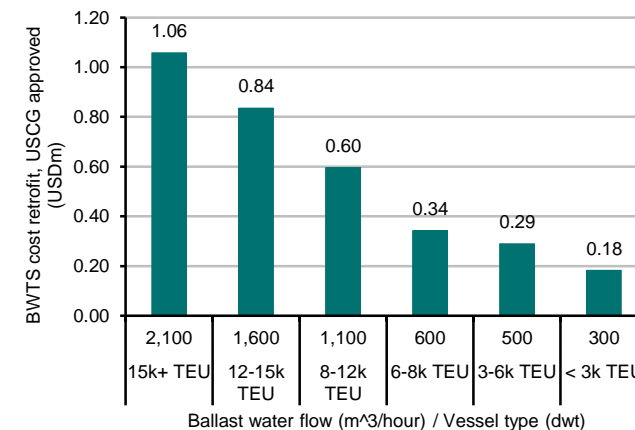
Containers; vessel size vs ballast water pump capacity



Tankers; estimated BWTS cost, retrofits

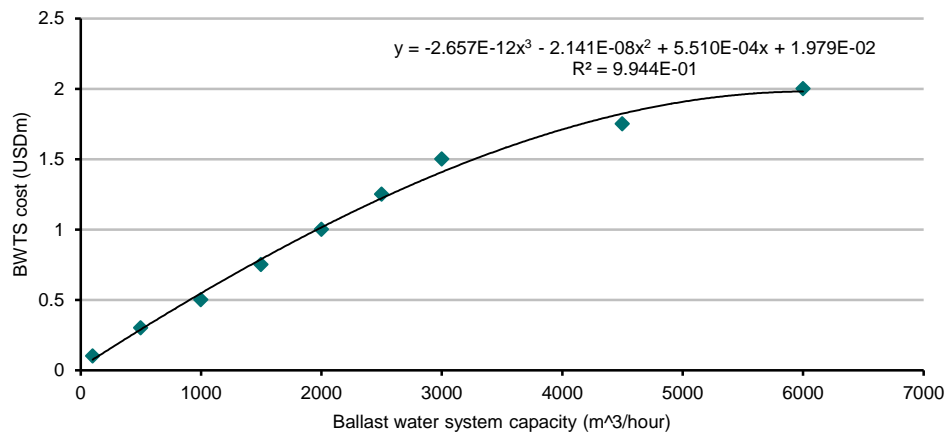


Containers; estimated BWTS cost, retrofits

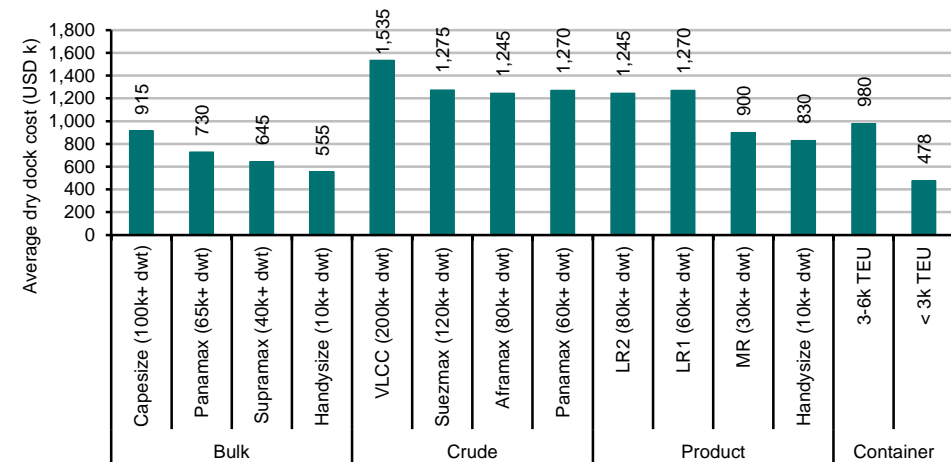


# The tougher environmental regulations ratified in the past months are forcing more capex onto already cash-strapped shipowners and shorten the economic lifetime of vessels

The cost of a ballast water treatment system is about the same as...



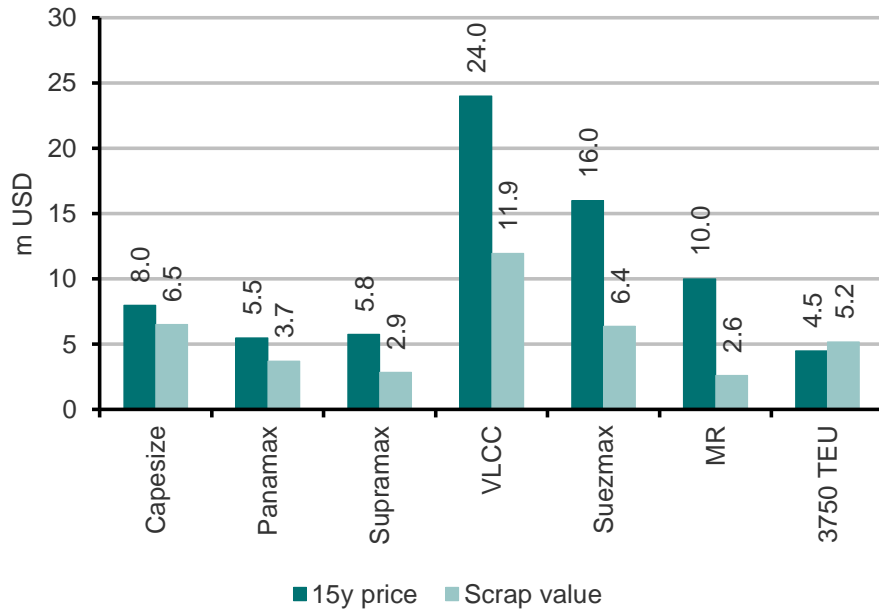
...the cost of a conventional dry dock



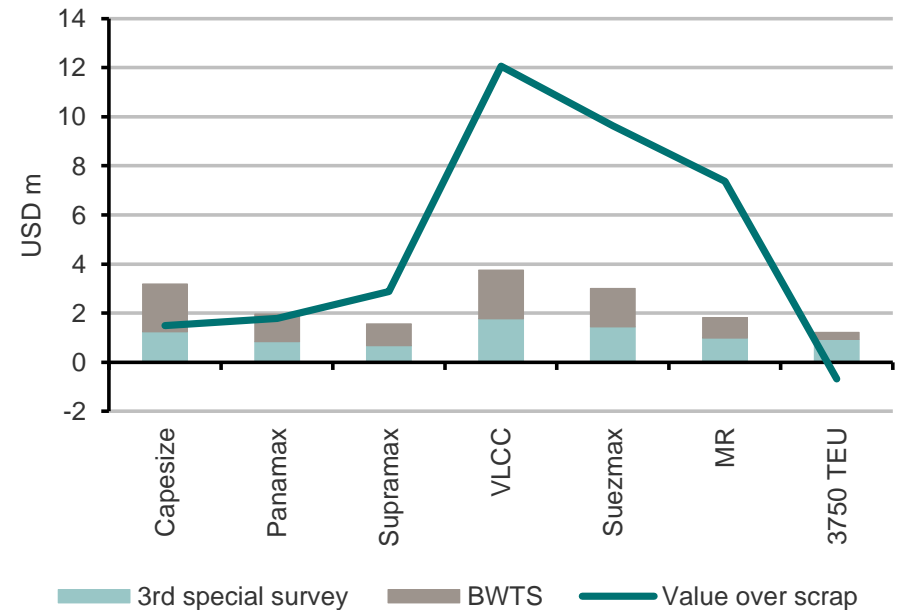


# Scrapping remains driven by earnings (or the lack of such), but in the current market the cost of a BWTS is a meaningful catalyst for container and dry bulk vessels

Vessel prices for 15-year-old vessels versus its scrap value

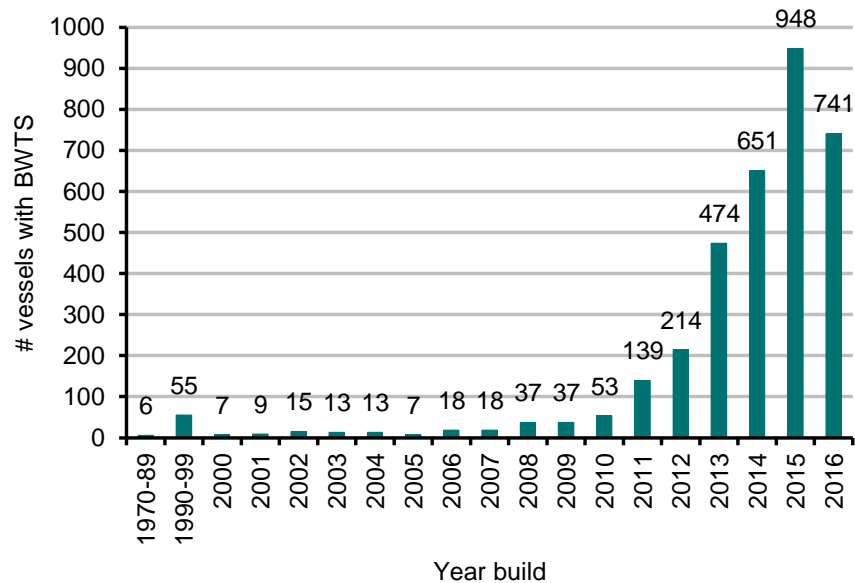


Value above scrap versus the cost of a third special survey plus installation of a BWTS

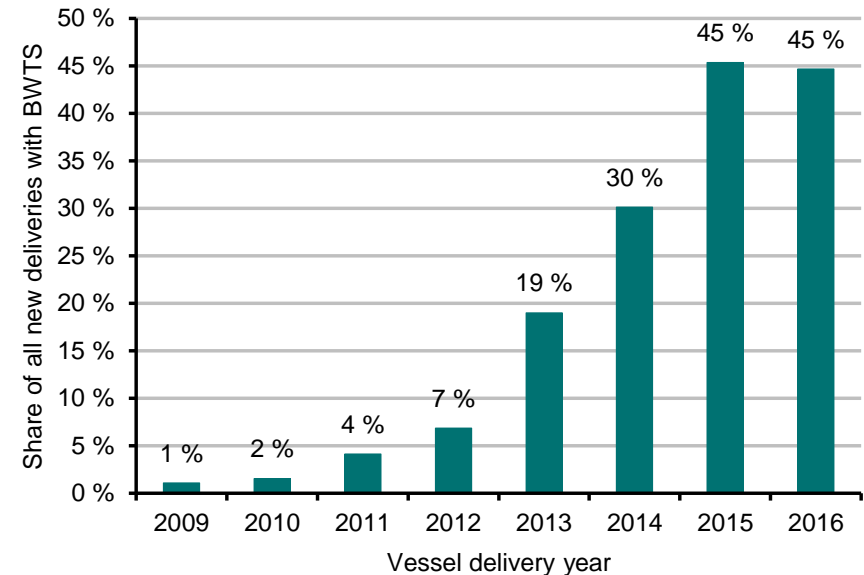


# Newbuilds have started to install BWTs, but recent uncertainty from the potential disharmonisation of the IOPP have halted implementation

## Number of vessels with a BWTs installed

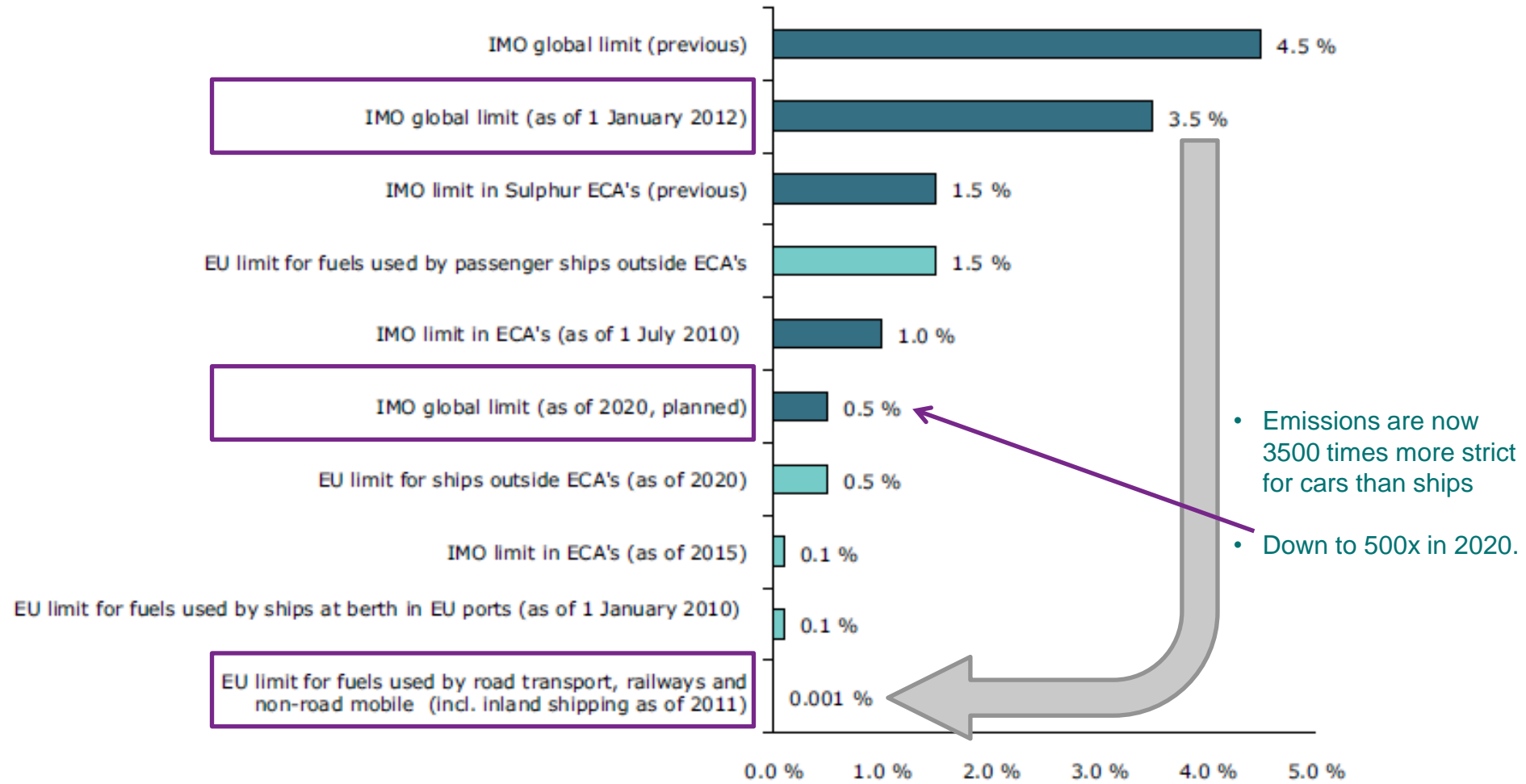


## Share of newbuilds (excl. Misc. type) delivered with BWTs



## Sulphur emissions; what is the problem?

“The number of premature deaths in Europe due to [air pollution from] international ship traffic is ~49,500 and ~53,200 for the year 2000 and 2020, respectively”



**Note:** % by mass of the fuel.

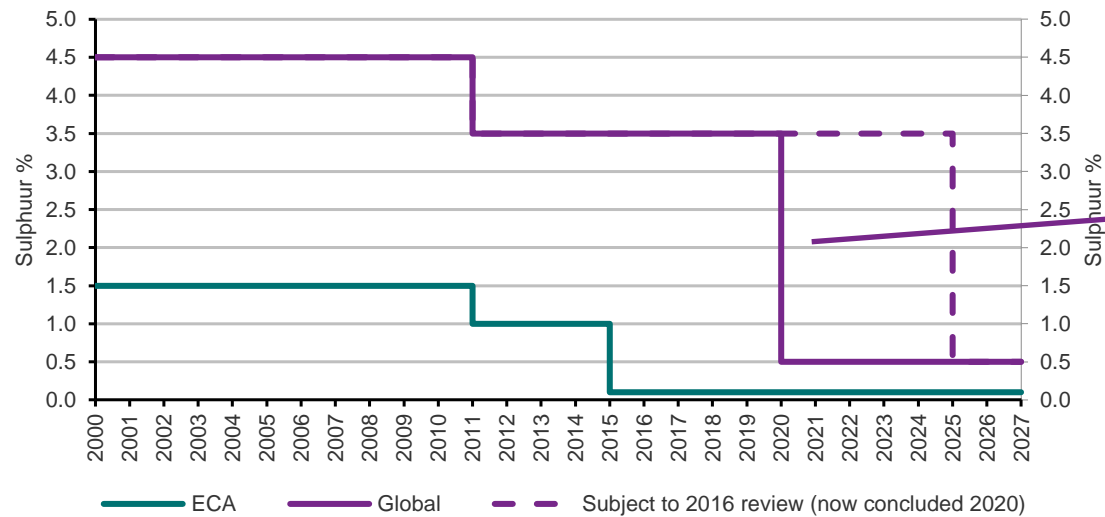
**Source:** EEA, based on IMO and EU legislation.

## Background and alternatives for compliance

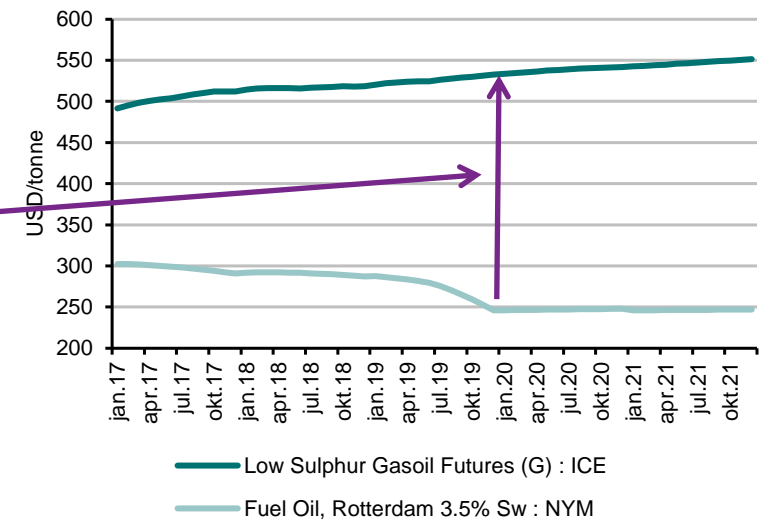
- MARPOL Annex VI, first adopted in 1997, limits the main air pollutants contained in ships' exhaust gas, including sulphur oxides (SO<sub>x</sub>) and nitrous oxides (NO<sub>x</sub>).
- On 19 May 2005, the MEPC agreed to revise MARPOL Annex VI with the aim of significantly strengthening emission limits. The revised MARPOL Annex VI requires all ships use fuels with a sulphur content of 0.5% from 1 January 2020, but until this October market consensus was that this would be postponed until 2025 to give all stakeholders more time to adapt.
- **Alternatives for compliance**
  - **Use a fuel with less than 0.5% sulphur.** In practice, vessels just switch fuel and there is general consensus that this should be technically feasible for all vessels. Most are likely to switch to a sort of low-sulphur fuel oil, but LNG and methanol are also possible alternatives. The latter two are really only alternatives for newbuilds since retrofitting would be very costly.
  - **Continue to use high-sulphur fuel oil, but clean exhaust gas.** This would require installation of an exhaust gas cleaning system (EGCS), or a scrubber as it is more commonly known.

# The main conclusion is that the lower sulphur limit will double bunker cost according to the forward market...

28 Oct it was decided that the lower sulphur limit will be implemented from 2020 (and not 2025 which as consensus expectations)

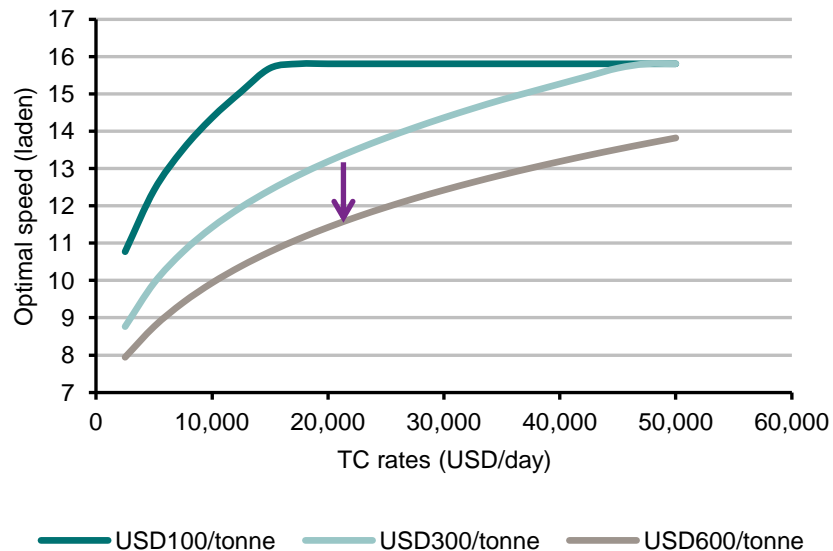


In practice this implies a doubling of the bunker cost from 2020

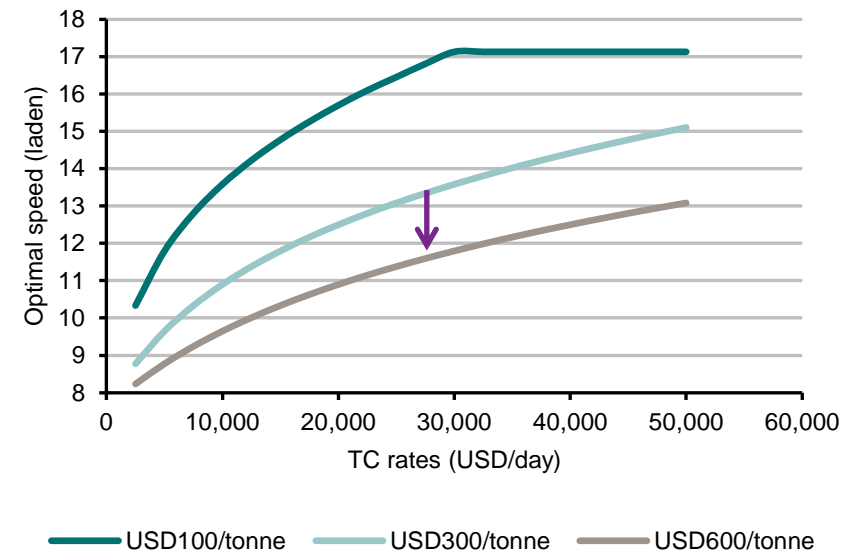


...which is a **positive** as costs are transferred to charterers/consumers, while fleet utilisation is increased as effective vessel supply is reduced by ~10%

Optimal Capesize speed slows by 12–14% if bunker prices double from USD250–300/tonne (i.e. current) to USD500–600/tonne

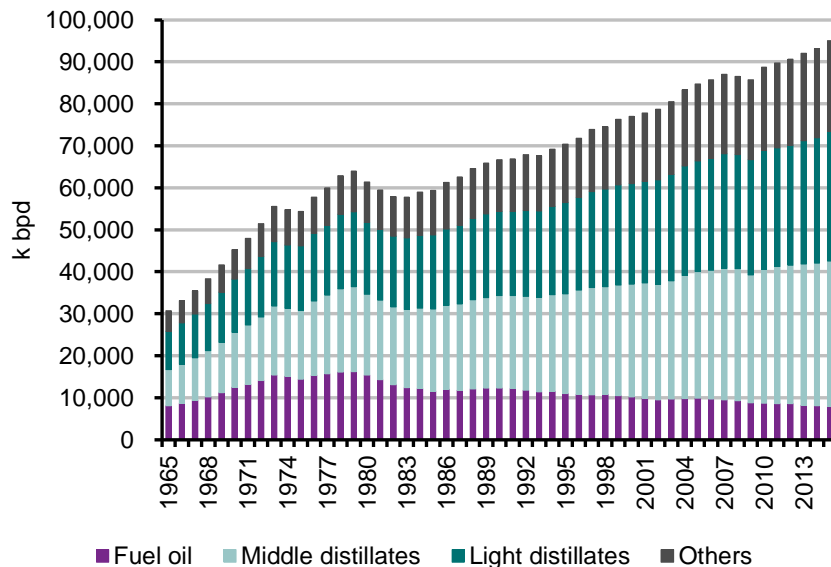


Optimal VLCC speed slows by 11–13% if bunker prices double from USD250–300/tonne (i.e. current) to USD500–600/tonne

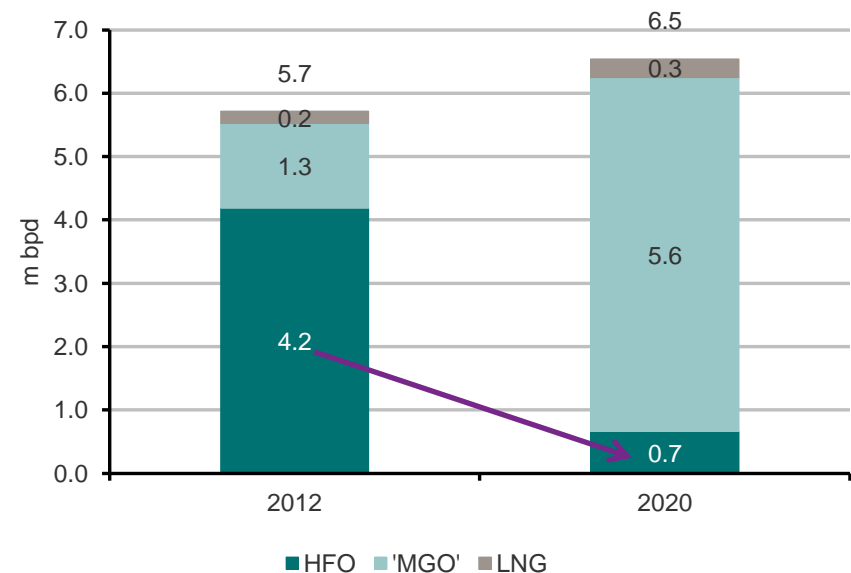


# What will be the actual spread between high and low sulphur fuel oil? What we know is that the lower sulphur limit will cut global fuel oil demand in half...

In 2015 BP reported total fuel oil consumption of 7.97m bpd, about 8% of global oil consumption. Of this, about 4.2m bpd (~50%) was demand from the marine sector.



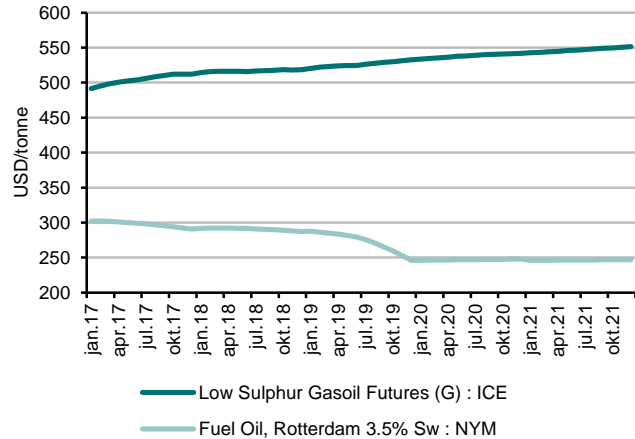
Shipping demand for fuel oil to fall by 84% (from 4.2m bpd to 0.7m bpd)



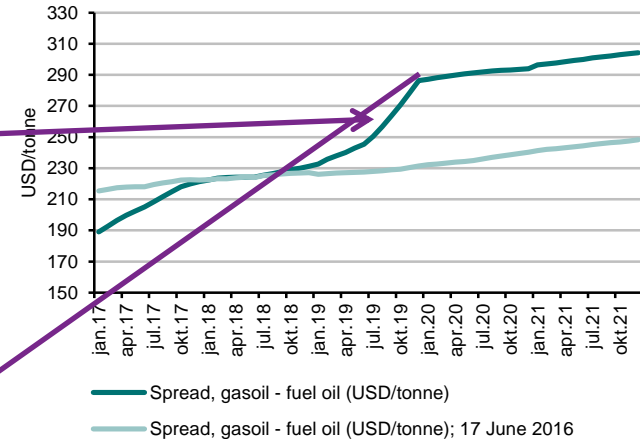
The "Delft" report assume that 3800 vessels will have a scrubber installed by 1 Jan 2020 which will continue to use heavy fuel oil (HFO). However, about 3.5m bpd (190m tonne) of fuel oil would still need to convert to gas oil. Assuming a spread of USD300/tonne, this is close to USD60bn/annum. Or a VLCC-fleet of all new vessels! Every year. But it is also 'only' an increase of USD0.5/barrel in freight cost for crude oil from Middle East to Japan (TD3), equivalent to less than 1% increase in delivered cost at current oil prices.

# ...and the market has already reacted: the problem is **not** to produce enough distillates, but to **get rid of excess fuel oil**.

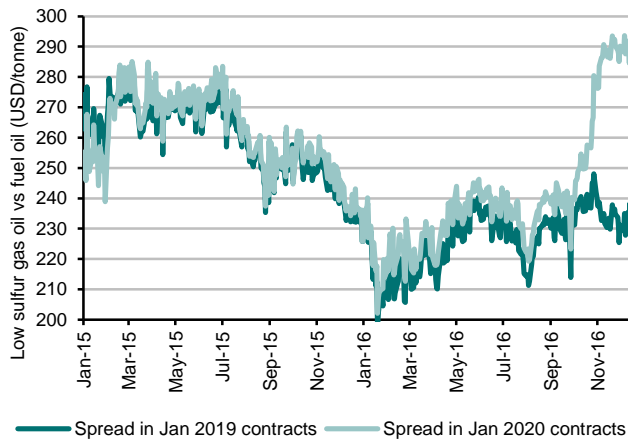
Forward curves for gas oil and fuel oil (19 December 2016)



Implied spread in forward curves (19 December vs. 17 June)



The spread went out (gas oil became more expensive relative to fuel oil) for 2020 contracts...



...mostly because fuel oil in 2020 became cheaper than in 2019



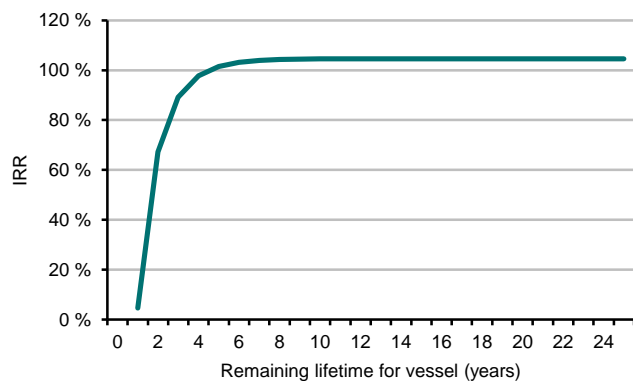


# Scrubbers seems to be a highly attractive investment for most shipping segments; ~100% IRR at the current spread in forward prices for fuel vs gas oil

NPV of retrofitting a scrubber assuming 10 years' remaining lifetime

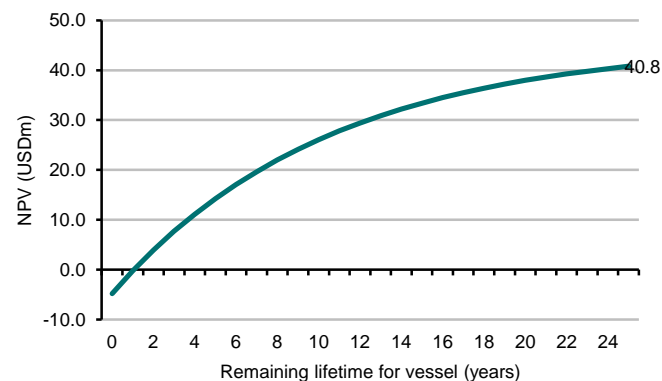
		Engine size (MW)															
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Scrubber cost (m USD)		3.1	3.4	3.7	4.0	4.3	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.4
Daily consumption (tonne/24h)		18	35	53	71	88	106	124	141	159	176	194	212	229	247	265	282
Premium LSFO vs HSFO (USD per tonne)	0	-3.1	-3.4	-3.7	-4.0	-4.3	-4.5	-4.8	-5.1	-5.4	-5.7	-6.0	-6.3	-6.6	-6.9	-7.2	-7.4
	25	-2.3	-1.8	-1.3	-0.8	-0.3	0.2	0.7	1.2	1.7	2.2	2.7	3.2	3.7	4.2	4.7	5.2
	50	-1.5	-0.2	1.1	2.4	3.7	5.0	6.3	7.5	8.8	10.1	11.4	12.7	14.0	15.3	16.6	17.9
	75	-0.7	1.4	3.5	5.5	7.6	9.7	11.8	13.9	16.0	18.0	20.1	22.2	24.3	26.4	28.5	30.6
	100	0.1	3.0	5.8	8.7	11.6	14.5	17.3	20.2	23.1	26.0	28.8	31.7	34.6	37.5	40.3	43.2
	129	1.0	4.8	8.6	12.4	16.2	20.0	23.8	27.6	31.3	35.1	38.9	42.7	46.5	50.3	54.1	57.9
	200	3.2	9.3	15.3	21.4	27.4	33.5	39.5	45.5	51.6	57.6	63.7	69.7	75.7	81.8	87.8	93.9
	300	6.4	15.6	24.8	34.0	43.2	52.4	61.7	70.9	80.1	89.3	98.5	107.7	116.9	126.1	135.3	144.5
	400	9.6	21.9	34.3	46.7	59.1	71.4	83.8	96.2	108.6	120.9	133.3	145.7	158.1	170.4	182.8	195.2
	500	12.7	28.3	43.8	59.4	74.9	90.4	106.0	121.5	137.1	152.6	168.1	183.7	199.2	214.8	230.3	245.8
600	15.9	34.6	53.3	72.0	90.7	109.4	128.1	146.9	165.6	184.3	203.0	221.7	240.4	259.1	277.8	296.5	

~100% IRR for a Capesize if installing a scrubber  
(scrubber cost of USD4.8m, 57 tonnes/day consumption,  
20% port ratio, USD300/tonne spread)



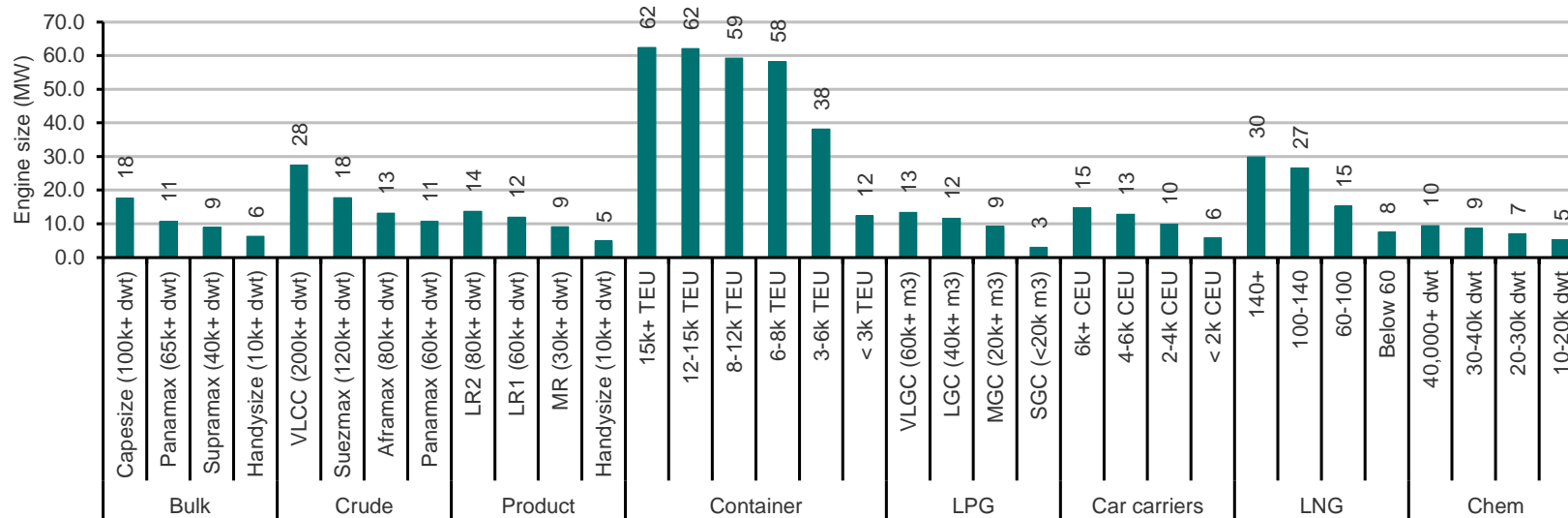
— IRR (accumulated)

Assuming 25-year lifetime, the NPV of a scrubber on a Capesize is comparable to the value of the vessel  
(spread of USD300/tonne, 10% discount rate)



— NPV (accumulated)

## The larger the vessel's engine, the higher savings (= increased profits)

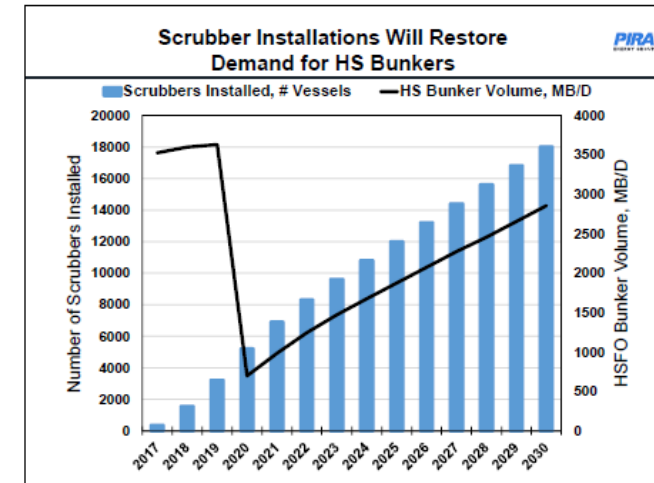
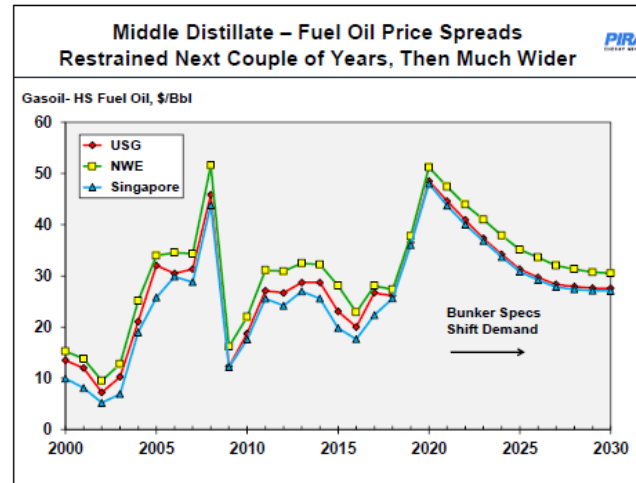
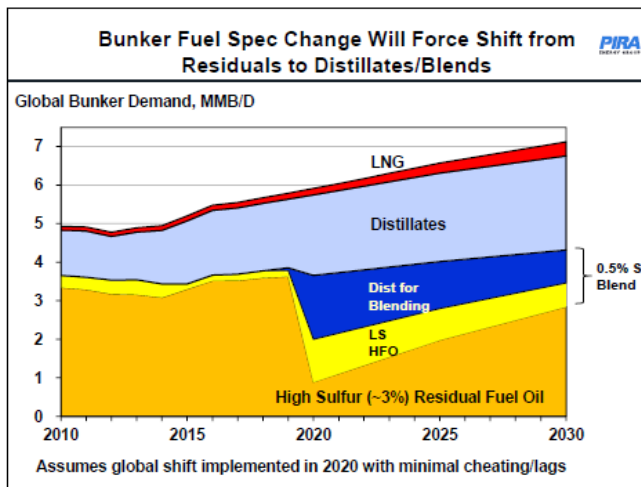


### NPV of a scrubber on a newbuild for different engine sizes assuming 25 years' remaining lifetime

		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Engine size (MW)		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Scrubber cost (m USD)		2.6	2.8	3.1	3.3	3.5	3.7	3.9	4.2	4.4	4.6	4.8	5.0	5.3	5.5	5.7	5.9
Daily consumption (tonne/24h)		18	35	53	71	88	106	124	141	159	176	194	212	229	247	265	282
Premium LSFO vs HSFO (USD per tonne)	0	-2.6	-2.8	-3.1	-3.3	-3.5	-3.7	-3.9	-4.2	-4.4	-4.6	-4.8	-5.0	-5.3	-5.5	-5.7	-5.9
	25	-1.5	-0.5	0.4	1.4	2.3	3.3	4.2	5.2	6.1	7.1	8.0	9.0	9.9	10.9	11.8	12.8
	50	-0.3	1.8	4.0	6.1	8.2	10.3	12.4	14.5	16.7	18.8	20.9	23.0	25.1	27.3	29.4	31.5
	75	0.9	4.2	7.5	10.8	14.0	17.3	20.6	23.9	27.2	30.5	33.8	37.1	40.3	43.6	46.9	50.2
	100	2.1	6.5	11.0	15.4	19.9	24.3	28.8	33.3	37.7	42.2	46.6	51.1	55.5	60.0	64.5	68.9
	129	3.4	9.2	15.0	20.9	26.7	32.5	38.3	44.1	49.9	55.7	61.5	67.4	73.2	79.0	84.8	90.6
	200	6.7	15.9	25.0	34.1	43.3	52.4	61.5	70.7	79.8	88.9	98.1	107.2	116.3	125.5	134.6	143.7
	300	11.4	25.2	39.0	52.8	66.7	80.5	94.3	108.1	121.9	135.7	149.5	163.3	177.1	191.0	204.8	218.6
400	16.1	34.6	53.1	71.6	90.0	108.5	127.0	145.5	164.0	182.5	201.0	219.5	237.9	256.4	274.9	293.4	
500	20.8	43.9	67.1	90.3	113.4	136.6	159.8	182.9	206.1	229.3	252.4	275.6	298.7	321.9	345.1	368.2	
600	25.4	53.3	81.1	109.0	136.8	164.7	192.5	220.3	248.2	276.0	303.9	331.7	359.6	387.4	415.2	443.1	

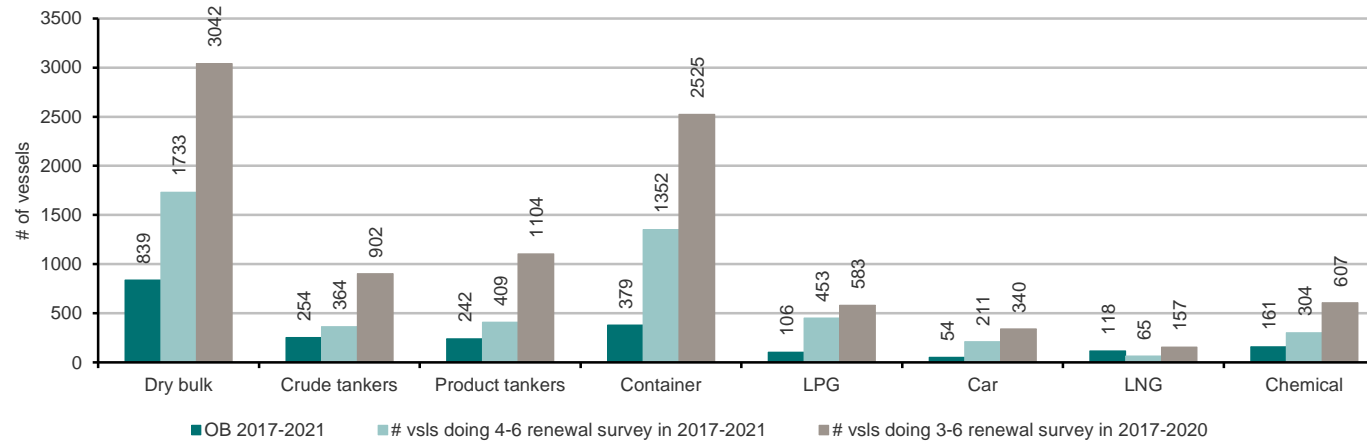
## Other analysts are also optimistic about the potential for scrubbers

- The CE Delft report assumes that 3,800 scrubbers will be installed by 1 January 2020.
- PIRA, which also quotes strong growth in scrubber installations, writes that “Longer-term, scrubber penetration will continue to increase as the normal vessel replacement cycle persists, wherein older vessels are scrapped and replaced by new vessels, which would most likely have scrubbers. At some point, scrubbers on new vessels will be viewed as “standard equipment” rather than an option.”

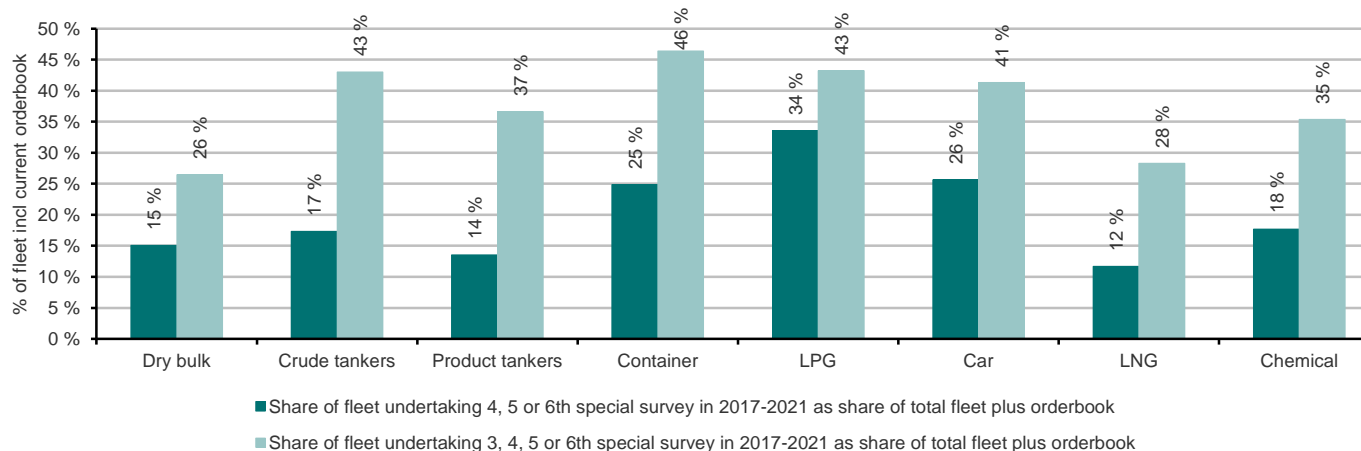


# Scrapping candidates are plentiful; next 5 years can see 15-45% of current fleet (incl orderbook) scrapped

## Current order book and special survey schedule across segments



## Special survey schedule as share of fleet (incl orderbook)



# Newbuilding prices declining despite steel prices climbing...

EQUITY RESEARCH  
Research report prepared by DNB Markets, a division of DNB Bank ASA

26 April 2016

DNB  
MARKETS

## ASIA ROADSHOW TAKEAWAY

### Yards set to close, first prices down

DNB Markets' Shipping Team has been on a one-week reverse roadshow in Asia. The main takeaways are: 1) a perfect storm is brewing for Chinese yards, likely to be followed by a sharp decline in newbuild prices, capacity shutdown and potential new shipping supercycle at the end of the decade; 2) the recent dry bulk recovery looks set to be short-lived; 3) Stolt-Nielsen will face increasing competition as the Chinese state (Sinochem) is about to replicate its business model; 4) Chinese PDH is a risk to LPG demand; 5) changing contract structure and low gas prices are a short-term risk to FLNG; and 6) the container market is set to improve, with an uptick in rates in May.

**Yard and asset values (-): A perfect storm is brewing for yards** as the combination of: 1) steel prices seeming to have bottomed out; 2) wage inflation at yards up 66% in two years; 3) low order intake; 4) limited accessibility to fresh funding; and 5) shipowners delaying orders, leaves H2 2016 the likely inflection point when smaller yards either conclude new contracts at a loss or reduce capacity, or potentially close down.

**Chemical infrastructure (-): Stolt-Nielsen head-to-head with 'China Inc'**. We met with state-owned Sinochem, which is about to replicate Stolt-Nielsen's business model globally; we fear that Stolt-Nielsen is likely to face increasing competition across all segments ahead. Stolt-Nielsen's margin decline in Tank Containers correlates well with when Sinochem expanded globally two years ago. Sinochem's first terminal opens in July and it has sophisticated vessels on order.

**Container (+): Container market expected to improve.** We met with top management of China Cosco; our takeaways are: 1) the economic situation and container market are improving this year; 2) rates are set to improve in May; 3) there was all-time-high idling in Q1; 4) more rational competition expected; and 5) 8% unit cost saving post-merger expected.

**Dry bulk (-): Short-lived recovery according to Asian sources.** Our meetings in China concluded that the rise in steel and iron ore prices was likely to be short-lived, which combined with increasing congestion in China, triggered the big miners to book a significant amount of spot vessels to benefit from sales at high commodity prices ahead of a commodity price correction. Higher steel prices were explained by: 1) high sales of car steel plates; 2) the government curbing financing (production); and 3) a flower show.

**LPG (-): Delays and cancellations of Chinese PDH, risk to demand.** In several meetings we heard scepticism about the viability of Chinese PDH plants and most expected rather flat demand from China. Although India and Indonesia were held up as bright spots, the growth rate of the overall LPG demand was expected to decline.

**FLNG (-): Changing contract structure and low gas prices a medium-term risk.** Prices for LNG, currently imported to Japan, are linked to the price of crude; hence both Japan and Tokyo Gas are now taking action to diversify import formulas to procure LNG at as low prices as possible and try to eliminate global price differentials.

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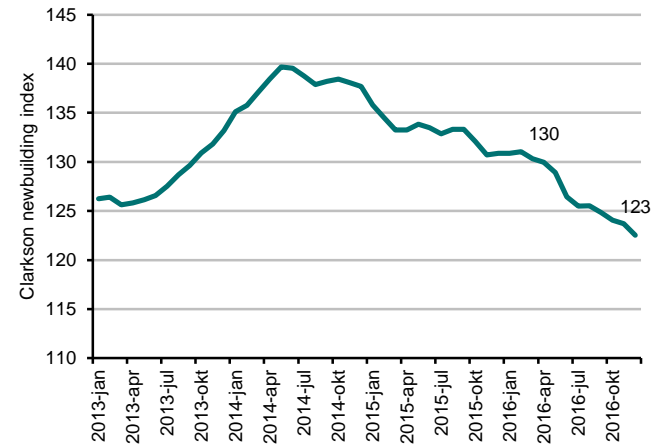
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## Newbuilding prices did come down...

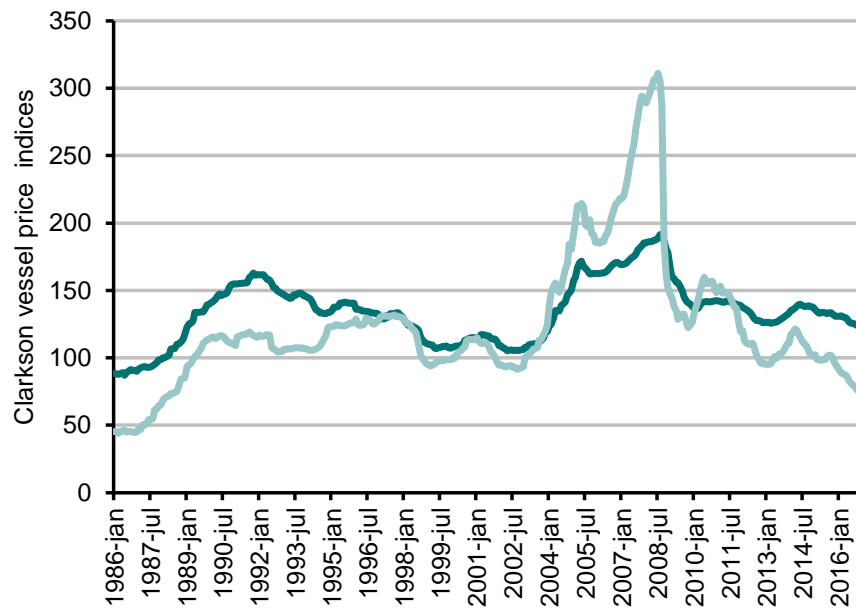


## ...despite steel prices appreciating 10% in the same period

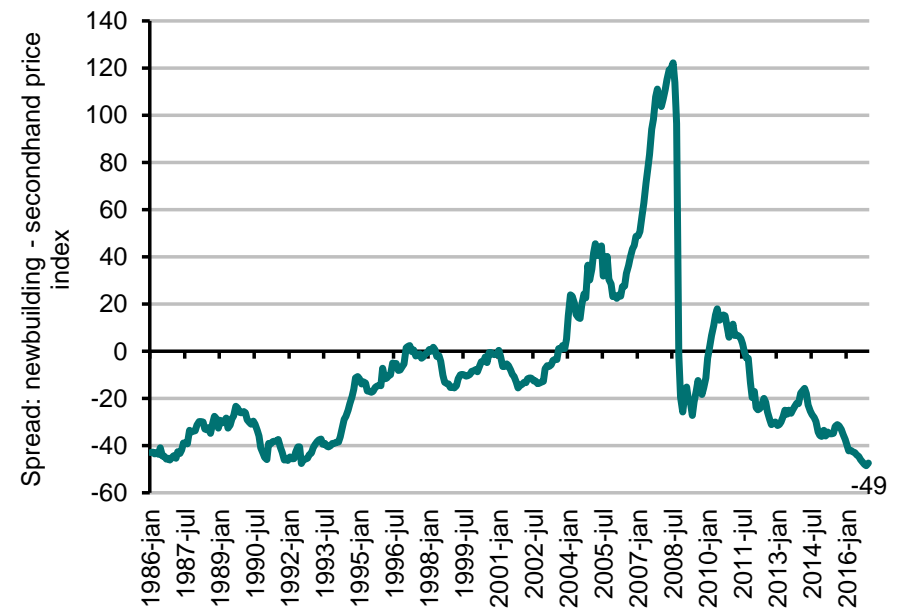


...but the fact that something is more expensive to produce does not necessarily make it a good investment; secondhand vessels are still much cheaper.

The spread between newbuilding and secondhand prices...

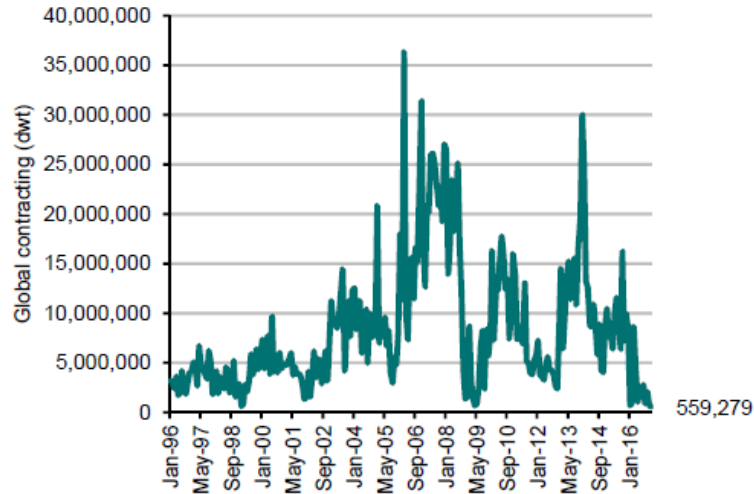


...was at a record low in November 2016

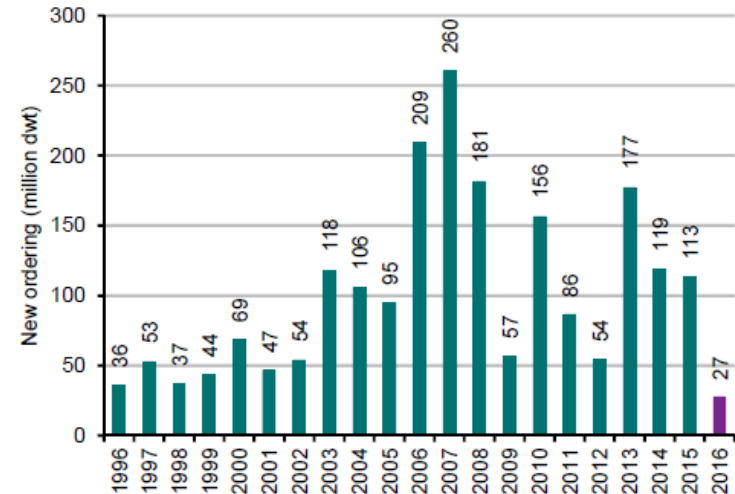


# From Shipping Daily 11 January; yards backlog is at very low levels...

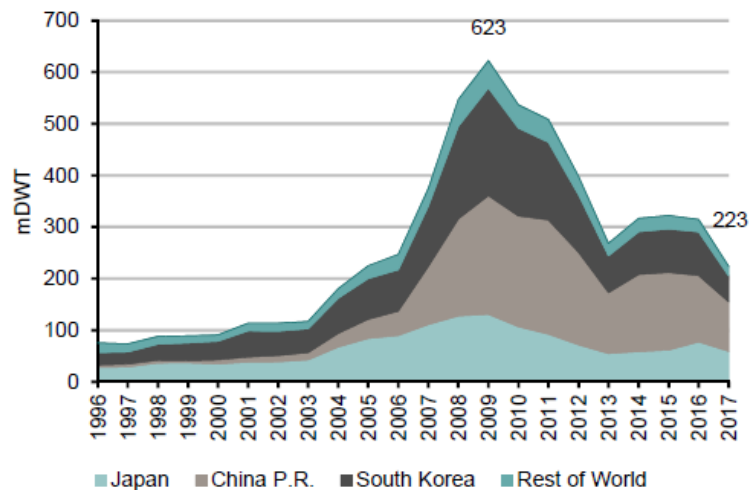
'All time low' contracting in December of 559k dwt



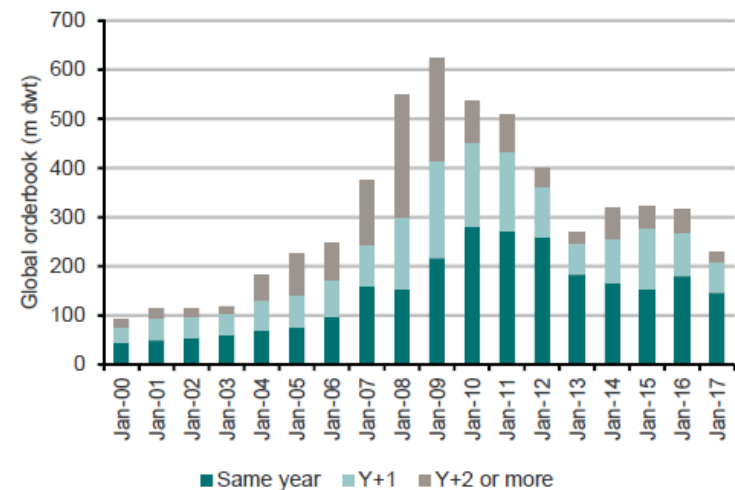
Also on annual basis 2016 is record low



The global orderbook is down 64% from peak

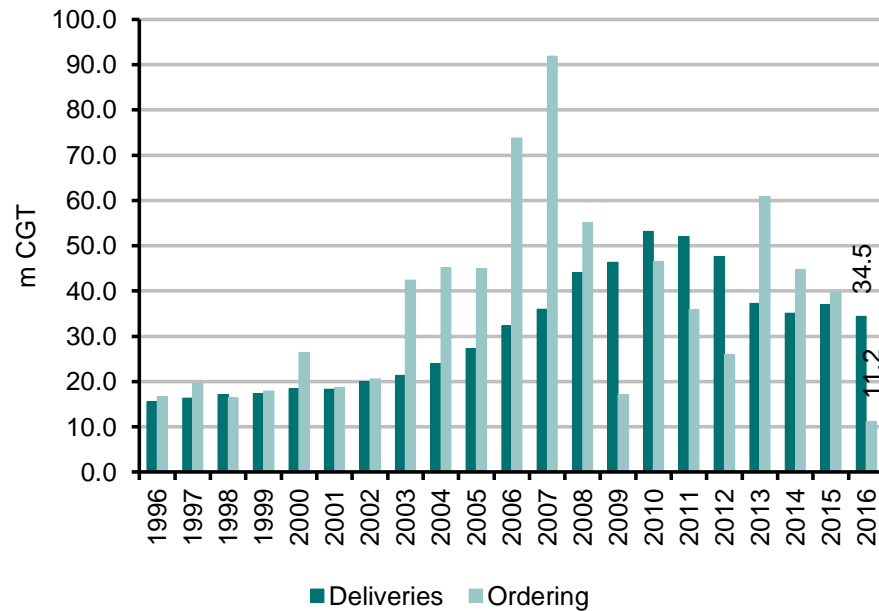


And backlog beyond 1 year is at very low levels



# ...and the back-log is also declining in a record high pace; 'all-time-low' replacement-ratio in 2016

## Deliveries and ordering, CGT



## Implied replacement-ratio

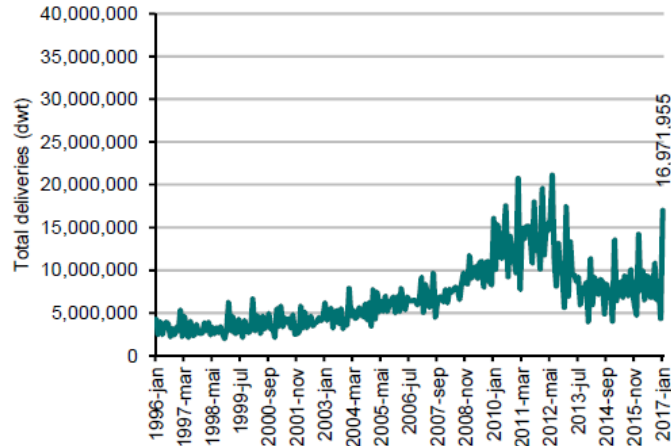




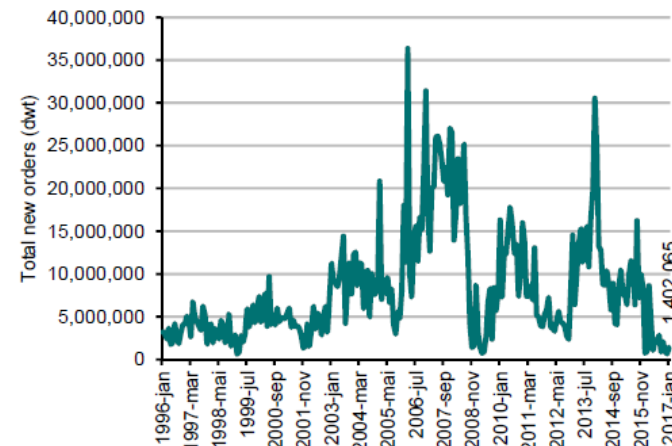
# From Shipping Daily 7 February; yards backlog is at very low levels...

## Chart of the day

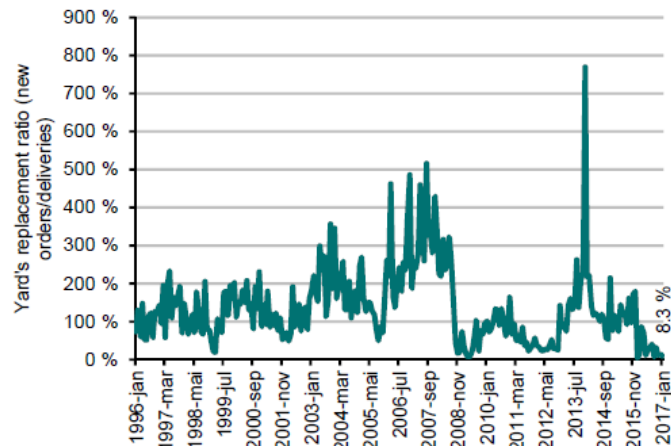
Four-year-high deliveries in January; about 17m dwt...



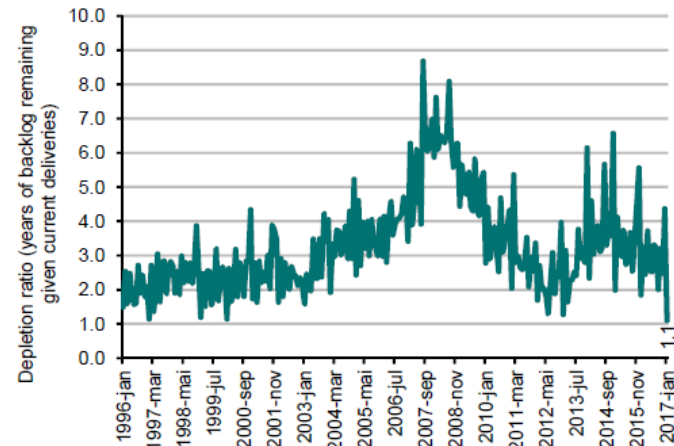
...in combination with only 1.4m dwt of new orders...



...yield a 8.3% replacement ratio for yards...



...and current the delivery pace results in an empty order book in 1.1 years!



## Main conclusions

- Ballast water treatment systems do **add a significant cost** to the next dry docking, and **while scrapping will remain a function of earnings** (not cost), BWTS is likely to act as scrapping **catalyst for dry bulk and container** vessels.
- The **price** of compliant bunker (less than 0.5% sulphur) will be far **higher** than current bunker fuel (less than 3.5% sulphur). New, more fuel-efficient, vessels will be beneficiaries as the bunker price increases.
- Bunker costs (unlike a ballast water cleaning system) are **generally a pass-through for shipping**, but liner shipping (container, car and chemical carriers) will take longer to flush a higher price though to customers, i.e. the transition period will be longer for liners than tramping (oil tankers, gas carriers and bulkers) shipping, but this should be seen as a one-off cost. There are exceptions. If fleet utilisation is high and freight rates are determined by 'fundamental arbitrage' (i.e. the geographical spreads in the prices for traded products), a higher fuel cost would predominantly eat into the shipowner's profit. I.e. **if this happens, it happens because freight rates are high and shipowners would hence be able to afford it**. In a low-freight environment the freight rate has a natural floor at opex levels, and consumer prices would need to increase to see continued trade.
- Freight rates will be settled on the basis of the higher fuel cost; **shipowners who install scrubbers**, and trade spot (or have a cargo contract portfolio) **will be able to extract the savings**.
- Vessel **speeds will likely reduce** as it is more cost-effective to sail slower when fuel costs rise due to the non-linear relationship between speed and fuel consumption. **Effective supply will be reduced by ~10%**.
- Refiners will not have any problems supplying sufficient amounts of compliant fuel oil. The biggest **problem for refineries will be getting rid of excess high-sulphur fuel oil**; the spread between low- and high-sulphur fuel oil for delivery in 2020 has already widened since the IMO's decision in October.
- Shipowners with contracts stretching into 2020 and beyond may face challenges: if the contract includes a bunker escalation clause, the basis for the fuel oil price used in the freight rate formula will no longer be applicable (if the vessel does not install a scrubber). Also, when signing new contracts that stretch into the 2020s the shipowner would need to look carefully at the type of bunker hedge to put in place.
- Come 2020 and assuming nothing much has happened (refiners have not invested in more hydrodesulphurisation or hydrocracking capacity, and scrubbers are still not widely used); the switch from heavy fuel oil to a compliant fuel is likely to hit the balance between fuel oil and gas oil from both sides: in this exercise demand for fuel oil declines by ~40-50% while the middle distillate pool sees demand increase by ~20%, both of which widen the spread between the two prices. Also, the refinery runs (i.e. crude oil demand) would likely need to increase, again highly likely to boost all petroleum product prices and therefore also widen the spread between distillates and fuel oil in USD terms. **We believe the spread between gas oil and fuel oil will widen. A lot. Scrubbers look like a vital part of the solution**, already yielding an IRR of 100% on forward prices.
- The **fleet can decline by 15-45% over the next 5 years** in most segments; scrapping is *not* a guarantee for a great market, but it will act as an insurance against a very weak market.
- Cash-strapped owners and recently burnt equity investors can extrapolate the already thin orderbooks into 2019-2020. And then: **boom!**

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