



# Universal Ship Measurement

IMSF 2011 Annual Meeting  
Colin Cridland, Managing Director Analysts  
Hong Kong, 1 June 2011  
[www.clarksons.com](http://www.clarksons.com)



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# Clarksons Offices





# Background

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- First raised by IMSF Chairman, John Dowden
  - Challenge to examine the existing units of measuring ships and ask:
    - Are these accurate, representative and logical for measuring all types of ships?
    - Do these allow meaningful comparisons between different types and classes of ship?
  - If existing measurements do NOT meet the challenge what new 'Universal' measure or measures could be employed?
- A perfect challenge for the IMSF!



# Where Would it be Useful?

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- Comparing shipbuilding output/capacity by vessel type
- Comparing national flag and ownership fleets
- A means by which dues, taxes, levies etc might be more fairly applied across ship types
- A basis by which an economic value might be more accurately applied to national fleets

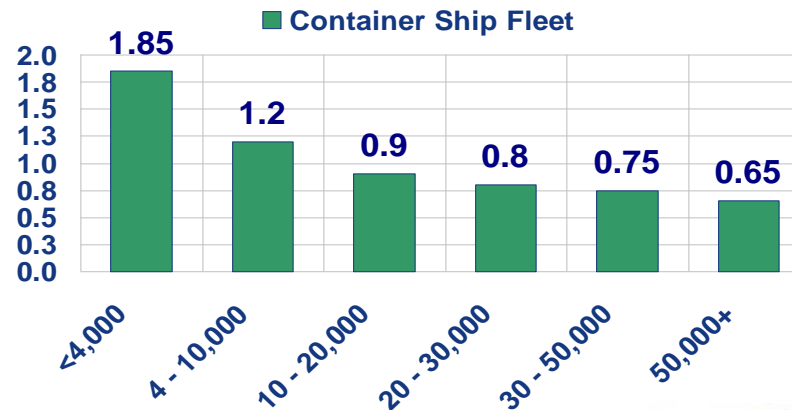
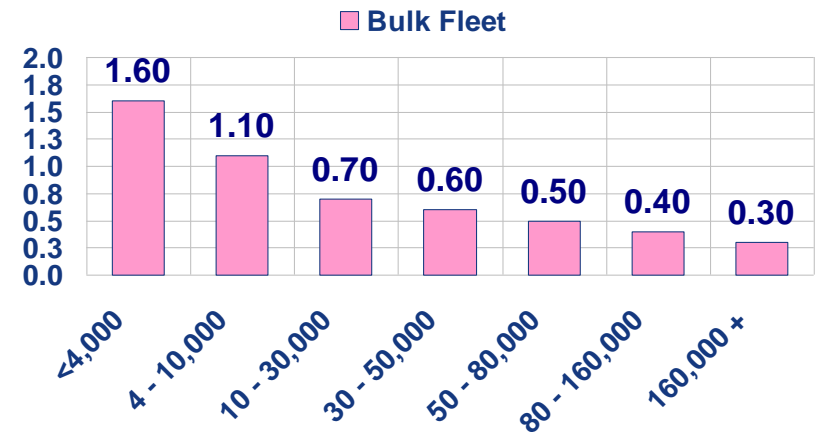
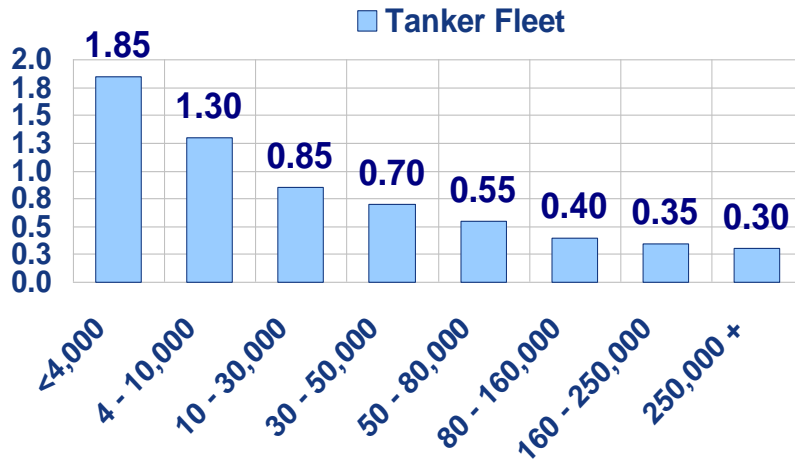


# Existing Universal Measures

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- **Deadweight (dwt)**
  - Max cargo in tonnes plus fuel, stores etc up to specific load line
  - Weakness
    - Load Lines can be changed
    - Badly represents vessels with low density cargoes – Container, wood chip, passengers, vehicles etc
- **Gross Tonnage (GT)**
  - A measure of enclosed spaces in cu ft divided by 100 and called tons
  - Weakness
    - Inconsistently measured between class soc
    - Badly represents vessels with high proportion of cargo out of enclosed spaces – container
- **Net Tonnage (NT)**
  - Derived from GT using complicated 'black art' formula to exclude certain enclosed spaces
  - Weakness – Nobody understands what it means
- **Compensated Gross Tonnage (CGT)**
  - Derived from GT by applying varying factors according to vessel type
  - Weakness – assumes construction effort varies between vessel types on a consistent basis and yard productivity is constant

# CGT Coefficients – Old System

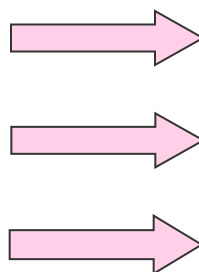


Data source: Clarksons



# New CGT System Formula (Version 2007)

$$\text{Compensated Gross Tonnage} = A * GT^B$$



Ship Type	A	B
Oil Tanker (D/H)	48	0.57
Chemical Tankers	84	0.55
Bulk Carriers	29	0.61
Combined Carriers	33	0.62
General Cargo	27	0.64
Reefers	27	0.68
Full Container	19	0.68
RoRo Vessels	32	0.63
Car Carriers	15	0.7
LPG carriers	62	0.57
LNG	32	0.68
Ferries	20	0.71
Passenger Ships	49	0.67
Fishing Ships	24	0.71
NCCV	46	0.62

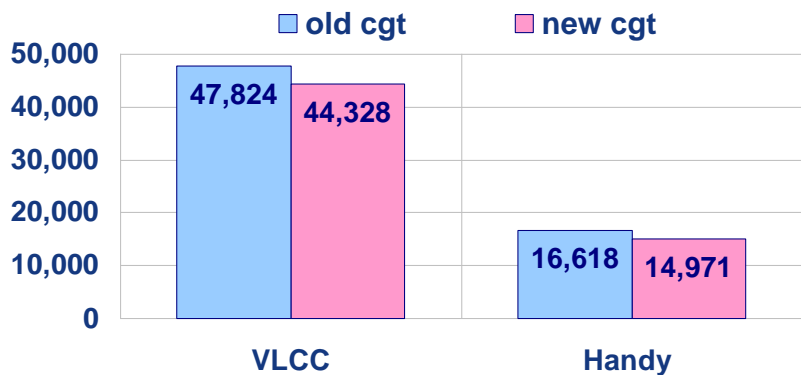
- *Previous system* was based on CGT coefficients, depending on type and dwt of ships
- *New calculation* is based on formula.
- Instead of dwt as base for the choice of the coefficients, the system is based on gross tonnage.



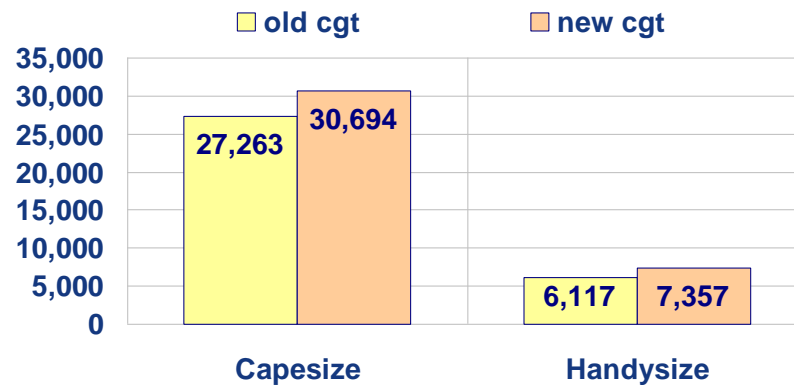


# CGT Comparison of the two systems

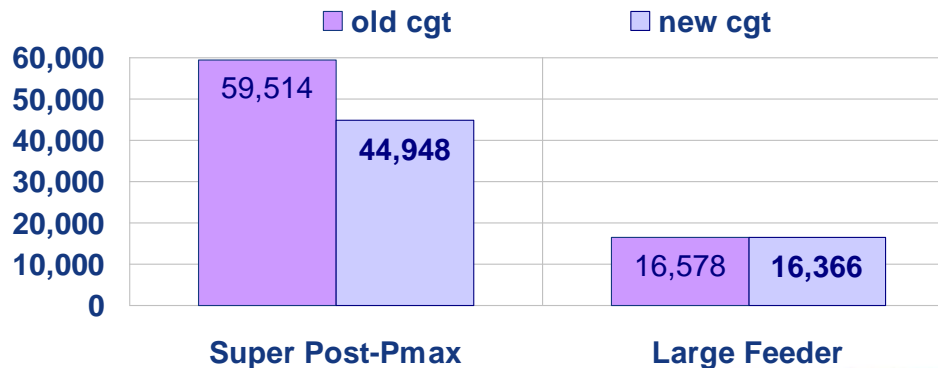
## Tankers



## Dry Bulk



## Container ships



Data source: Clarksons



# Capacity

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## STRONG ARGUMENT TO HAVE UNIVERSAL CARGO CAPACITY MEASURE

- Typical existing cargo capacity measures
  - Grain (m3) – 100%
  - Bale (m3) – 100%
  - Ore (m3) – 100%
  - Liquid (m3) – 98%
  - Liquefied Gas (m3) – 98%
  - TEU/FEU (no of)
  - Insulated capacity (ft3)
  - Lane Metres (m)
  - Passengers (no of)
  - Berths (no of)
  - Vehicles (no of)
- IMPORTANT vessels with more than one of the above can refer to EITHER exclusive OR non-exclusive spaces



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# Introducing Total Cargo Capacity (TCC) ©

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# Calculating TCC<sup>©</sup>

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ALL VESSELS 1,000 dwt plus – EXISTING and ON ORDER

Tankers (all types)

Bulkers (all types)

General Cargo (all types inc reefer)

Containerships

Liquefied Gas (all types, all sizes)

- Methodology

- Convert all TEU capacity to m<sup>3</sup> by multiplying by 38.14m<sup>3</sup>
- Use largest capacity (grain, bale, ore, liquid, liquid gas or TEU derived)
- Work out the ratio between dwt and largest m<sup>3</sup> for individual ships (vast majority)
- Apply the average dwt/m<sup>3</sup> ratio to calculate m<sup>3</sup> capacity where it was missing



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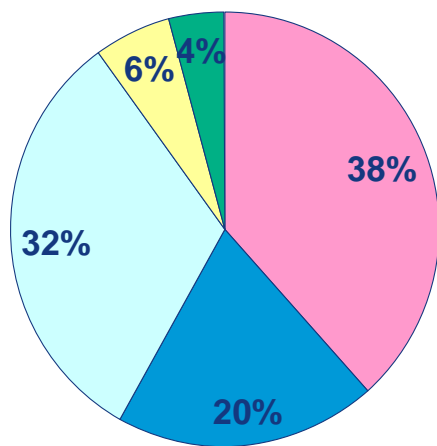
# Comparing TCC<sup>©</sup> to dwt/GT

© Colin Cridland

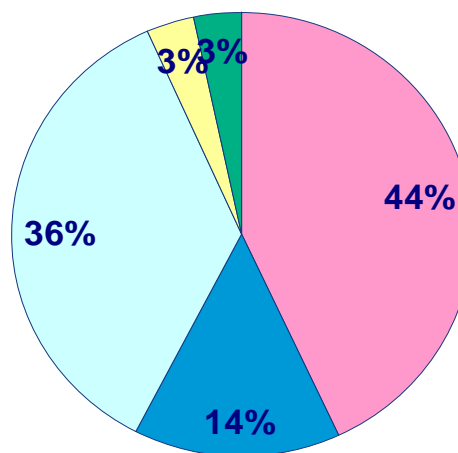


# Existing Fleet Comparisons

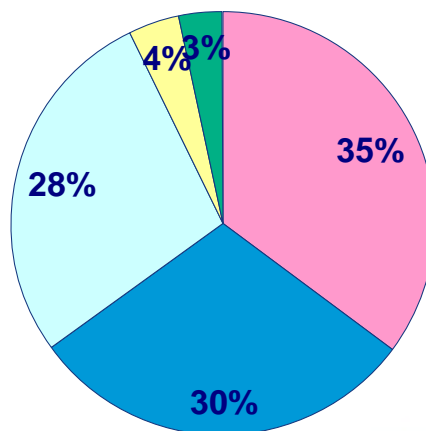
**Gross Tonnage**



**Deadweight**



**TCC<sup>©</sup>**



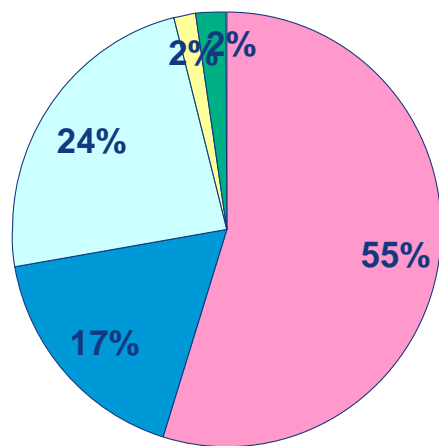
- Bulk
- Container
- Tanker
- Gas
- General Cargo



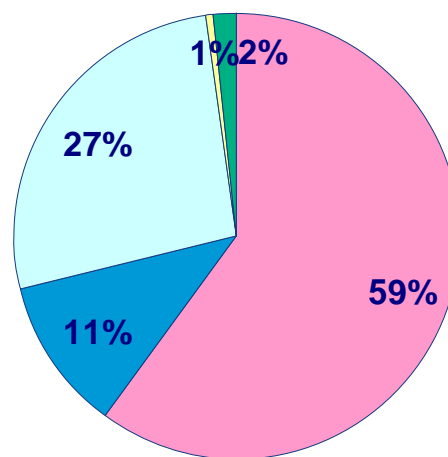
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# Orderbook Comparisons

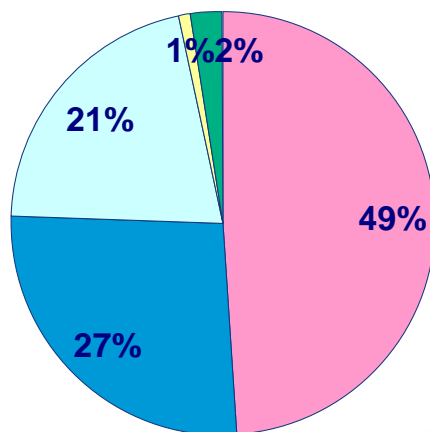
Gross Tonnage



Deadweight



TCC<sup>©</sup>



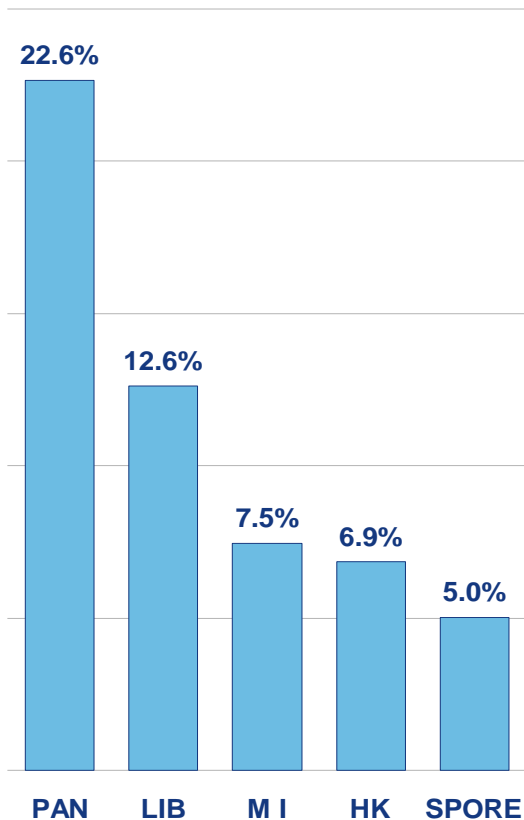
- Bulk
- Container
- Tanker
- Gas
- General Cargo

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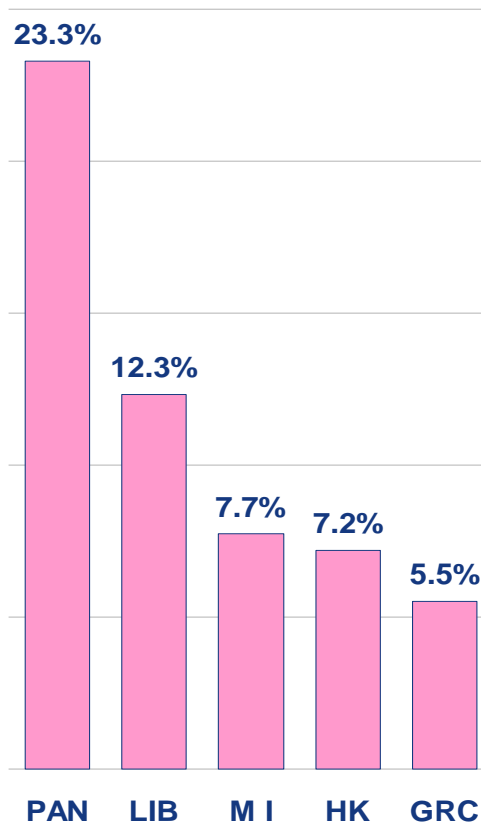


# Top 5 Flags - Existing Fleet

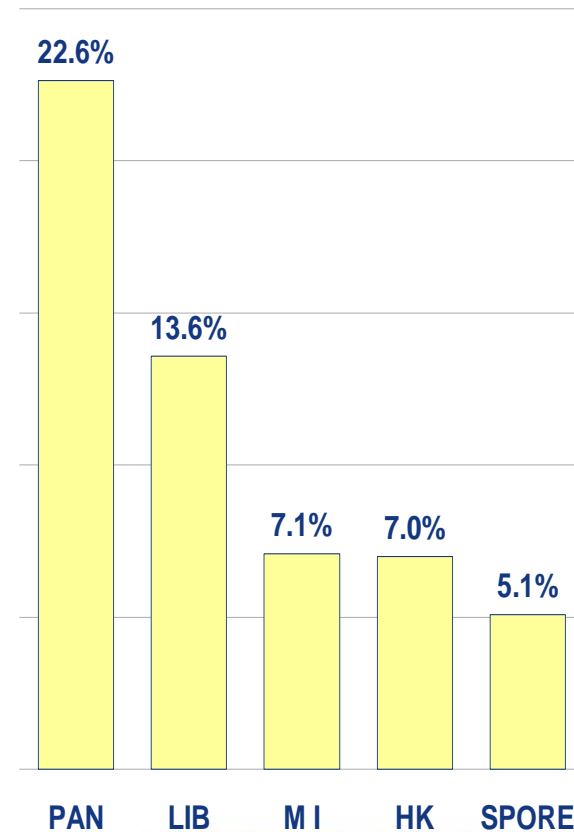
**GT**



**DWT**



**TCC<sup>©</sup>**



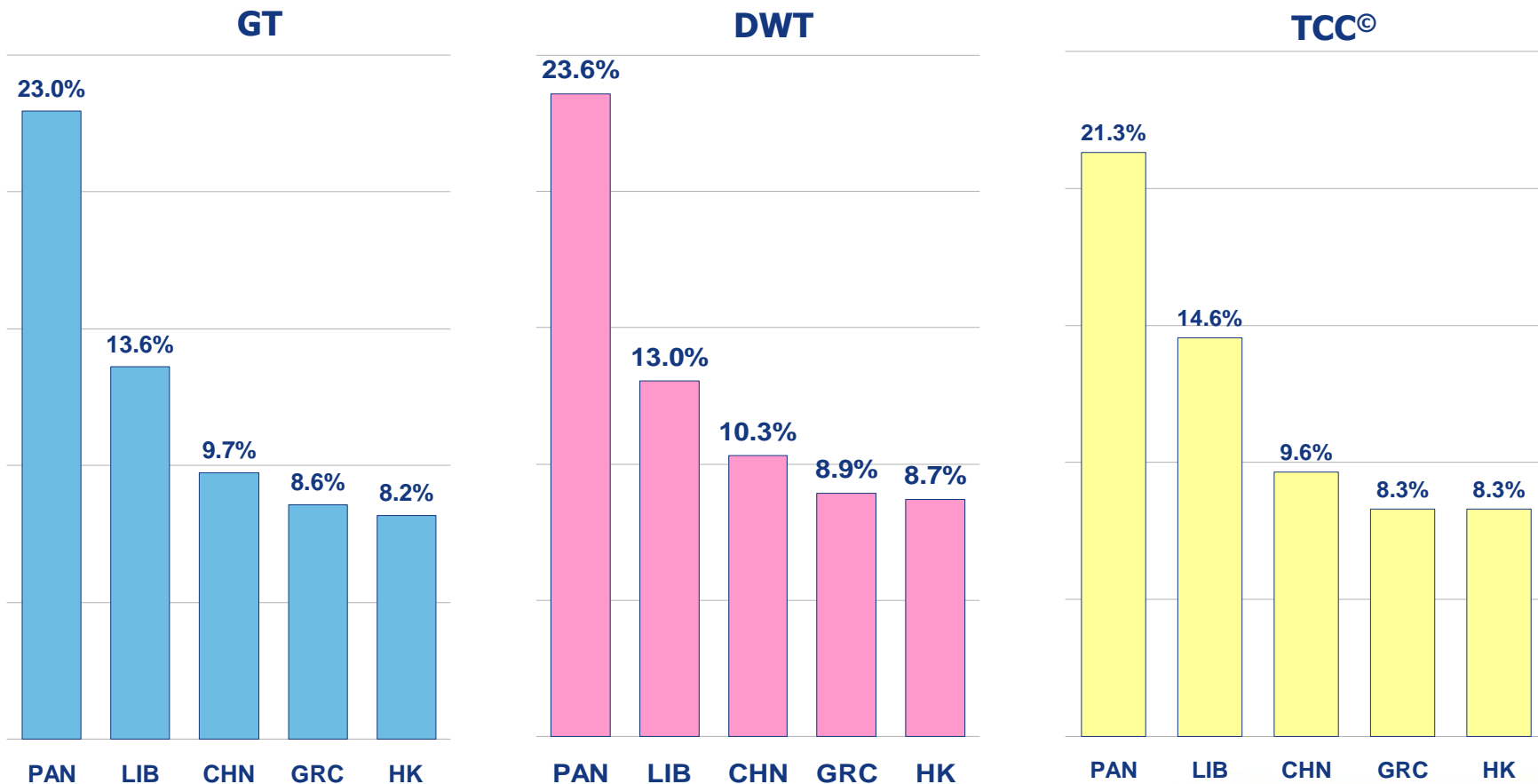
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# Top 5 Flags – Fleet on Order

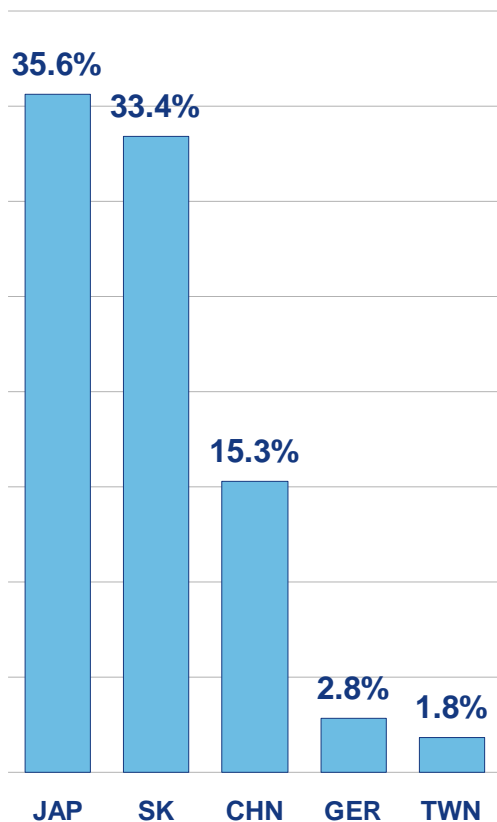


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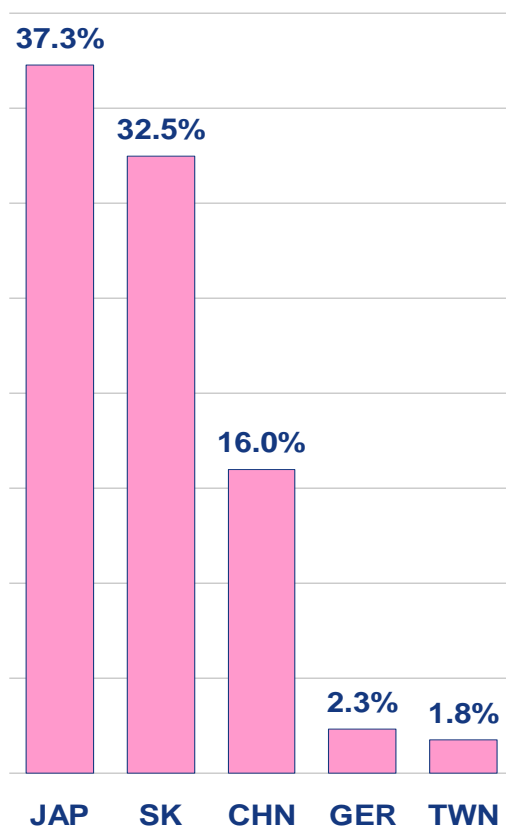


# Top 5 Builder Countries - Existing Fleet

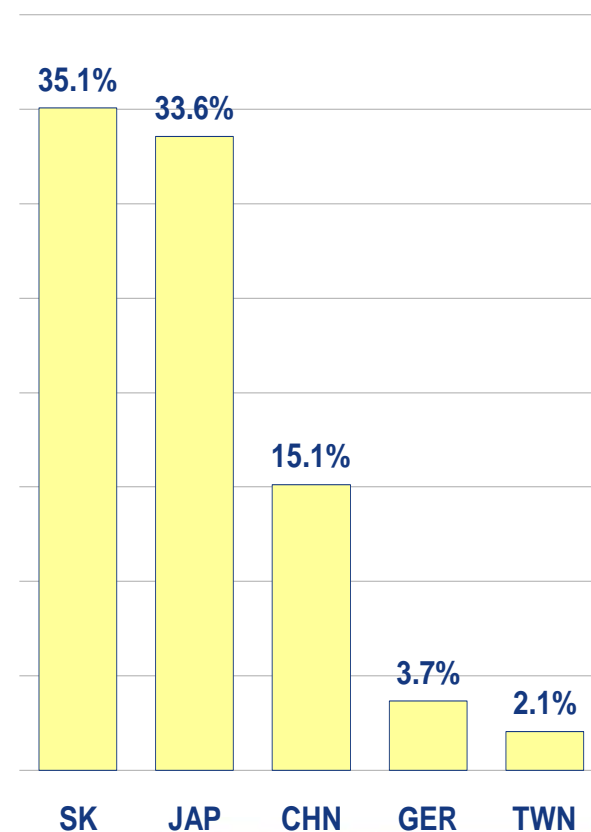
**GT**



**DWT**

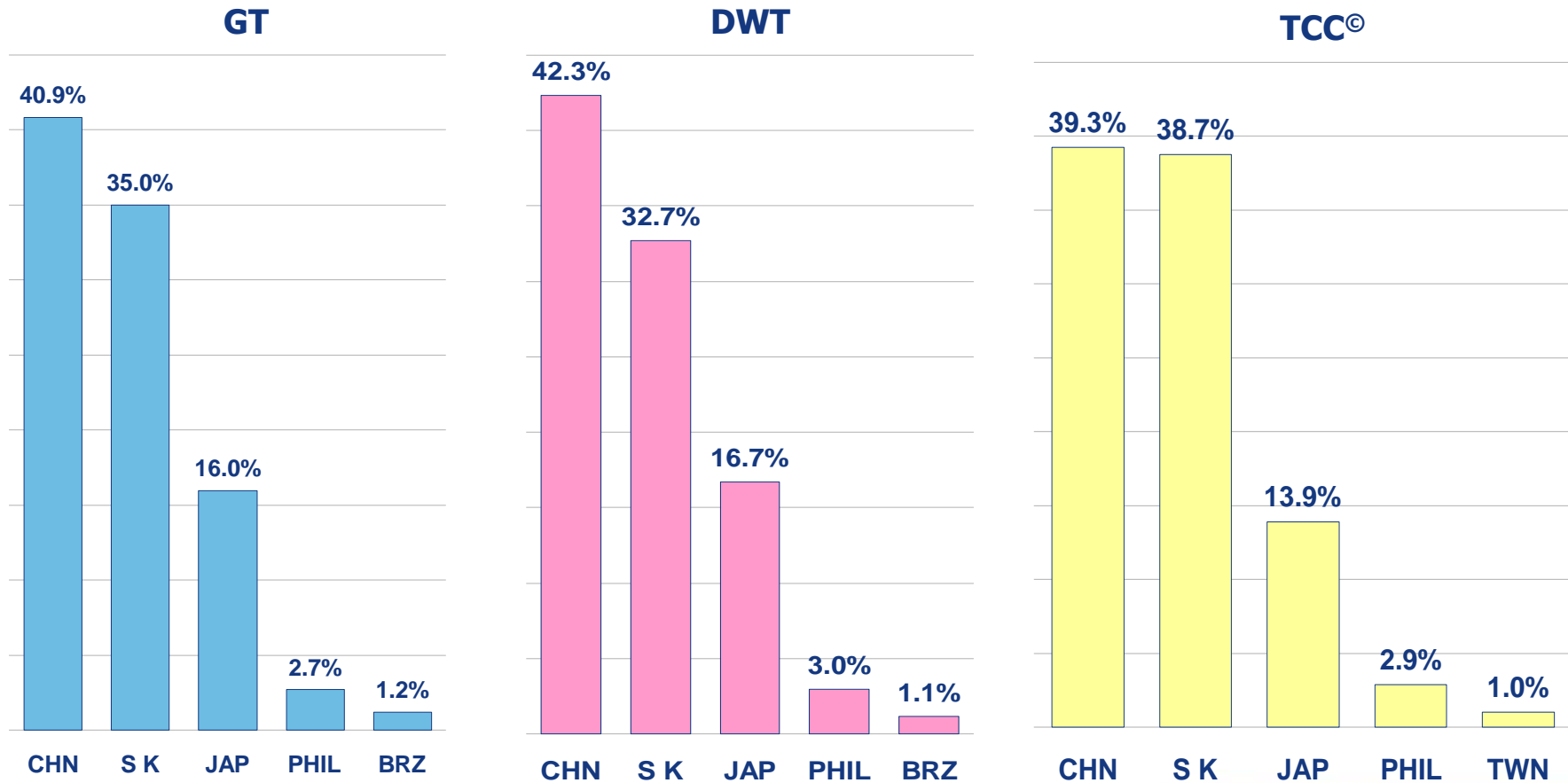


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# Top 5 Builder Countries - Orderbook



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# Introducing Hull Square (m<sup>2</sup>)<sup>©</sup>

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# Introducing Hull Square (m<sup>2</sup>)<sup>©</sup>

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HULL SQUARE (m<sup>2</sup>)

= maximum length of vessel (m) x maximum beam of vessel (m)

PROPOSED PRIMARILY AS A MEANS OF MEASURING SHIPBUILDING  
OUTPUT/CAPACITY

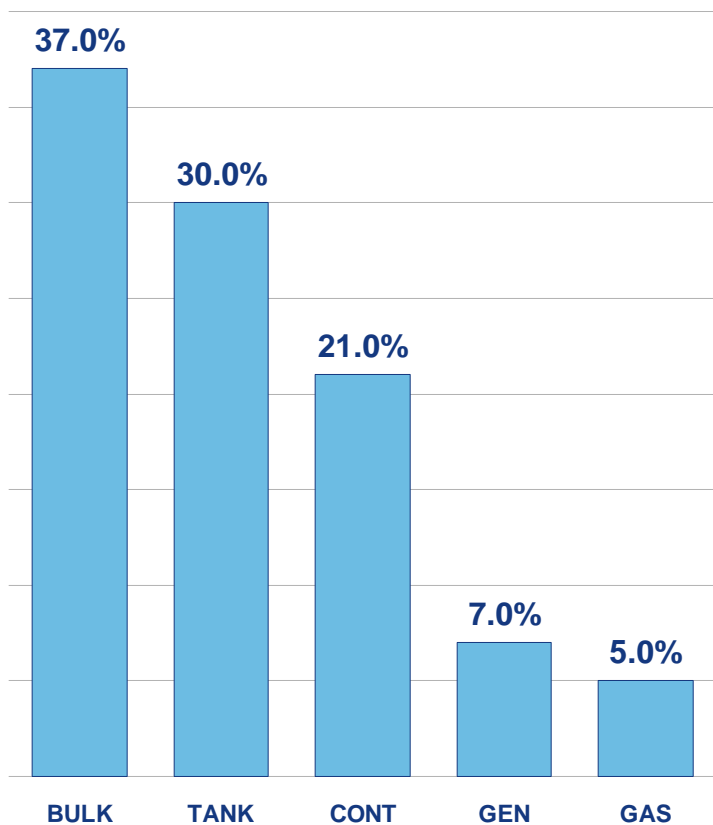
Logic –

- a major determining factor in shipyard output is the square area of the building dock
- WHY not therefore measure orderbook in (m<sup>2</sup>) ?

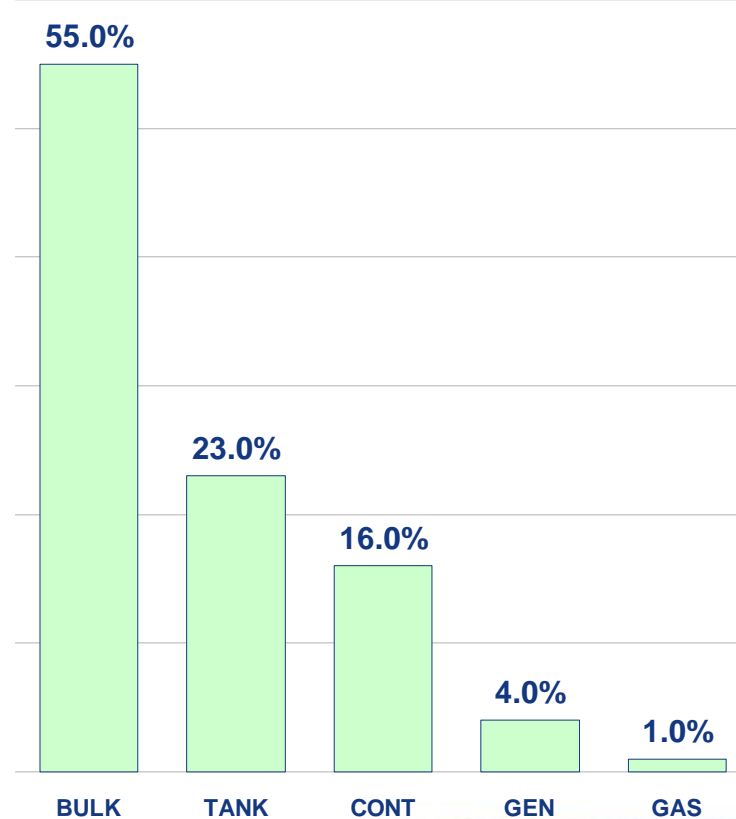


# Hull Square<sup>©</sup> – Vessel Types

**Existing**



**Orderbook**



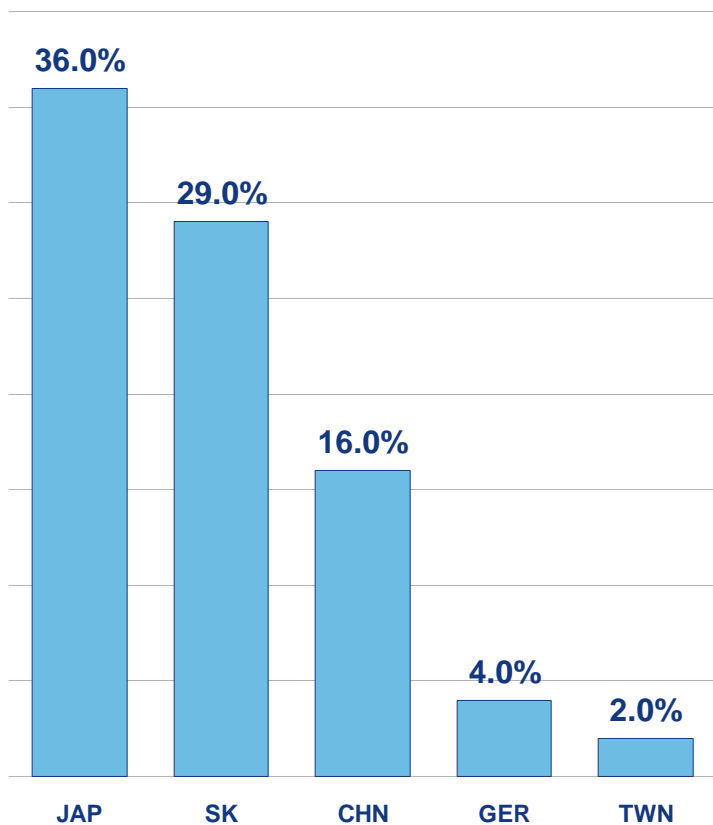
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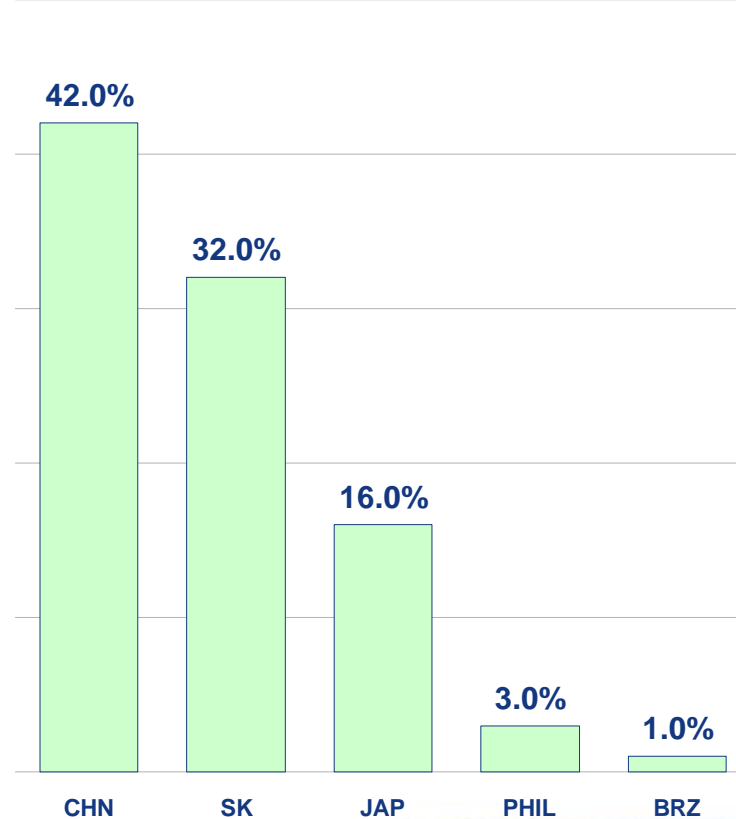
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# Hull Square<sup>©</sup> – Builder Country

Existing

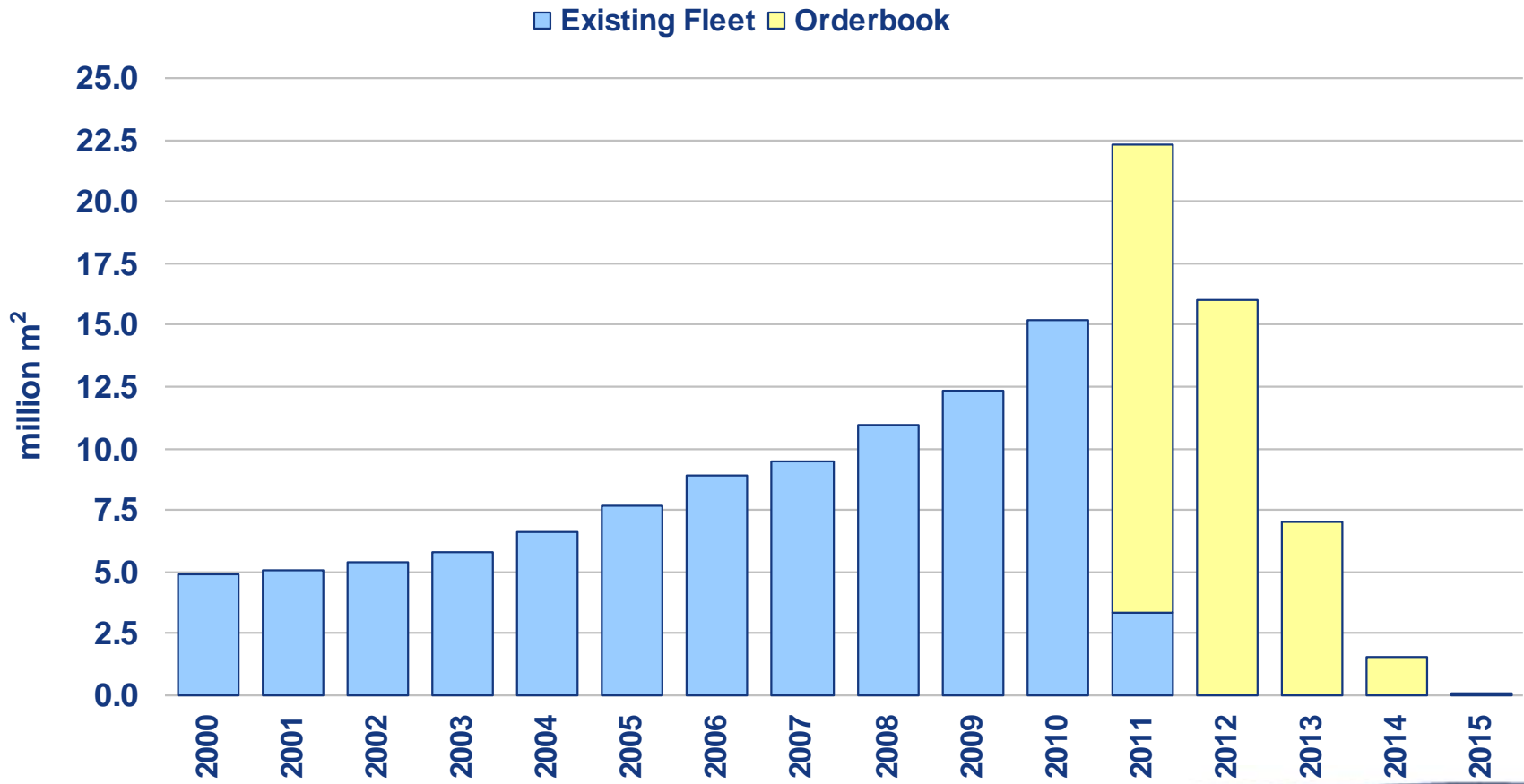


Orderbook



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# Hull Square<sup>©</sup> – Shipyard Output







## Largest Vessels in TCC<sup>©</sup>

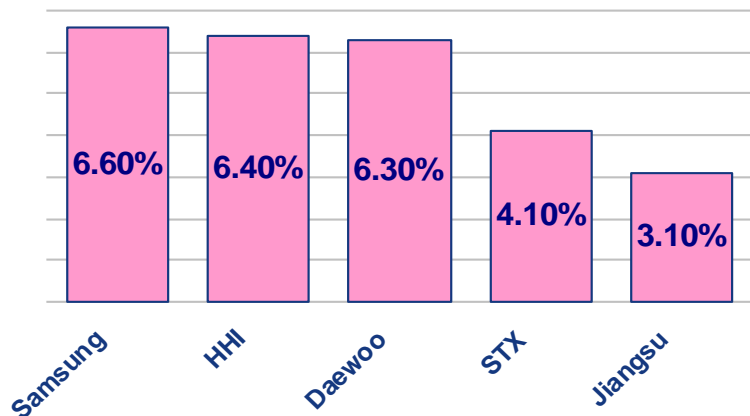
Ship Type	Max TCC <sup>©</sup>	DWT	GT	Hull Square <sup>©</sup>
Ore Carrier	242,424	400,000	153,347	23,530
Bulk Carrier	293,683	259,587	129,325	17,742
Tanker	490,505	441,585	234,006	25,840
Container	686,520	165,000	156,616	23,600
Gas	267,335	152,600	163,922	18,579
General Cargo	83,908	37,000	26,000	5,306



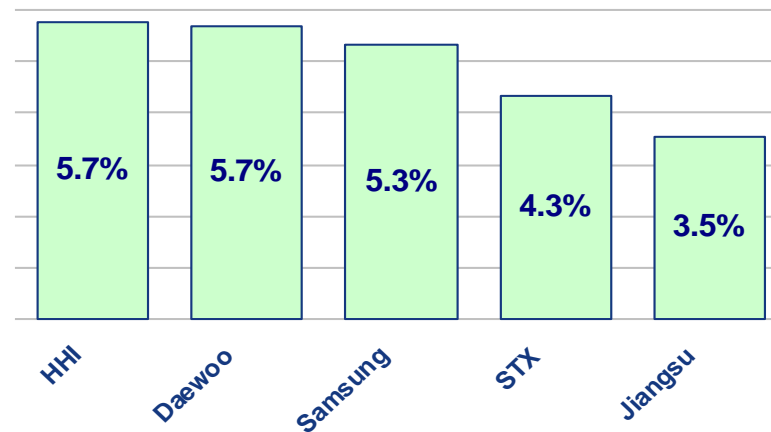
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# Top 5 builders in orderbook

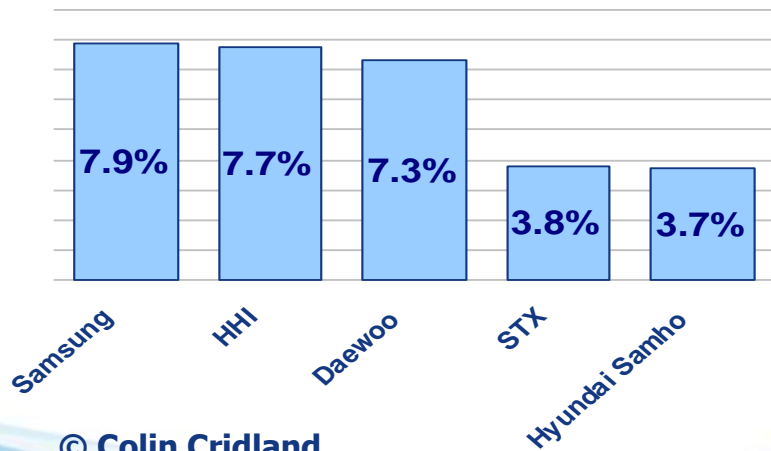
**GT**



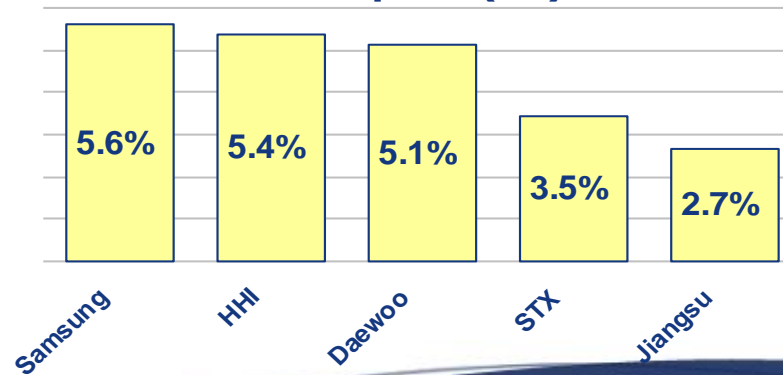
**DWT**



**TCC<sup>©</sup>**



**Hull Square (m<sup>2</sup>)<sup>©</sup>**





# Concluding Remarks

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**TCC**<sup>©</sup> is a far more representative measure for comparing the capacities of vessels across types than either dwt or GT. Reflects better the importance of containerships

**Hull Square**<sup>©</sup> is a more representative measure of shipbuilding output, capacity and therefore of orderbook than dwt, GT or CGT.

**TCC**<sup>©</sup> would be a useful tool in progressing towards a universal economic ship measure by applying a factor representing say ship value, cargo value or freight

**TCC**<sup>©</sup> could be extended to non TEU deck cargo vessels by applying square area of deck multiplied by square root of square area. Passenger vessels might be more challenging in deciding which areas should be included as a accommodating the cargo only (i.e. passengers)

Either **TCC**<sup>©</sup> or **Hull Square**<sup>©</sup> or a combination of the two might be used as a measure of a more universal mechanism by which port charges might be levied and compared



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# **Thank You**

# **Discussion PLEASE**