MAGNITUDE OF THE IMBALANCES IN THE SHIPBUILDING INDUSTRY

Estimation of oversupply of vessels

Oversupply of vessels was estimated as the gap between completions and vessel requirements whereof the latter indicator was derived on the basis of seaborne trade expansion and replacement demand (Figure 1).

Figure 1. Methodological approach to assess past vessel requirements

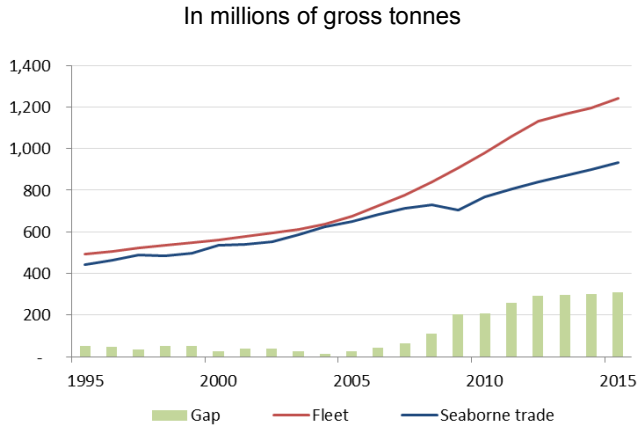
$$\textbf{Oversupply}_{\,t}\ (in\ GT) \;=\; \underset{\sim\ \textbf{vessels completions}_{\,t}\ (IHS)}{\text{Vessels new-buildings}} \;-\; \textbf{Actual new–building requirements}_{\,t}$$

$$\textbf{Actual new–building requirements}_{\,t} \;\Rightarrow\; \textbf{Seaborne trade}_{\,t}\ (Clarkson) \;\;\textbf{Replacement demand}_{\,t}\ (IHS)$$

Source: OECD Secretariat.

Based on this methodology, the largest level of oversupply occurred in 2009 when the estimated gap between vessel completions and vessel requirements reached 77.4 million gt representing 100% of total completions. In total, between 2005 and 2015, the cumulated oversupply reached 297 million gt, representing 23% of the world fleet in 2015. These results are robust with those of a supplementary approach based on vessel supply (proxied by global merchant fleet in gross tons, gt) and vessel demand (proxied by seaborne trade in gt) (Figure 2). The extent of the gap between those two indicators amounted to around 307 million gt in 2015, thereby representing a difference of only 3% in comparison to the alternative approach.

Figure 2. Global merchant fleet and seaborne trade, 1995 - 2015



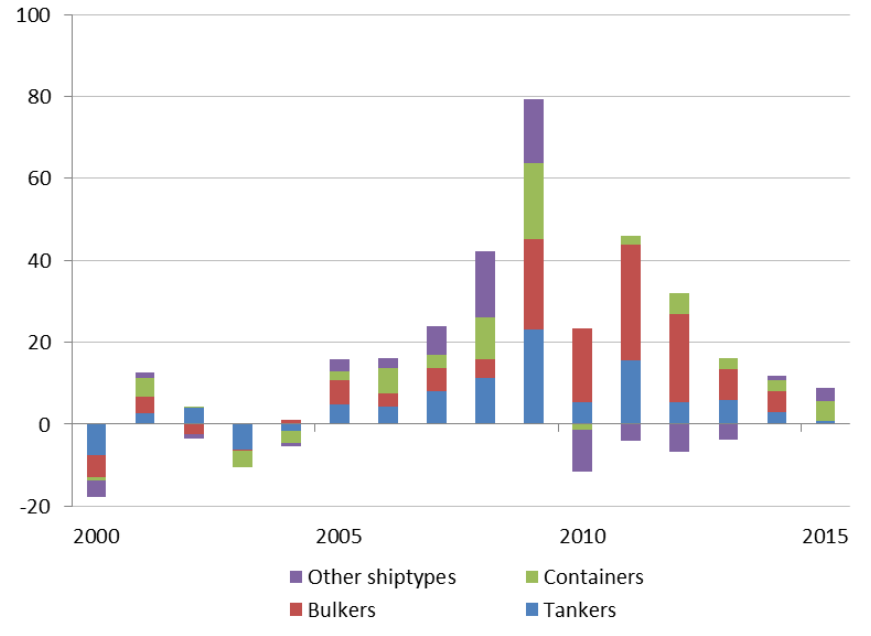
Source: OECD based on IHS Seaweb and Clarkson.

The oversupply situation is still worrisome for most large vessel categories, notably tankers, bulkers and containers (Figure 3). Between 2000 and 2015,cumulated excess supply of tankers reached around 88

1million gt (36% of tanker fleet in 2015), oversupply of bulkers amounted to approximately 122 million gt (29% of bulker fleet) and overproduction of containers reached about 56 million gt (26% of container fleet).

Figure 3. Gap between vessel completions and requirements (2000 – 2015)

In millions of gross tonnes



Note: Tankers include crude oil, oil products and other liquids; Bulkers include bulk dry, bulk dry/oil, self-discharging bulk dry, other bulk dry; Containers include fully cellular containers with and without ro-ro facility.

Source: OECD based on Clarkson Research (2015), IHS World Fleet Statistics Future vessel requirements

Methodology

The methodology to forecast vessel requirement is twofold (Figure 4):

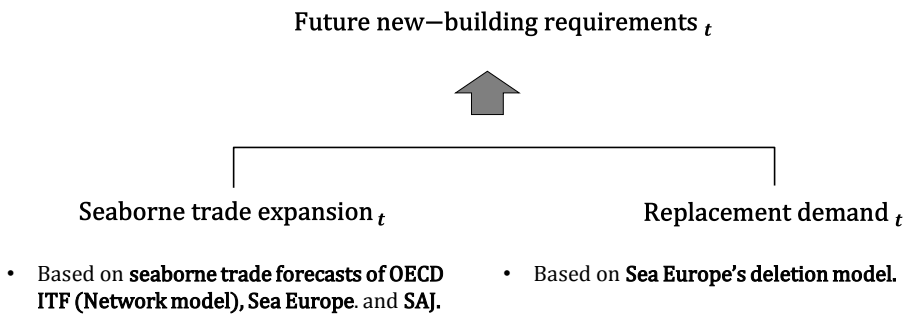
- Future vessel requirements linked to seaborne trade expansion are estimated on the basis of seaborne trade forecasts provided by the International Transport Forum (ITF).
- Survival rates across vessel age are used to assess future vessel requirements on the basis of historical vessel completions.

Seaborne trade forecasts are based on a network model developed by the International Transport Forum (Martinez et al., 2015). This model projects international freight transport activity until 2050 encompassing three world trade scenarios depending on the degree of trade liberalization. The baseline scenario is used for the analytical work[2] presented in this document.

For its analysis, ITF uses the international trade scenarios that were derived by OECD's Economics Department which bases its analysis on a general equilibrium model (Château et al., 2014). OECD's trade scenarios integrate long-term macro-projections for the world economy including GDP, saving, investment and current accounts, with a sector-specific trade model that produces key trade determinants and specialization dynamics of past trends.

On that basis, ITF derives a transport network with centroids for road, rail, sea and air trade, which allows the forecast of future trade of 19 commodities by pre-defined corridors between origin and destination countries encompassing the Indian Ocean, Mediterranean Sea, Atlantic Ocean, Pacific Ocean, South Atlantic and South Pacific.[3] As a reference, these predictions of seaborne trade expansion by ship type are compared to forecasts of selected shipbuilding associations.

Figure 4. Methodological approach to assess future vessel requirements

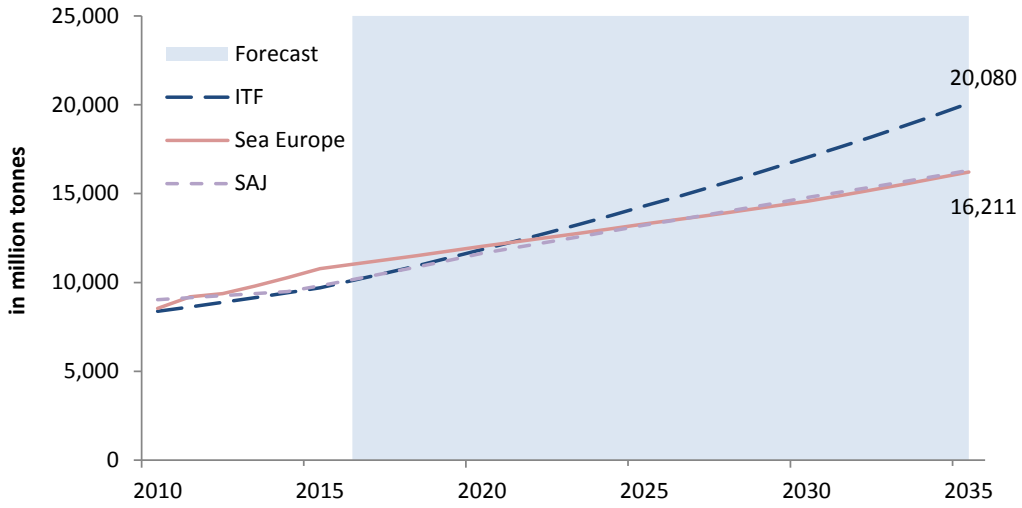


Source: OECD Secretariat.

Vessel requirements linked to seaborne trade expansion

Figure 5 shows seaborne trade projections until 2035 from ITF, Sea Europe and SAJ. According to the ITF's network model, seaborne trade would reach 20.8 billion tonnes in 2035, a higher value than Sea Europe and SAJ that expect seaborne trade to reach 16.2 billion tonnes in 2035.

Figure 5. Seaborne trade projections (2010 - 2035)

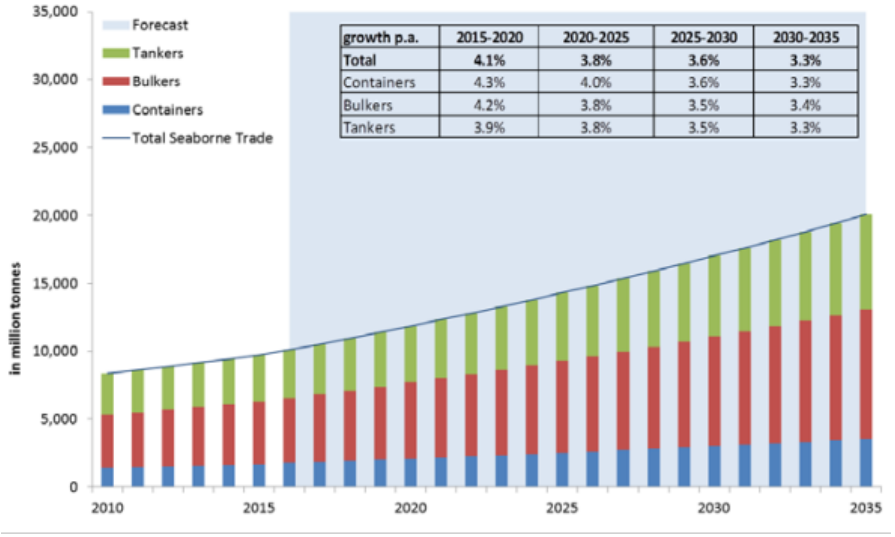


Source: ITF (2015); Sea Europe (2015a); SAJ (June 2015).

Figure 6 shows seaborne trade projections by ship type until 2035 with growth rates for containers ranging from 4.3% per year (2015 – 2020), to 3.3% per year (2030 – 2035); for bulkers from 4.2% to

3.4%; and for tankers from 3.9% to 3.3%. The yearly growth rate for the aggregation of these three ship categories is expected to be 4.1% in the next five years and to decrease to 3.3% at the end of the forecasting period.

Figure 6. Seaborne trade projections for good categories corresponding to three ship types (bulkers, containers and tankers)



growth p.a.	2015-2020	2020-2025	2025-2030	2030-2035
Total	4.1%	3.8%	3.6%	3.3%
Containers	4.3%	4.0%	3.6%	3.3%
Bulkers	4.2%	3.8%	3.5%	3.4%
Tankers	3.9%	3.8%	3.5%	3.3%

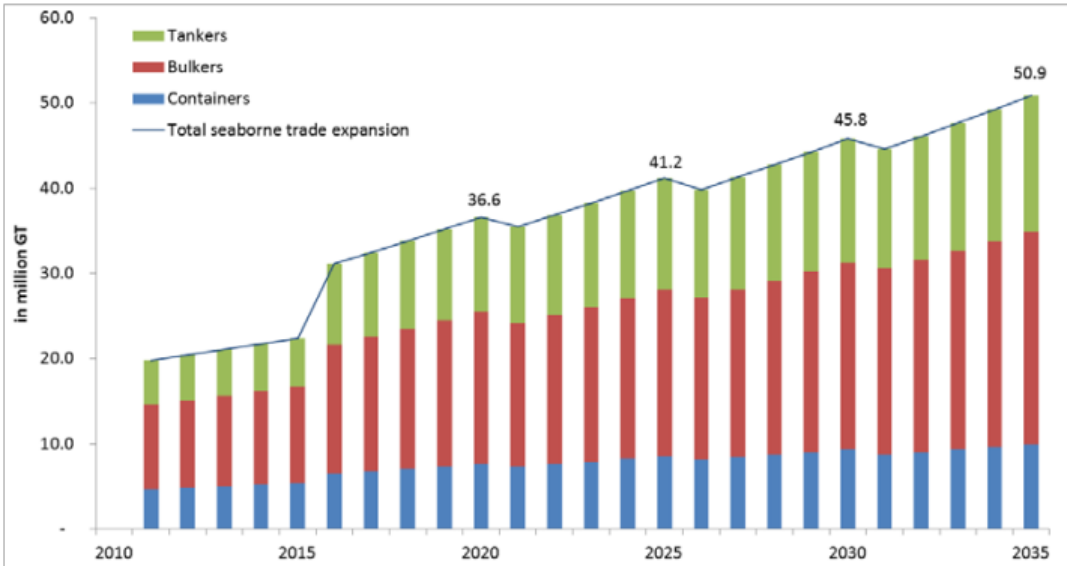
Note: ITF's predictions of seaborne trade by commodities have been grouped by cargo category for each of the three ship types studied. Tankers including chemicals rubber and plastic, crude oil, gas, refined oil / petroleum and coke; containers incl. electronic devices, livestock, other agriculture / fishing, other manufacturing, textile, transport equipment; bulkers incl. coal, food, iron and steel, metal products, other metals / non-ferrous, other minerals / non-metallic, other mining, paper and wood, pulp, print, rice and crops.

Source: OECD based on ITF's seaborne trade forecast (2015).

To derive vessel requirements, seaborne trade is then converted from tonnes into dead weight tonnes (dwt) by using a specific conversion coefficient for each ship type (i.e. 10.0 for containers, 11.3 for bulker and 7.8 for tankers) and subsequently converted into gt by using another specific conversion rate for each ship type (i.e. 0.89 for containers, 0.90 for bulkers and 0.56 for tankers).

For 2015-2035, total vessel requirements are expected to reach 835 million gt in total with 36.6 million gt in 2020, 41.2 million gt in 2025, 45.8 million gt in 2030 and 50.9 million gt in 2035. By ship type, tanker requirements would reach a total of 261 million gt for the years 2015 to 2035, bulkers around 400 million gt and containers approximatively 170 million gt for the same period (Figure 7).

Figure 7. Future vessel requirements linked to seaborne trade by ship type (2010 - 2035)



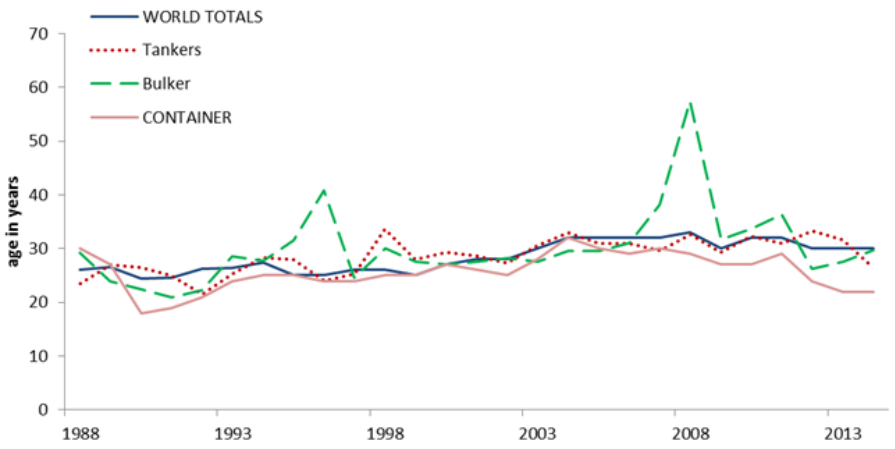
Note: The graph shows vessel requirements follow a linear trend with discrete breaks every five years due to the change in growth rates every five years (as depicted in Figure 6). The decline in growth rates every 5 years is therefore in new vessel requirements linked to seaborne trade expansion visually more pronounced.

Source: OECD based on ITF's seaborne trade forecast (2015).

Assessment of future vessel requirements linked to vessel replacement

An important driver for vessel disposals is the average lifetime of ships which is complemented by other determinants, such as the policy environment (i.e. environmental regulations), bunker fuel costs, technical obsolescence, freight rates, new-building prices, second hand prices and demolition prices (Bijwaard and Knapp, 2008; Knapp et al., 2008). Figure 8 shows the average age of vessels disposed between 1988 and 2014. On average, vessels have been scrapped after 25 to 30 years with differences across ship types for selected economies; while the disposal age of tankers varies between 25 to 30 years and the average lifetime of containers differs between 17 and 26 years, bulkers show a more volatile disposal age ranging between 20 and 35 years with peaks at the age of 40 years in 1996 and even 55 years in 2008. The periods preceding these years were characterised by strong world trade activities with growth rates averaging around 7% in 1992-1995 and 8% in 2004-2007. In such market conditions, ship owners are more inclined to keep ships in operation for a longer time.

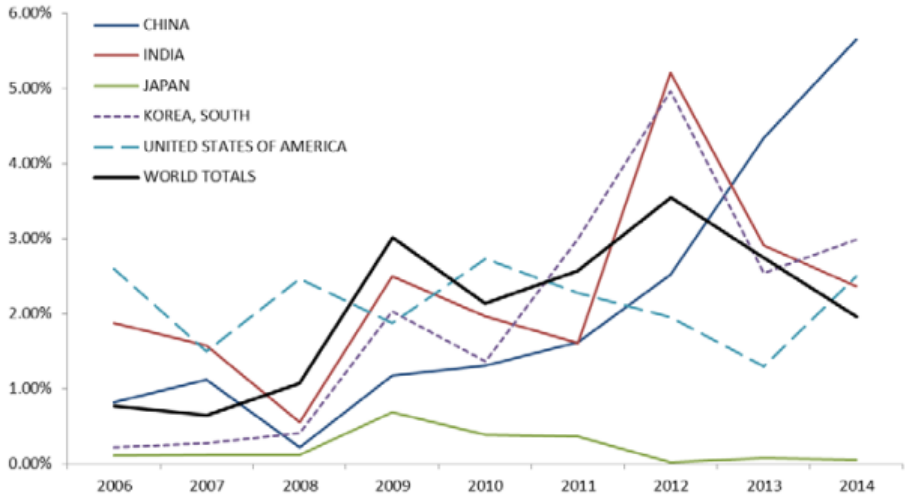
Figure 8. Average age of scrapped vessels by year and ship type



Source: IHS Maritime & Trade

The average scrapping activity relative to the world fleet followed an upward trend from 1% in 2006 to 3.5% in 2012 and then decreased to 2% in 2014. This ratio varies strongly by country with a decreasing share for Japan, an increasing share for Korea to around 5% in 2012 as well as a steady increase of People's Republic of China's (hereafter "China") scrapping activity to roughly 6% of the country's total fleet in 2014 (Figure 9). Note that disposal rates were very low, consistent with the spike in age of scrapped vessels in Figure 8 above.

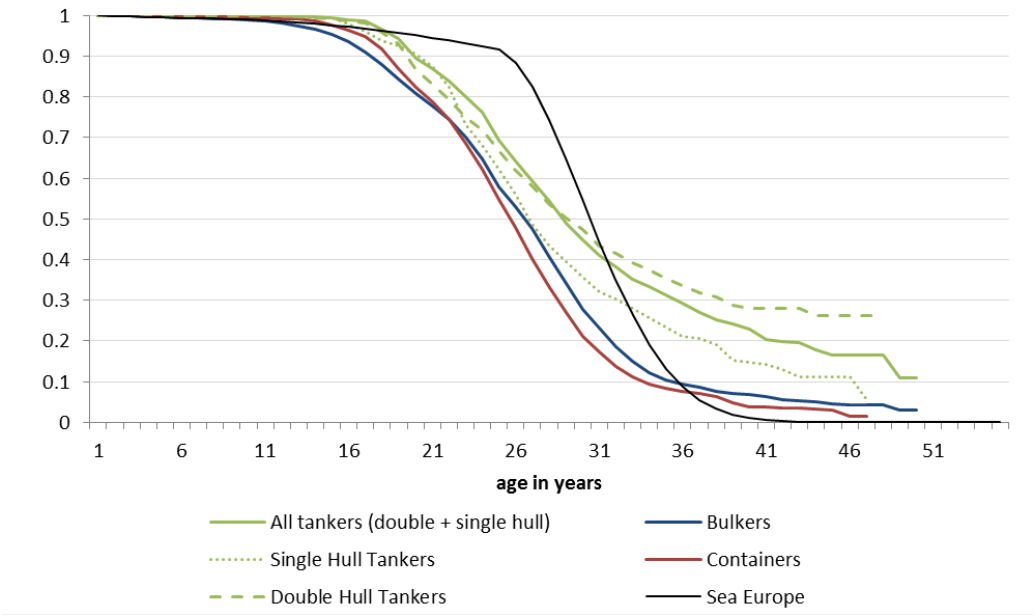
Figure 9. Disposals of vessels as a percentage of fleet by country (2006 – 2014)



Source: IHS Maritime & Trade

Future vessel demolitions are estimated using survival rates by ship type and age (Figure 10). Tankers have in general a higher survival rate over the years than bulkers and containers. Strikingly double hull tankers have still a survival rate of around 25% during their 40 years of age. However, single hull tankers are demolished at an earlier age than those with a double hull – most probably due to the IMO regulation on double hull.

Figure 10. Survival rate by ship age



Source: OECD based on IHS Seaweb (2016).

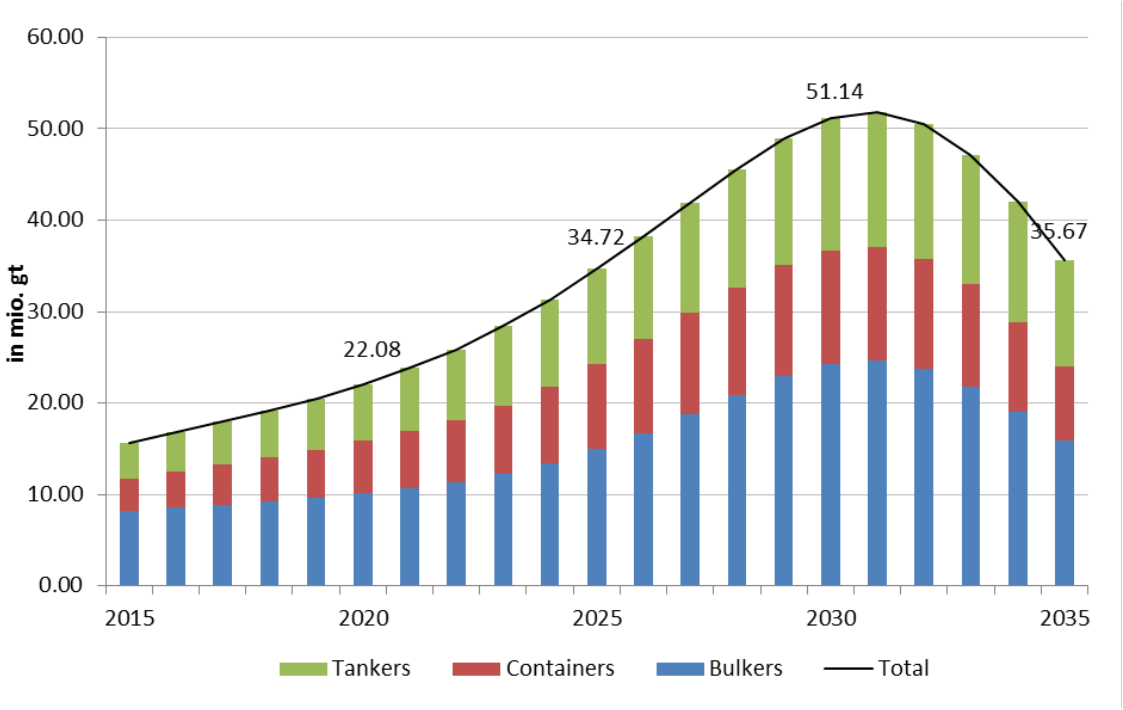
Results of a Cox proportional hazard model show how ships' survival rates are influenced by different determinants (Table 1). The model predicts the likelihood of vessel demolition at a given age with several variables of control, notably on building year, size in gt, owner country, builder country, ship types and economic cycles. The results confirm that bulkers and containers display higher demolition rates than tankers of a given age, ownership country, builder country, and scrapping time. The other coefficients show that ships built in later years have a lower likelihood of being scrapped (i.e. due to technological advancements) and that scrapping activities are higher in economic downward cycles compared to the reference period of 1986 to 2011 (i.e. sustained growth in the industry). Furthermore, ships built in the Netherlands, Norway and Germany as well as Chile display higher survival rates in comparison with Japanese ships. On the contrary, Korean and Chinese ships show a higher probability of scrapping compared to Japanese ones (see Appendix 1)

Table 1. Statistical results of Cox regression

				Shipbuilding Business Cycles			
Building year	*Size in gt*	*Bulkers*	*Containers*	*1965-1975 vs. 1986-2011*	*1976-1980 vs. 1986-2011*	*1981-1985 vs. 1986-2011*	*2012-2015 vs. 1986-2011*
*0.940****	*1.000****	*1.254****	*1.828****	*0.0787****	*0.463****	*3.169****	*3.581****
[-25.74]	*[31.35]*	*[9.001]*	*[16.69]*	*[-3.538]*	*[-4.433]*	*[20.21]*	*[40.61]*

Future vessel requirements by ship type linked to ship disposals are then estimated using demolition rates and past completion levels for the preceding years (Figure 11). Between 2016 and 2035, new vessel requirements linked to disposal activity are expected to reach a total of 690 million gt, where tankers make up around 200 million gt, bulkers account for roughly 315 million gt and containers for about 170 million gt. From 2030 onwards, vessel requirements linked to disposal are expected to decline due to the lower completion activity after the economic crisis.

Figure 11. Future vessel requirements linked to disposals by ship type (2015 – 2035)



Note: Tankers include crude oil, oil products and other liquids; Bulkers include bulk dry, bulk dry/oil, self-discharging bulk dry, other bulk dry; Containers include fully cellular containers with and without ro-ro facility.

Source: IHS Maritime & Trade.

Forecast of total vessel requirements

Total new building requirements are expected to reach around 1 500 million gt between 2016 and 2035, where tankers account for around 460 million gt, bulkers make up about 710 million gt and containers reach a total of roughly 335 million gt (Figure 12 and Appendix 2 for detailed vessel requirements by ship types).

Future vessel requirements are not expected to equal the peak of completions that was reached in 2011 around 2030. As a consequence, without future capacity closures, the excess capacity situation in the shipbuilding industry is likely to remain for the next 15 years (Figure 12).