



WORLD SHIPPING COUNCIL
PARTNERS IN TRADE

Container Supply Review

May 2011

Today, the number of ocean shipping containers in use in the global fleet of container equipment is roughly 18.605 million units or 28.535 million TEU.¹ The issue of sufficient container equipment availability arises in various contexts, but there are few overall analyses of what factors are most relevant to whether supply is constrained or ample. This World Shipping Council (WSC) paper seeks to provide a summary of the factors that influence the size and use of the global container equipment fleet, and the current status of the aggregate supply compared to demand.

This paper seeks to address the question from a global container supply perspective. It does not seek to address specific regional or local container imbalances, which may result where, for example, exports in a particular region may face a container shortage because there are relatively few containerized imports that come to that area, and thus empty containers must be repositioned on the basis of a sufficient forecasted certainty and at a price that justifies the repositioning of the equipment to such an area.

This paper concludes that equipment supply will be tight during the 2011 peak shipping season, and that proper planning and forecasting by shippers and carriers will be important to manage through times of constrained equipment supply.

BACKGROUND

The global recession of 2009 was felt deeply in the container manufacturing sector, which had seen demand for new containers average in excess of 3 million TEU a year for the previous five years. In 2009, however, world container production of new boxes was just 450,000 TEU, which included orders held over from 2008.² This resulted in a decline in the total global container fleet of 1.4 percent, after years of continuous expansion.

The demand for existing containers was also weak in 2009 when global container cargo volume declined for the first time in history. This meant that at the end of 2009, despite the lack of new container production, millions of empty containers were idle and available for use. Carriers therefore, did not anticipate that the global fleet would need to be supplemented by new containers until the second half of 2010, when the normal seasonal cargo demand surge usually

¹ A TEU is a twenty foot equivalent unit. TEU figures are calculated in terms of container length. 20ft=1.00; 24ft=1.20; 28ft=1.40; 30ft=1.50; 40ft=2.00; 43ft=2.15; 45ft=2.25; 48ft=2.40; 53ft=2.65.

² Containerisation International Market Analysis: Container Leasing Market 2010

occurs. As a result, in April 2010, *Containerisation International* projected a full year output of new boxes at 1.6 million TEU, most of which would be delivered late in the year.

Instead, contrary to forecasts, cargo demand surged early in the year, utilizing the surplus in the existing container fleet. This unforecasted demand was exacerbated by the simultaneous conversion of more liner services to slow-steaming in order to reduce fuel costs, which required the use of more containers. Carriers and leasing companies turned to container manufacturers for new production; leasing companies purchased about 60 percent of the new production. It took some time for factories to increase their production capacity to meet the demand, but by the end of 2010, it is estimated that approximately 2.5 million TEU were produced.

The shortage of containers in 2010 caught carriers off-guard and forced them to take a number of aggressive and often costly steps to improve the availability and utilization of the existing fleet. These included: evacuating empty containers from surplus regions by deploying extra vessels just to transport the empties; reducing the length of time that empty containers remained idle; and delaying disposal of older containers.

Container factory production has been restored in 2011, yet several sources have stated that container supply may be insufficient to meet demand in 2011. This paper attempts to review the question of adequate container supply in more detail.

ANALYTICAL APPROACH

A number of sources provide information about either the global container fleet or the global cargo demand that will utilize those containers. The more difficult and relevant analysis is whether the expected container fleet size is sufficient to handle the expected cargo demand. This is in large part because a number of market forces affect the availability of containers, and their impacts are difficult to quantify and predict. Therefore, we sought to evaluate each of those factors independently utilizing multiple sources, including discussions with senior equipment experts at WSC member companies and industry analysts. The results follow and a list of sources used can be found at the end of the paper.

EARLY INDICATORS OF CONTAINER SUPPLY

Industry experts and analysts who monitor container supply look at projections in comparison to historical patterns for a number of metrics, as an early indicator of whether the global container supply will be sufficient. Four common metrics are: new container production; container versus vessel slot ratio (known as the “Box to Slot Ratio”); rate and volume of the scrapping of old containers (Scrapping Rate); and, the age of the carrier-owned fleet. Additionally, we felt it would be meaningful to look at the ratio between the actual cargo volume moved each year and the size of the container fleet for that year. That relationship is calculated and discussed under Container Traffic to Container Fleet Ratio.

- **New Container Production**

As evidenced by the table from *Containerisation International* below, container production averaged just over 3 million TEU per year for the five-year period preceding the recession year of 2009.³ The combined production of 2009 and 2010, however, equated to just less than 3 million TEU (2.95 million)⁴. As a result, at the start of 2011, the global container fleet had approximately 3 million fewer containers compared to levels to which the industry had become accustomed.

GROWTH AND REPLACEMENT OF GLOBAL CONTAINER TEU FLEET FOR 1990-2009 AND PROJECTED 2010-15						
	Fleet addition	%*	Fleet replaced	%*	Total output	End-year fleet size
Historic profile						
pre-1990	5,960,000	-	2,275,000	-	8,235,000	5,960,000
1990	415,000	7.0	390,000	6.5	805,000	6,375,000
1991	530,000	8.3	390,000	6.1	920,000	6,905,000
1992	725,000	10.5	410,000	5.9	1,135,000	7,630,000
1993	480,000	6.3	495,000	6.5	975,000	8,110,000
1994	690,000	8.5	460,000	5.7	1,150,000	8,800,000
1995	930,000	10.6	465,000	5.3	1,395,000	9,730,000
1996	820,000	8.4	470,000	4.8	1,290,000	10,550,000
1997	935,000	8.9	545,000	5.2	1,480,000	11,485,000
1998	960,000	8.4	520,000	4.5	1,480,000	12,445,000
1999	1,025,000	8.2	515,000	4.1	1,540,000	13,470,000
2000	1,405,000	10.4	525,000	3.9	1,930,000	14,875,000
2001	655,000	4.4	625,000	4.2	1,280,000	15,530,000
2002	1,030,000	6.6	710,000	4.6	1,740,000	16,560,000
2003	1,525,000	9.2	875,000	5.3	2,400,000	18,085,000
2004	1,880,000	10.4	1,080,000	6.0	2,960,000	19,965,000
2005	1,450,000	7.3	1,150,000	5.8	2,600,000	21,415,000
2006	1,920,000	9.0	1,180,000	5.5	3,100,000	23,335,000
2007	2,900,000	12.4	1,350,000	5.8	4,250,000	26,235,000
2008	1,900,000	7.2	1,350,000	5.1	3,250,000	28,135,000
2009	-1,050,000	-3.7	1,500,000	5.3	450,000	27,085,000
Projected profile						
2010	550,000	2.0	1,450,000	5.4	2,000,000	27,635,000
2011	1,850,000	6.7	1,550,000	5.6	3,400,000	29,485,000
2012	2,700,000	9.2	1,600,000	5.4	4,300,000	32,185,000
2013	2,750,000	8.5	1,650,000	5.1	4,400,000	34,935,000
2014	2,700,000	7.7	1,800,000	5.2	4,500,000	37,635,000
2015	3,000,000	8.0	2,000,000	5.3	5,000,000	40,635,000
* = percentage of preceding end-year fleet size						

Source: Containerisation International Market Analysis: Container Leasing Market 2010

Current production estimates for 2011 range from 3 million to 3.5 TEU. This is consistent with the historical annual production, but not sufficient to make up for the production loss

³ CIMC and Singamas are the two largest container manufacturers. Alphaliner has estimated that these two manufacturers account for approximately 60-70 percent of the market.

⁴ At the time of the CI table issuance (September 2010), total output for 2010 was projected at 2 million TEU. Current estimate for 2010 final output is 2.5 million TEU.

of 2009 and 2010, when manufacturers had to dismiss workers and shut-down production lines. These are steps the container manufacturers presumably do not want to repeat. Based on the current projections for 2011, manufacturers are expected to operate at about 60-65 percent of their total maximum production capacity of 5.5 to 5.7 million TEU. Output seems to be on-track to deliver the projected 3.5 million TEU with a Q1 2011 estimated output at 900,000 TEU. It is probable that the manufacturers could produce an incremental 500,000 to 1 million TEU at current production-line and staffing levels if the orders are there. However, it is believed that an annual output of more than 4.5 million TEU would not be possible without increasing production-lines and staffing.

Prices are currently at an all-time high, reportedly exceeding \$3,000 per TEU.⁵ When demand for new containers is strong, as it is in 2011, prices are likely to remain high. These high prices in turn can obviously restrain carriers' decisions to order more equipment if cargo volume forecasts cannot ensure full year-round utilization of that equipment. Additionally, carriers' capital budgets for 2011 were generally fixed before the start of the year, thus constraining their ability to further increase their purchases of more containers beyond budgeted quantities.

It seems likely that container manufacturers will capitalize on the strong demand and produce no more than the maximum level that can be produced with *existing* production lines and staffing. This is estimated to be 4 to 4.5 million TEU, or 0.5-1 million TEU above current order levels, and any incremental volume will probably be produced only with firm advance orders.

Some additional production capacity is expected to be added in 2012. In the Singamas Annual Report 2010, the Chairman's Statement reports on the acquisition of land in Qidong, near Shanghai, where the company plans to build two new factories, which are expected to be operational in 2012.⁶

- **Box-to-Slot Ratio**

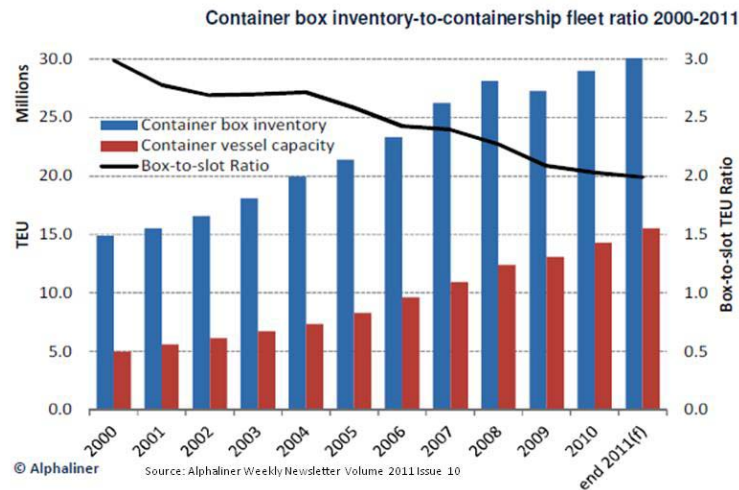
A common benchmark for indicating whether container supply is likely to be sufficient to handle cargo volume is to look at a comparison of the container box inventory to the container vessel capacity, as *Alphaliner* did in March 2011.

The *Alphaliner* review, entitled "Container Shortage to Hit Shippers," noted that "the box-inventory-to-vessel capacity ratio will drop to 1.99 by the end of this year from 2.03 in 2010. This is the lowest ratio on record. It lies way below the 2.99 boxes per slot of 2000."⁷

⁵ Container Production and Average Prices 2000-2010, *Alphaliner Weekly Newsletter* Volume 2010, Issue 25, indicates price per TEU was approximately \$1,500 in 2000, \$2,250 in 2008 and climbing toward \$3,000 at mid-year 2010.

⁶ Singamas Annual Report, 2010.

⁷ *Alphaliner Weekly Newsletter*, Volume 2011 Issue 10, 01.03.2011 to 07.03.2011, p. 1.



This trend does support the view that there may be a shortage of container supply; however, this ratio is not the only indicator, or even the most definitive indicator, of whether sufficient container supply will exist. As the report also notes, part of the decline in the ratio is due to more efficient management of container equipment by carriers. While difficult to quantify, some industry experts argue that the decline in the ratio over the past decade results almost exclusively from more efficient equipment management by carriers. There is some merit in the argument. Without efficiency improvements, the box-to-slot ratio would have remained constant or grown as demand grew, and would have risen further as a result slow-steaming. However, we saw in the container production review that annual production remained fairly constant at around 3 million TEU, even as cargo demand grew. So, the carriers' only choice was to "do more with less" and improve the efficiency of the existing fleet.

This increase in the efficiency of container utilization can only be accomplished by carriers more efficiently managing origins and destinations for cargo bookings, managing equipment depots, being more careful about where and when they will position empty containers, and more strict about how long customers can wait to pick up their cargo or keep containers without paying a fee.

The global cargo demand for 2011 is projected to be about 11 percent above the 2008 levels. Container production forecasts for 2011 at 3.5 million TEU represent 26 percent more than the 2008 production, which is a significant growth but not enough in TEU terms to replace the container production lost in 2009 and 2010.

- **Container Traffic to Container Fleet Ratio**

Perhaps a more meaningful ratio would be to look at the relationship between the loaded TEU moved for each TEU of container equipment in the global fleet.

Several patterns emerge when reviewing these ratios. From 1990 to 2002, the Traffic/Fleet ratio remained fairly constant in the 4.5 to 4.7 range, despite some market fluctuation in container cargo demand during the same period.

YEAR	World Container Traffic (Million TEU)	Growth	End-Year Fleet Size (Million TEU)	Growth	Traffic/Fleet Ratio
1990	28.7		6.375		4.50
1991	31.3	9.06%	6.905	8.31%	4.53
1992	34.1	8.95%	7.63	10.50%	4.47
1993	37.1	8.80%	8.11	6.29%	4.57
1994	41.9	12.94%	8.8	8.51%	4.76
1995	46	9.79%	9.73	10.57%	4.73
1996	49.1	6.74%	10.55	8.43%	4.65
1997	54	9.98%	11.485	8.86%	4.70
1998	56.3	4.26%	12.445	8.36%	4.52
1999	61.6	9.41%	13.47	8.24%	4.57
2000	68.3	10.88%	14.875	10.43%	4.59
2001	70.7	3.51%	15.53	4.40%	4.55
2002	78.9	11.60%	16.56	6.63%	4.76
2003	91.9	16.48%	18.085	9.21%	5.08
2004	105.3	14.58%	19.965	10.40%	5.27
2005	115.5	9.69%	21.415	7.26%	5.39
2006	127	9.96%	23.335	8.97%	5.44
2007	142.4	12.13%	26.235	12.43%	5.43
2008	148.9	4.56%	28.135	7.24%	5.29
2009	134.56	-9.63%	27.085	-3.73%	4.97
2010E	153	13.70%	27.635	2.03%	5.54
2011F	165.6	8.24%	29.485	6.69%	5.62
2012F	177.7	7.31%	32.185	9.16%	5.52

Source: World Container Traffic - Drewry Annual Reports; End Year Fleet Size - CI Market Analysis: Container Leasing Market 2010

In 2003, the ratio crossed over the 5.0 mark, likely due to the unexpected surge in cargo volume. Except for the recession year of 2009, it has remained over 5 since 2003. Increased demand in the short-haul intra-regional trades, like Intra-Asia, would certainly contribute to carriers' ability to increase the number of TEU moved for each TEU of container equipment. Additionally, more efficient handling of the container fleet, as discussed in the Box to Slot Ratio section above, would also contribute to an increased ratio here.

However, perhaps most telling is that in 2010, when container shortages were clearly felt in various locations at certain times of the year, the Traffic/Fleet ratio reached a 20 year high of 5.54. While this is arguably positive from an asset utilization perspective, we know that, at this ratio, equipment shortages did exist.⁸

⁸ There are numerous variables that may affect an individual carrier's "traffic/fleet" ratio. For example, a carrier with a substantial presence in a long-haul trade, such as Asia-Europe, will get fewer equipment turns per year than a carrier operating in short-haul trades. Similarly, a carrier operating in a balanced trade will be able to transport more cargo with its equipment than it could when it operates in an unbalanced trade and must reposition empty equipment.

Based on current forecasts, the 2011 Traffic/Fleet ratio is expected to be higher than 2010. This suggests that container shortages in some locations, and particularly during peak volume periods, are likely in 2011. By comparison, if one applied the 2008 ratio of 5.29 to the projected cargo demand for 2011, it would project a required container fleet of 31.304 million TEU or 1.82 million TEU above the current 2011 projected container fleet size.

The current outlook for 2012 improves slightly.

- **Box Disposal**

The average annual container disposal rate over the past decade has been approximately 5 percent of the fleet. However in 2010, when production capacity was limited and demand for new boxes surged, *Nomura* estimated a disposal rate as low as 2.2 percent, but revised that to 3.8 percent, in their *Container Manufacturing* update of January 2011. A slower than average rate of disposal is also expected in 2011 (at 4.5 percent), with a return to the historical average pattern in 2012 (at 5.3 percent).

Fewer disposals mean more boxes are available for use, at least through 2011. If an estimated 1.5 percent more containers were retained in the fleet, that would represent about 415,000 TEU or about 14 percent of the 3 million containers not supplied to the inventory due to the lack of production in 2009-2010.

- **Age of Container Fleet**

The table below is from *Containerisation International Market Analysis: Container Leasing Market 2010*, published in September 2010. The average age of the container fleet over the 16 years is 5.175 years. In 2005, the age of the shipping companies' owned containers (in contrast to leased containers) became less than the average age of the global fleet, indicating that carriers were selling or disposing of containers more quickly, which corresponds to high production, and related carrier purchases, in the same years. In 2009, when new production was limited and cargo volume declined, carriers reverted to the practice of holding on to their equipment longer. Although the figures for 2010 have not yet been released, we would expect the 2009 pattern to continue through 2010 into 2011 and possibly even 2012 in order to help offset the production shortfall of 2009 to 2010.

CALCULATED AVERAGE AGE IN YEARS OF GLOBAL CONTAINER TEU FLEET BY OWNER CATEGORY FOR 1994-2009				
	Leasing company	Shipping company	Other transport operator*	Total
END-1994	5.10	4.90	4.70	5.00
END-1995	5.00	4.85	4.95	4.90
END-1996	5.00	4.90	5.20	4.95
END-1997	4.85	5.00	5.10	4.90
END-1998	4.90	5.15	4.80	5.00
END-1999	5.05	5.35	4.75	5.15
END-2000	5.10	5.40	4.65	5.20
END-2001	5.45	5.70	4.80	5.50
END-2002	5.45	5.90	4.95	5.65
END-2003	5.40	5.70	5.10	5.50
END-2004	5.20	5.40	5.20	5.30
END-2005	5.35	5.15	5.40	5.25
END-2006	5.25	5.00	5.45	5.15
END-2007	5.05	4.75	5.30	4.90
END-2008	5.05	4.85	5.25	4.95
END-2009	5.45	5.45	5.35	5.50

* = shipper, forwarder, mvocc, and rail, intermodal, military and specialised tank operator

While it is difficult to quantify the precise impact of the aging fleet to the 2011 supply, it is clear that more boxes will be available for use longer. That will somewhat mitigate the effects to the fleet of certain operating conditions, like slow-steaming.

OTHER FACTORS AFFECTING CONTAINER SUPPLY

It has been noted that a number of other factors might affect the availability of containers in 2011. These include the length of time shippers use a container; the use of slow-steaming by ocean carriers; and more recently, the loss of containers resulting from the Japanese tsunami and subsequent radiation contamination.

- **Shippers' Use of Equipment**

The number of days granted to shippers for use of a container -- at origin for loading, at the discharge port before pick-up, and at destination for storage and unloading -- has been a contentious issue between carriers and their customers. The longer the time that a container is assigned to any one shipment, the less time the container is available for other shipments and customers. The adverse effect on container availability is felt more strongly during times of peak demand.

Because "free-time" terms are part of the confidential commercial arrangement between carrier and customer, terms can vary greatly. There is no set standard, and therefore no basis for determining what is extensive or unusual free-time. Shipper needs vary; carrier operating standards vary. As a result, it is not possible to quantify the impact to the global fleet of the issuance of free-time. However, the longer a shipper holds a container (whether as part of "free time" or when subject to a per diem charge) the more it constrains a carrier's efficient use of its supply of equipment.

- **Slow-steaming**

The practice of sailing ships at slower speeds in order to reduce fuel consumption and greenhouse gas emissions is now an accepted operating practice in liner shipping. It first

began in 2008 but proliferated in 2009, consistent with the decline in global trade and with carriers' economic duress. During that year, both container and vessel assets were plentiful. In 2010, the demonstrated economic advantages caused more services to be converted to slow-steaming at a time when cargo demand rebounded unexpectedly; new container production did not return to normal levels until the second half of the year.

Almost all services that converted to slow-steaming did so by adding another ship to the service in order to maintain the same weekly schedule. This means that a service that now operates as a slow-steaming service uses more containers on that service than it did before conversion to slow-steaming. There is broad consensus on this point. But, how much "more?"

SeaIntel Maritime Analysis built for WSC a "Simple Slow-steaming Equipment Impact Model" to analyze the effect on required containers on a particular service that converts to slow-steaming. Based on examining a number of representative services, the model concludes that some services could require as much as 10 percent more containers, than if the service was not slow-steaming. On services that already have a very long ocean voyage, like Asia to North Europe, however, the percentage increase would be lower, and probably around 5 or 6 percent. Additionally, it is important to note that not all services are slow-steaming.

Based on WSC analysis of various service examples, a review of public statements, and discussion with WSC member companies, we estimate that the introduction of slow-steaming, which is now largely implemented, requires 5 to 7 percent more containers than would have been needed to handle the same cargo volume on the same services without slow-steaming.⁹

If slow-steaming, now fully operational in 2011, requires 5 percent more boxes than were needed before slow-steaming was fully operational – for example, the end of 2008 - that would equate to a requirement for an incremental 1.4 million containers.

- **Loss of Containers in Japan**

The March 11 tsunami in Japan destroyed many containers, although specific quantitative estimates are difficult to obtain. Bloomberg reported that Quam Securities Co., of Hong Kong has estimated that the Japan tsunami and quake could potentially generate demand for up to an additional 1 million replacement boxes over two years. This is a preliminary estimate and seems high, but it will be some time before the actual effect can be quantified.

⁹ This estimate assumes that all other operating conditions, including land-side dwell time for loads and empties, trade imbalance, etc., remain the same before and after slow-steaming.

CONCLUSIONS

- Lack of normal container production levels in 2009 and 2010 means that at the start of 2011, the global container fleet had approximately 3 million fewer containers compared to what would have existed if production had been at levels to which the industry had become accustomed.
- Container production output is on-track to deliver the 2011 projected new container supply of 3.5 million TEU.
- Even if there were more firm advance incremental orders, it is unlikely that manufacturers would produce more than 4 to 4.5 million TEU in 2011.
- Container prices are at an all-time high and are expected to remain high through 2011.
- The container fleet will be constrained in 2011 as each available container TEU will need to handle more cargo than ever before, with a projected Container Traffic to Container Fleet Ratio of 5.62. By comparison, if we apply the 2008 ratio of 5.29 to the projected cargo demand for 2011, it would compute a required container fleet of 31.304 million TEU or 1.82 million TEU above the current 2011 projected container fleet size.
- Many factors affect the availability of containers, and carriers have historically demonstrated an ability to adjust operating practices as conditions change while box supply remains fairly fixed. This is evidenced by both the declining Box to Slot Ratio and the increasing Container Traffic to Container Fleet Ratio.
- The effects of many factors on container supply and availability cannot be quantified; however, there are quantitative estimates that since 2008, the container fleet has seen:
 - A production loss of 3 million TEU
 - The adoption of slow-steaming, requiring an estimated additional 1.4 million TEU
 - A loss in Japan of as much as 0.5 to 1 million TEU
- The forecasted container supply to traffic demand ratio indicates that the second half of 2011 and 2012 will likely be tight enough to cause equipment supply difficulties in some areas.
- Delaying container disposal in 2011, as occurred in 2009 and 2010, will offset some of the projected shortfall by making more total containers available for use in 2011. If an estimated 1.5 percent more containers were retained in the fleet that would represent about 415,000 TEU.
- Reducing the time shippers hold containers would help increase the efficient utilization of the existing container fleet.
- Precise execution of empty container repositioning plans, and reducing both loaded and empty container dwell-time, will enable more container shipments to be moved with the same amount of TEU in the container fleet.

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