REALIGNMENT OF NATIONAL SUPPLY CHAINS

Executive Summary

There is some evidence that the use of land transport for east-west freight is being affected by a structural change in Australian retail supply chains, especially consumer goods. The model whereby retailers operated national distribution centres in Sydney and/or Melbourne from which to supply western states appears to be changing. Many major retailers are setting up regional distribution centres in Perth, which are supplied by imports into Fremantle, rather than domestic manufactures or imports via land or coastal shipping from the east coast ports.

Retailers report that the cost of long distance Australian freight, the uncompetitiveness of Australian manufacturing and the rapid growth in the population of Perth have contributed to this phenomenon. The improvement in freight consignment tracking systems has also allowed companies to reduce warehouse usage and simplify their chains, especially for Asian imports. Several retailers have in effect, moved some of their national distribution activities off-shore, into hubs in locations such as China and Malaysia.

Effectively what appears to be happening is the replacement of traditional east-west supply chains in some key sectors with rapidly emerging north-south supply chains.

New large, regional retail distribution centres have recently been established in the newer logistics precincts of Perth including Forrestfield, Hazlemere and Jandakot Airport. Containers will increasingly be delivered direct to these locations by road (and possibly by rail/road) from the Port of Fremantle, movements which will, to some extent, replace short haul rail-road transfers from the Kewdale Rail Precinct to nearby warehouses.
The published data on freight does not yet reflect the impact of these changes, which have been implemented over the last 12-18 months. However, information from Brookfield Rail and the major rail freight providers suggests that east-west freight volumes have plateaued or fallen slightly over the last 24 months. By contrast, port trade data clearly shows the rising importance of import of household sector consumer goods into Fremantle, especially from China, in the last few years.

For certain categories of containerised freight, these trends confirm that the importance of the east-west freight corridor is being supplanted by a north-south axis, reflecting the shift of Australian manufacturing capacity to Asia, and the development of highly efficient international supply chains, particularly in the retail sector.

Freight on the east-west corridor is critical to the Western Australian economy, but data explaining freight trends is thin on the ground. Overall freight volumes on rail can be estimated from Brookfield Rail data, and coastal freight volumes can be gained from port trade data, but a breakdown of freight types is not readily available.

A 2008 BITRE study of interstate freight is a good platform for study, but follows a top-down statistical approach to data rather than an intuitive approach. Its modal forecasts to 2030 are therefore generally inadequate. Prediction of future freight volumes requires an organic understanding of the nature of freight services required by each sector of the economy.

Future freight records on the east-west land corridor will indicate reduced freight volumes. However, retail and general freight usage trends can be swamped in the aggregated data by the ups and downs of bulk freight volumes (eg minerals concentrates, mining inputs etc) which can involve higher volumes, particularly on rail and sea.

Our understanding of, and ability to predict, long distance freight volumes would be enhanced by a more systematic approach to data collection and analysis for the east-west corridor, which could include:

- more detailed periodic reporting by Brookfield Rail on the scale and nature of rail freight
- equivalent reporting of port trade containerised and break-bulk freight commodities
- permanent traffic count data collection at points along the Great Eastern Highway and Eyre Highway
- partnering with key firms in the retail, construction and resources sectors to report freight volumes and qualitative trends

Systematic analysis of port trade data to monitor the growth in the north-south corridor trade is readily achievable, given the quality of shipping and customs data that is routinely available. A comprehensive understanding of the emerging shift in the focus of the freight sector serving the WA domestic economy is thus possible.

This in turn will assist in understanding the changing nature of demands made by the freight industry on the transport infrastructure serving Fremantle, the Perth metropolitan area and the state.

Contents

1 INTRODUCTION

The economies of Perth and Western Australia have been dependent on long distance freight since their settlement. Sea freight, rail and road freight have all been vital to the growth of the state. As the state has grown trade and freight patterns have evolved in line with global trends, and these patterns have played a part in defining the industrial and transport infrastructure of the city.

There is now some evidence of changes to some long standing freight patterns which have the potential to impact on urban infrastructure needs (especially road and rail links between Fremantle and the outer industrial areas). National retail supply chains and some other industrial chains are being re-engineered in view of systems improvements and increasing domestic freight costs. This, combined with the rapid rise of imports in place of local manufacturing, is having some effect on east-west freight volumes, and increasing the importance of north-south supply lines between Asia and Western Australia

This study provides an overview of current long distance freight patterns and describes the changes being observed in the general freight environment. It also suggests some likely impacts of change on the urban industrial infrastructure of Perth.

The first part of this report describes the Australian retail sector and its supply chain structures, while the second addresses freight data sources illustrating the changing focus of supply lines into Western Australia.

2 RETAIL SUPPLY CHAINS

Retail is one of the main freight generating industry sectors and is a major consumer of containerised imports.

The Australian retail sector is categorised here into sectors for analytical purposes as per IBISWorld market research publications as follows:

- Consumer goods (including department stores, clothing, furniture, appliances, hardware)
- Supermarkets and grocery (excluding petrol stations, liquor and convenience stores

The scale of these business sectors and major retailers in Australia are summarised in **Error! Reference source not found.Error! Reference source not found.** below.

Table 1- Major retailers in Australia

Grocery		Consumer goods	
National sales	$87 billion	National sales	$121 billion
WA (8%)	$7 billion	WA (10%)	$12 billion
Woolworths	39.6%	Wesfarmers*	14.5%
Coles, BILO	33.5%	Woolworths**	4.8%
ALDI	10.3%	Myer	2.6%
IGA	9.5%	David Jones	1.5%
Other	7.1%	Other	76.6%
Total	100.0%	Total	100.0%

** includes Kmart, Target, Officeworks, Bunnings*
*** includes Big W, Masters*
Source IBISWorld Reports G4111 (2014), G4200 (2013)

The table illustrates the heavy concentration of supermarket sales, with two companies (Woolworths and Coles/Wesfarmers) accounting for 73% of total sales in the grocery sector. By contrast, the consumer goods category is much more disaggregated, with the top four companies accounting for only 24% of sales. This segment includes the full range of specialist outlets and major chains such as Dick Smith, Harvey Norman, Dymocks, Just Jeans and IKEA.

2.1 Consumer goods sector

The Consumer Goods category includes sales of household goods, department store goods and clothing as shown in below.

Table 2 – Consumer Goods Breakdown

Consumer goods breakdown	
Household goods	38%
Department store	16%
Clothing	17%
Other	30%

Source - IBISWorld

The consumer goods sector accounts for a significant proportion of imports, as it relies heavily on suppliers throughout Asia. Local Australian manufacturing of products in all the categories has become uncompetitive and fallen away over the last two decades, helping to

drive the continued high growth rates of imports into Sydney and other major ports such as Melbourne, Fremantle and Brisbane.

Major retail chains such as Kmart, Target, Big W and Bunnings import up to 90 per cent of their entire product range, generally from Asia. The steady rise in the proportion of Asian imports (of total sales) has been a significant factor in the sustained increase in import trade through major Australian ports over the last 15 years.

These companies (and others like them) have large new DCs in the larger cities (typically Sydney, Melbourne, Brisbane and Perth) which concentrate all their imported and local supplies under one roof. Such properties have been developed with the space and the associated council approvals to hold and handle large volumes of inbound loaded shipping containers on site.

2.2 Grocery and supermarket sector

Supermarkets and groceries are an important subset of the retail sector and are dominated by the two major players (Woolworths and Coles), with two minor players (Aldi and IGA). The supermarket sector includes large fresh produce components and they are major outlets for Australian processed and fresh foods. At present, 67 per cent of sales are of branded products, with 28 per cent private label (home brands) and 5 per cent organic products. Private labelled product is expected to grow as a proportion of sales, but only gradually (source - IBISWorld G411).

Product sold in the grocery segment of the retail sector is much more likely to be locally produced than in the consumer goods sector. Most branded products are processed locally rather than imported, but a higher proportion of private label products are imported. In-house label products are cheaper than branded products, and this is often achieved through import substitution (eg Italian tinned tomatoes over locally canned product). The intention of some supermarkets to increase the proportion of in-house labels will probably, therefore, lead to more importing. Notwithstanding this, the overall proportion of imported product in this segment is small relative to the consumer goods segment.

The high level calculation in the table below is used to estimate the volume of imports into WA by the two retail segments, based on annual sales data. *Note – the term 'imports' here includes volumes that may arrive in WA via land from interstate.*

Table 3 – Estimate of WA grocery and consumer goods imports

	grocery	consumer
WA sales ('000)	$7,000,000	$12,000,000
Est sales value ($/kg)	$10	$20
tonnes	700,000	600,000
tonnes/TEU	15	9
TEU equivalent	46,667	66,667
import %	25%	90%
import TEU	11,667	60,000

Source – THA, IBIS World G4111

These calculations suggest that imports destined for the WA retail sector could amount to around 70,000 TEUs per year.

2.3 Retail supply chains

2.3.1 Imported product chains

Loaded import containers are transported from the port towards the premises of the importer either directly or indirectly. Direct transfers occur when the customer has the facilities to handle a sea container (either a dock or sufficient space to manoeuvre a forklift vehicle) and the arrival time is within acceptable operating hours.

Indirect movements occur where the timing of the release of the container from the wharf at Fremantle does not allow for the container to be received by the customer. It is therefore staged via an intermediate yard, usually belonging to the transport carrier. Such yards are clustered around the port, where many carriers are headquartered, but there are also some in the Kewdale / Forrestfield area.

Many customers cannot receive containers, through lack of space or facilities, and thus rely on third parties to destuff their containers at intermediate premises. Goods are then delivered to the customer via vans or specialised trucks.

Still other customers do not receive full container loads from their suppliers, and have their goods brought into the country in mixed loads, which are then distributed from the de-consolidation location to the many separate customers. In many cases in the retail chains, the suppliers of a product arrange the importation of FCL containers through their own global supply chains, and distribute to multiple retail distribution networks from their own premises in Sydney, Melbourne, Brisbane or Perth.

2.3.2 General domestic retail chains

Retail consumer chains have changed markedly over the last decade, driven largely by the ability to optimise inventory holdings, respond to increased offshore sourcing, and the more rapid and frequent supply and replenishment of retail outlets.

Three broad arrangements have emerged:

a. Fewer and larger DCs - which have centralised inventory and increased stock turns. This model relies on efficient supply along the east coast of Australia, with a modest stockholding in Perth, given the distance of supply from the east coast. In some cases, these large DCs serve a national aggregation function, but other companies, particularly those with a high proportion of imports, have moved towards a regionalised model.

b. State-based warehouses - where high volume products are held in close proximity to the retail outlets and where rapid replenishment is critical to avoid “out of stock”

situations. This model tends to suit products with a low intrinsic value or staple goods.

c. A model of national and state warehouses integrating (a) and (b) above - where retailers have segmented a large number of inventory lines into fast and slow moving lines to optimise inventory levels. Slow moving lines tend to be held in a national DC under this approach.

Most of the major players in the Australian retail sector have made rapid changes to their supply chain structures over the last 10 years. Many have opened grand new DCs in major cities (including Perth in and around the Perth Airport precinct), which consolidate the activities of several warehouses with new hi-tech inventory management systems. In some cases, these systems have also allowed for streamlining of international (Asian) supply chains, through radically improved consignment tracking systems, with store-based ordering that can make intermediate warehousing activities redundant

2.4 Retail supply chains case studies

Some case studies are provided below. (Some of the research here derives from a recent assessment of retail chains made for a Sydney client).

2.4.1 Retail Case Study 1 – KMart (Sydney)

KMart provides an illustration of the way in which the increasing dependence on imports is affecting the supply chain.

In 2003, KMart opened a major 50,000 sq m warehouse and DC facility on a large new estate (Wonderland) at Eastern Creek in Sydney. This location now serves as the receiving point for all supplies sold through its Sydney and NSW stores (as far north as Coffs Harbour and south to Wagga). The DC replaces a set of smaller warehouses and DCs in the 'suburban' industrial ring of Sydney.

The development application for the facility included the provision of space for storage of large numbers of full and empty containers. (At the time of inspection of the site for this study, there were over 50 full 40 foot containers stacked on site.) Containers are unloaded by forklift vehicles when the goods are required inside the building. Distribution from the DC to the outlet stores is via vans with 'store-loads' ie loaded from the contents of many different containers and suppliers.

The facility handles around 400 containers per week (20,000 per year). The large storage area is required, since the company has a 'long supply chain' from China, and needs to retain large amounts of inventory in the containers rather than hold volumes for long periods inside the building. KMart is essentially a low-value high volume retailer and controls its own supply chain from supplier to store. It has no need for intermediate storage and handling after arrival of the import container at the wharf.

KMart does not have any significant use of interstate freight networks ex-Sydney, as it has major DCs in Melbourne, Perth and Brisbane, which attract their import volumes into their local ports. Adelaide is supplied generally from Melbourne. Any volumes ex-Sydney for Perth would be handled by rail via freight forwarders such as Linfox and Toll.

2.4.2 Retail Case Study 2 – Target

Target is a major retailer of clothing and homewares, and part of the Wesfarmers Group. It is fully Australian owned. The company has struggled in recent years in competition with KMart and Big W. It relies on imports for a large proportion of its sales, especially textiles from China and Bangladesh.

Until 2013, Target centred its supply chain operations on a national distribution model, based in Melbourne. Under this model, all local and international supplies were delivered directly to the Melbourne DC from the point of manufacture. At the DC, store-specific loads were accumulated and despatched across Australia. For WA these loads arrived by rail and were dispatched to stores direct from the railhead.

In 2013, Target replaced this system with a regional DC model, closing its national distribution centre. This was in response to high land transport costs in Australia, the increasing importance of imports, and the potential for streamlining supply chains that arises from improved consignment tracking systems.

Target established a hub in Malaysia, near Port Kalang, which serves to accumulate all product from suppliers in China, Bangladesh and other countries for freight to Australia. At this hub warehouse, store-specific loads are accumulated into containers and despatched directly to DCs in the major Australian capitals. The sea freight costs under this approach are much lower than the land freight costs that were previously incurred under the national distribution model. This change has been made possible by sophisticated “cradle to grave” tracking systems.

The impact of this change has been to reduce the volume of freight moved by Target across the country between Melbourne and the other capitals, and to increase the short haul import freight in each capital, including Perth.

Target’s Perth DC is outsourced to CTI Logistics, which has built a new warehouse for the purpose on Bushmead Rd, Hazlemere. There, some international import containers are dispatched to stores, without de-consolidation while others are unpacked and the contents stored. By the end of 2015 this site will cover 30,000 sq m, from only 2,000 sq metres four years ago.

The maps below illustrate the change in supply chain philosophy.

Figure 1 – changing supply chains for retail container imports

Target's Supply Chain – 2013

Target's Supply Chain – 2014

The outcomes of this change by Target are an increase in the amount of imports directly into Perth for WA sales, and a reduction in the amount of interstate freight on the east-west corridor.

This trend is by no means replicated across the sector. It does, however, highlight the possibility that sea freight (both international and coastal domestic) will replace land transport on some legs if road and rail costs continue to rise (eg with fuel costs and carbon pricing etc) and the trend towards increased international sourcing of product continues. It also demonstrates that improvements in global systems for tracking of consignments can lead to simplification of chains through the removal of stages in the chain.

2.4.3 Retail Case study 3 – Supermarket supply chains

The grocery segment is the most concentrated of the retail sectors. Woolworths and Coles compete head to head in all Australian markets and have 75 per cent of the market between them. Both have similar supply chain structures and product profiles. Both companies have recently opened large DCs in new logistics precincts in the larger cities such as Sydney, Melbourne and Perth, relocating activity from suburban industrial zones.

Aldi is a more recent entrant to the market, and has 10 per cent of Australian market share. Aldi has opened several new DCs in western Sydney and Melbourne and is constructing a DC for its entrance to the WA market at Jandakot Airport.

Aldi's model it to focus on a much smaller number of basic product lines than its competitors, with a high degree of private branding. Aldi imports a high percentage of its products as a result of this approach.

Coles, Woolworths and Aldi all have the scale to be importing FCL consignments from key overseas suppliers.

IGA is part of the Metcash Group, which also has hardware (Mitre 10), liquor (Cellarbrations) and automotive parts retailers. IGA has a different business model to the other majors, under which independently owned stores are linked into a common marketing and distribution system. IGA has a network of DCs in each capital city.

IGA generally does not handle its inwards freight, since its suppliers tend to have the scale to better co-ordinate freight. (Suppliers are often selling through multiple retail chains). A large proportion of sold products are delivered direct to store by suppliers, rather than through the IGA DCs.

IGA has some imported lines, but is generally focused on local branded products. In response to competition, however, it is starting to generate some private branded lines, which may result in additional imports.

2.5 Retail Supply Chains Study Findings

Very recently, there has been a significant reorientation of retail supply chains, from a national to a regional distribution model, leading to an increased dependence on imports directly via Fremantle, in place of distribution channels in Sydney and Melbourne. In Western Australia, this means the replacement of traditional east-west supply chains in some sectors with emerging north-south supplies.

This has been driven by:

- the high cost of long distance freight
- the reduced competitiveness of Australian manufacturing
- the rapid growth of Perth's population
- improvements in global freight consignment tracking systems

The development of large scale warehousing and distribution centres in the Hazlemere-Forrestfield area has been rapid, and leads to significant intensification of use of road freight routes between Fremantle and that precinct, and on the radial roads network. A systematic approach to freight data collection across all modes for key sectors of the WA economy would be of benefit in the prediction of future freight volumes and

3 FREIGHT DATA

East-west freight movements over land have been a significant component of the Western Australian economy since Federation. While Perth has been supported through the Port of Fremantle since its early days, it has relied heavily on manufactures, food and other supplies from the eastern states throughout the last century. The construction of the Trans-Australian railway in 1917 (standardised by 1970) paved the way for large volumes to migrate from shipping to rail transport.

The volume of freight carried by road and rail across the Nullarbor Plain is estimated in general terms by various agencies, but the composition of the freight task is not well

understood. This study seeks to assess whether significant changes to the volume and composition of this freight is occurring, due to structural changes in the supply chains of key industry sectors, especially in the retail sector. Of particular interest is the suggestion that growing north-south sea freight traffic between WA and Asia is affecting the volumes on the east-west corridor.

Freight studies often begin with port trade statistics since data is readily available and consistently collected from year to year. Fremantle Ports publishes detailed import/export volume data on a monthly basis, highlighting the mode of freight (container, bulk etc) as well as country of origin/destination and broad commodity typesIt is much harder to accumulate equivalent data sets for domestic freight movements, which occur under the management of a huge number of complex supply chains, often incorporating several discrete journey legs in the movement of a product from an origination point to a customer destination. Data on detailed freight movements is often fragmented or of the 'snapshot' variety, and research is made more difficult by the invisibility of the freighted product (in a container or van) and the use of intermediate destinations such as warehouses and transport depots. The ABS collects data on freight movements between states and down to Statistical Local Area levels, but cannot categorise freight in detail, especially the contents of containers.

Top down analysis of this kind of freight data will provide some evidence of volume trends, but a bottom-up analysis is required to gain insights into underlying freight and supply chain behaviours.

The freight carried by rail on the interstate corridor is measured indirectly by Brookfield Rail, at least for the portion west of Kalgoorlie. Brookfield's statistics are in gross tonne-km (gtk) terms, reflecting its unit of access charging. Gtk calculations include the weight of the locomotive and the wagon tares, which means that assumptions have to be made to calculate the weight of the net loads. This is made more complex by the need to account for the weight of containers and other material used in the transport of the product.

3.1 BITRE INTERSTATE FREIGHT REPORT 2010

One of the few attempts at a comprehensive analysis of interstate freight is the BITRE Report 120, Interstate Freight in Australia, 2010. This report aggregates estimated freight volumes on all interstate corridors by all modes from 1972 to 2007, and then estimates future annual volumes on all corridors to 2030. Unfortunately the approach is a statistical treatment of a large number of volume estimates, with very little conceptual analysis, and a reliance on economic and demographic indices to calculate future forecasts. However, this report does provide a starting point for understanding the current (at least, pre-GFC) long distance freight volumes between Western Australia and the rest of the country.

The table below estimates the volume of freight passing between WA and the other states by mode, for 2007. The table provides a snapshot of the main interstate trading corridors for WA, but there must be some doubts as to the veracity and significance of the numbers, given the difficulty involved in collecting accurate origin-destination data, especially from road and rail carriers.

Table 4 – Interstate freight volume estimate 2007 ('000 tonnes)

	Road	Rail	Sea	Total		Road	Rail	Sea	Total
NSW-WA	118	683	286	1,087	WA-NSW	226	434	14	674
Vic-WA	102	906	280	1,288	WA-Vic	103	796	19	918
Qld-WA	52	166	106	324	WA-Qld	86	162	5	253
SA-WA	586	723	14	1,323	WA-SA	843	486	9	1,338
NT-WA	119		2	121	WA-NT	163	0	10	173
Tas-WA	-	0	15	15	WA-Tas	0	0	173	173

Source: compiled from BITRE 2010

The study also analyses historical annual growth rates for each mode from 1972 for each mode by corridor. Many of the historical growth rates are high over the 35 year period, while projections for the next 22 years to 2030 are much lower.

Table 5 – Average annual growth rates for interstate volumes by mode

	road		rail		sea		all modes	
corridor	Average 1972-2007	forecast 2008-2030	Average 1972-2007	forecast 2008-2030	Average 1972-2007	forecast 2008-2030	Average 1972-2007	forecast 2008-2030
NSW-WA	7.6%	1.1%	5.6%	1.1%	2.2%	1.1%	4.4%	1.1%
WA-NSW	8.4%	2.9%	10.8%	2.9%	-5.8%	2.9%	3.8%	2.9%
Vic-WA	3.5%	2.9%	5.3%	2.9%	0.8%	2.9%	3.5%	2.9%
WA-Vic	6.5%	2.5%	13.7%	2.5%	-6.0%	2.5%	3.8%	2.5%
Qld-WA	7.6%	2.8%	10.0%	2.8%	2.5%	2.8%	5.3%	2.8%
WA-Qld	9.9%	4.3%	15.6%	4.3%	-2.4%	4.3%	8.3%	4.3%
SA-WA	12.7%	4.4%	4.2%	4.4%	2.2%	4.7%	5.5%	4.4%
WA-SA	12.8%	4.2%	5.0%	4.2%	-2.0%	4.2%	6.9%	4.2%
WA-NT	8.3%	3.4%			-2.0%	1.7%	4.7%	3.3%
NT-WA	9.0%	2.3%			-6.6%	2.3%	3.6%	2.3%
WA-Tas					8.0%	-0.9%	8.0%	-0.9%
Tas-WA					9.6%	-0.9%	9.6%	-0.9%

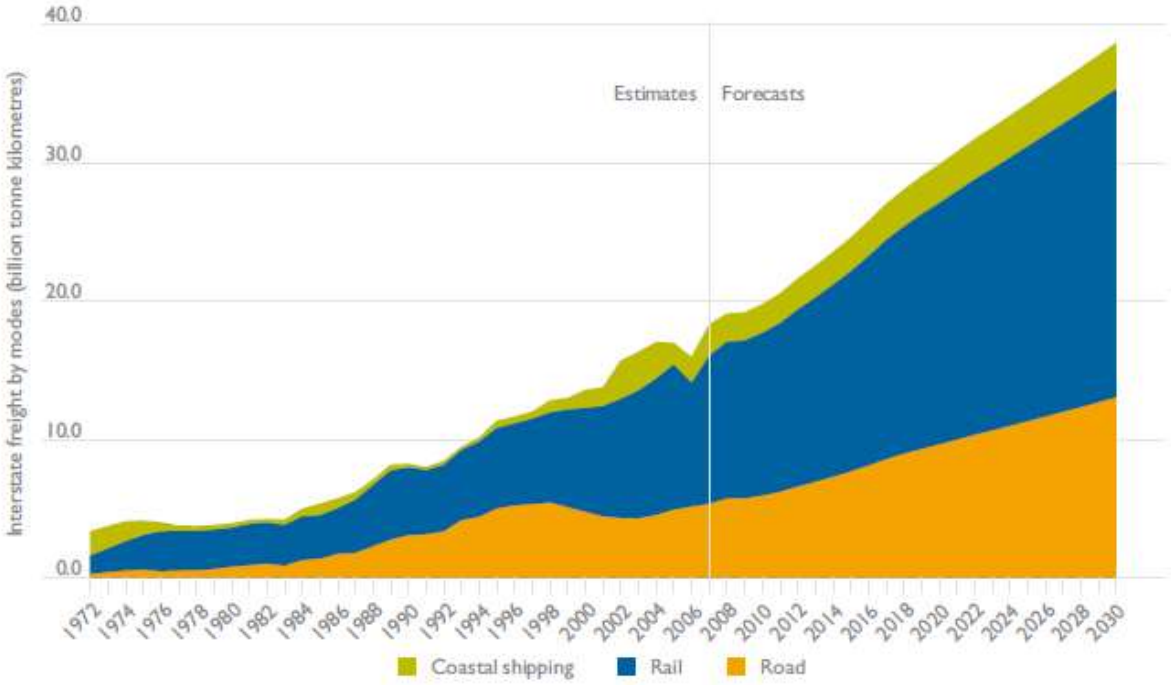
Source: compiled from BITRE 2010

The high growth rates in this table suggest that some of the earlier freight volume estimates (ie from 1972 onwards) were lower than in reality, and that collection techniques may have changed over time. They also reflect the difficulty of forecasting freight mode usage from a top-down statistical approach. Growth rates for road and rail freight from 2008 onwards on most corridors are identical, which suggests that there has been no genuine attempt to understand the modal choices made by different freight types (with their different growth rates).

This type of study cannot provide any differentiation between different types of freight, and any trends in the data are sometimes obscured by the volatile nature of bulk freight

movements, which can vary from year to year quite substantially, often as the result of changes to a particular mining province or the closure of a major minerals processing plant for instance. The study attempts to illustrate changes in volume and modal share over time for the east-west corridor in the following graph.

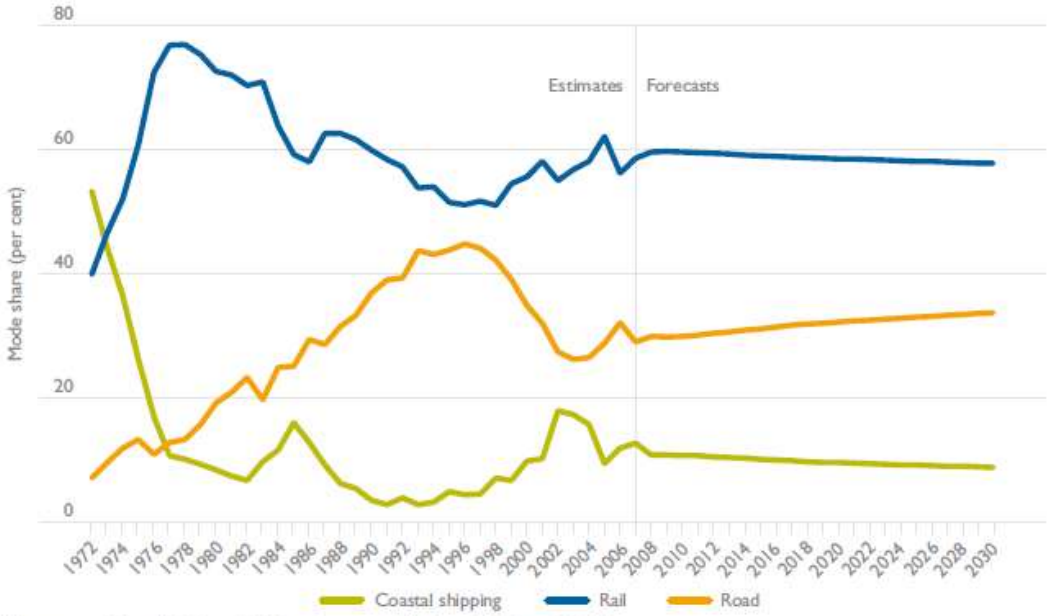
Figure 2 – East-west freight task (tonne-kilometres)



Note: From 1972 to 2007, estimates, while from 2008 to 2030, forecasts.
Source: BITRE estimtes.

The following graph shows how BITRE forecasts modal share to change over the 2008-2030 period.

Figure 3 – East-west corridor freight task modal share (based on volume)



Note: From 1972 to 2007, estimates, while from 2008 to 2030, forecasts.
Source: BITRE estimtes.

This figure illustrates the difficulty of making meaningful projections from data which is historically volatile, especially for sea freight (which is heavily exposed to the volatility of bulk freight point-to-point movements).

These modal share forecasts to 2030, showing road share improving marginally against rail, appear counter-intuitive, when the underlying trends to 2007 were in the opposite direction. More recent analysis would probably take into account trends in fuel price etc and company practice in favour of rail over the long east-west distances, and the split between heavy freight and more 'cubic' freight.

There has been no follow-up by BITRE to this study and there is no other apparent attempt at a comprehensive freight analysis for Australia since. Consequently, any attempts to measure and understand east-west freight rely on data gathered from disparate sources, which inevitably incorporate different freight data collection techniques, and assumptions, making comparisons over time fairly difficult.

3.2 BROOKFIELD RAIL DATA

Brookfield has provided some aggregated information to assist in the estimation of the current east-west long distance rail freight task and help identify growth trends. The table below is amalgamated gross tonne-km (gtk) data for the period since calendar year 2003. It pertains to interstate traffic crossing the Brookfield-controlled section of the interstate network, from East Kalgoorlie to Forrestfield. This traffic includes the trains operated by all operators, including Asciano, Aurizon and SCT. Most traffic is general freight (either containerised or otherwise carried on flat-top wagons or in vans), but there is also a large volume of steel product traffic carried by Asciano for BlueScope Steel and Arrium (formerly

OneSteel), from eastern steel mills to the Perth depot for local distribution and further processing.

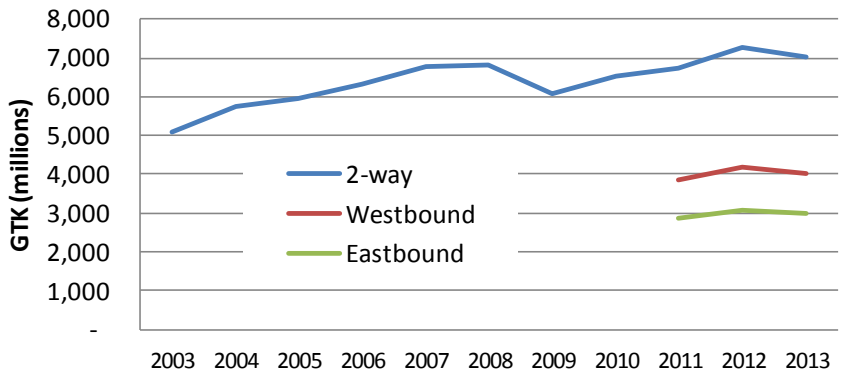
Table **6** shows the agglomerated information showing annual gtks, train numbers and train average length. The split of data by direction is only available for the last 3 years.

Table 6 – Long distance east-west corridor rail freight task (gtk)

Year	GTKs		Train Counts		Average Length	
2003	5,092,652,308		2,097			
2004	5,735,229,873		2,324			
2005	5,955,823,580		2,570			
2006	6,314,835,582		2,643			
2007	6,783,854,874		2,926			
2008	6,828,277,622		3,010			
2009	6,055,768,456		2,736		1,468	
2010	6,511,032,137		2,920		1,479	
	East-West	*West-East*	*East-West*	*West-East*	*East-West*	*West-East*
2011	3,859,337,626	2,882,209,877	1,482	1,470	1,509	1,541
2012	4,200,648,607	3,070,627,377	1,595	1,577	1,520	1,537
2013	4,035,273,112	2,980,252,502	1,605	1,558	1,457	1,498

This data shows that the overall task has grown steadily from 5.1billion gtks in 2003 to 7.3 billion gtks in 2012, softening slightly in 2013, as shown in the following figure.

Figure 4 – Long distance east-west corridor rail freight task (gtk)



Brookfield has no information on the nature of the freight carried and cannot release any information that might be confidential to any operator or its customers.

In order to generate a rough estimate of the amount of general freight being carried on the corridor in each direction by rail, some assumptions and calculations have been made for this report as shown in the following table.

Table 7 – Calculation of estimated rail freight volumes (2013)

general freight volume estimate		
direction	east-west	west-east
distance (km)	655	655
gross tonnes	6,160,722	4,550,004
est. gross/net ratio	1.68	2.09
net tonnes	3,659,835	2,173,569
less steel est (t)	1,000,000	200,000
general freight	2,659,835	1,973,569
container mass (t)	10	10
TEU equivalent	265,984	197,357

This table uses some assumptions regarding the size and weight of trains on the corridor to generate estimates of the gross/net ratio so as to translate gtk totals into net freight values. Notional bulk steel volumes are subtracted from the total to generate some general freight volumes, which are then expressed in TEU equivalent terms, in order to make a comparison between the volumes moved by ship and by train on the east-west and north-south corridors.

3.3 BITRE AUSTRALIAN SEA FREIGHT REPORTS

BITRE publishes an annual summary of Australian sea freight and port activity data, the most recent of which is for the year 2011/12. The data is aggregated, so that it is difficult to separate bulk from general freight.

Table 8 – Annual 'exports' from WA to Australian interstate destinations ('000 tonnes)

From WA to:	NSW	Vic	QLD	SA	WA	TAS	NT	Total	interstate total
2002–03	5,603	1,399	1,342	592	3,028	222	331	12,516	9,488
2003–04	6,031	2,408	824	795	3,308	11	160	13,537	10,229
2004–05	5,462	1,868	789	780	2,427	8	39	11,373	8,946
2005–06	6,101	1,821	814	593	2,293	7	50	11,679	9,386
2006–07	5,726	2,099	1,475	470	2,959	146	44	12,919	9,960
2007–08	5,211	2,019	369	3,288	3,219	149	61	14,316	11,097
2008–09	3,843	1,688	1,259	973	2,942	265	52	11,022	8,080
2009–10	6,580	1,615	886	1,022	862	149	101	11,215	10,353
2010–11	6,336	1,176	368	983	1,031	257	79	10,230	9,199
2011–12	4,358	999	336	954	795	173	134	7,749	6,954

Source – BITRE 2013

This table shows how interstate 'exports' have fluctuated over time, largely in line with changes in bulk movements, with the occasional spike, such as in 2007/08 to South Australia. One of the larger movements is that of about 3.5mt of iron ore annually from Port Hedland to Port Kembla (NSW) for steel making. The table also includes volumes moved between WA ports, especially Port Hedland to Fremantle.

A similar table for 'import' movements into WA ports shows much lower volumes.

Table 9 – Annual 'imports' to WA from Australian interstate origins ('000 tonnes)

To WA from:	NSW	Vic	QLD	SA	WA	TAS	NT	Total	interstate total
2002–03	241	505	73	357	3,028	487	14	4,705	1,677
2003–04	197	408	138	164	3,308	437	11	4,663	1,355
2004–05	196	567	220	107	2,428	12	71	3,601	1,173
2005–06	266	408	233	102	2,293	151	51	3,503	1,210
2006–07	406	389	321	348	2,959	243	124	4,790	1,831
2007–08	339	455	418	504	3,219	152	17	5,103	1,884
2008–09	26	480	250	310	2,942	128	139	4,275	1,333
2009–10	562	472	241	423	862	73		2,633	1,771
2010–11	296	620	177	976	1,031	2	3	3,103	2,072
2011–12	275	626	282	978	795	2		2,959	2,164

This table shows more consistent annual figures from most states, although there are still distortions resulting from obvious bulk freight haul peaks and troughs eg from SA in 2010-2012, which could relate to mineral sands volumes between Iluka mines in SA and processors in WA. Volumes from NSW and Victoria are more likely to be dominated by general freight, as there are less obvious bulk minerals transfers from those states to WA.

The BITRE Report also includes some data on container freight between the states, but limits it to containers carried under coastal voyage permits (issued to unlicensed foreign ships where a licensed vessel is unavailable). This data is summarised in the table below, showing the most important corridors for this freight segment.

Table 10 – Containerised freight under permits – most significant routes ('000 TEUs)

Financial year	Melbourne to Fremantle	Sydney to Fremantle	Brisbane to Fremantle	Adelaide to Fremantle	Bell Bay to Fremantle	All other routes	All routes	WA share
2007–08	14,257	6,667	893	350	3,303	18,942	44,412	57%
2008–09	18,879	6,479	1,097	548	1,900	15,417	44,320	65%
2009–10	26,618	15,479	3,310	1,405	2,701	19,407	68,920	72%
2010–11	37,716	22,487	3,489	1,554		14,064	79,310	82%
2011–12	37,116	24,924	7,445	4,261		5,995	79,741	92%

The table indicates that Fremantle is by far the largest destination for containers moved under permit in the Australian coastal trade, accounting for over 90% of all such volumes in 2011/12. The number of containers moved under permit has increased in recent years, but these figures do not correlate with the actual trade volumes as reported by Fremantle Ports, as illustrated in the following table.

Table 11 – Comparison of Fremantle coastal container port data from BITRE and FPA figures (TEU)

TEU	BITRE	FPA data - total containerised imports from Australian origins		
Financial year	Coastal permit volumes	full	empty	total
2007–08	25,470	59,765	19,777	79,542
2008–09	28,903	63,477	10,409	73,886
2009–10	49,513	63,909	5,055	68,964
2010–11	65,246	61,537	3,821	65,358
2011–12	73,746	61,148	3,918	65,066

The numbers reported in the BITRE Report exceed the actual trade data numbers because the permit numbers are based on estimates provided in advance of shipment by shipping companies, rather than the actual number of containers shipped under permit.

It is clear that there are limitations on the analytical utility of these major statistical reports compiled by national agencies on the basis of large amounts of data collected from many sources.

They serve a useful purpose for detection of broad trends, but they are of little value when more conceptual analysis of local freight issues is concerned. In light of this, it may be more valuable to try to understand the nature of freight movements through a bottom-up approach relying on real life examples illustrating the specific role and nature of freight in different economic sectors – eg the heavy industry, resources, agriculture and household sectors.

3.4 FREMANTLE PORT TRADE DATA

As an introduction to this approach, an analysis of recent Fremantle Port Authority containerised trade data has been conducted. FPA has provided a breakdown of container trade data according to origins and destinations, as well as commodity descriptions over the last 10 years. This data enables a fairly rigorous examination of how the import and export of different types of freight has evolved over that time.

Financial year 2013 is the most recent for which complete annual data is available. However data relating to Fremantle Port container trade is available up to April 2014 and this data has been extrapolated to represent a full financial year based on the contribution of ten months of data to overall year statistics in financial year 2013. Some 84% of annual trade appeared in the first 10 months of that year.

For the purposes of this exercise, the large number of commodity descriptors (over 100) has been reduced to less than 10, with the aim of separating industrial, bulk minerals and agricultural freight from those categories more related to household consumption (food, furniture and manufactures, building products etc). This categorisation can then be used to assess whether coastal shipping plays a significant part in the retail and household consumption components of east-west freight and supply chains. It can also reveal some detail regarding the increased dependence on imports for some aspects of the domestic economy.

In the following tables, all bulk minerals and chemicals imports have been labelled ‘heavy industrial’, while grain imports have been combined with other unallocated commodities and products, since they are essentially unrelated to the growth trends that this paper is focused on. Manufactures includes a range of product types for which there is no clear indication as to whether their usage is in the household or industrial sector. Building products include steel manufactures and cement.

The data is summarised in the following tables and figures, which focus on imports, reflecting the general inwards flow of freight of this nature.

Table 12 – International imports by commodity (TEU)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Est 2014	AAGR*
building products	13,581	17,160	19,143	19,964	20,784	23,178	27,802	30,802	35,740	33,607	29,246	8.0%
heavy industrial	14,890	16,666	16,256	17,491	22,442	21,308	21,163	26,667	28,891	27,814	30,914	7.6%
food products	9,591	11,338	11,264	13,433	14,979	15,295	16,306	18,506	21,003	21,988	23,511	9.4%
household goods	31,444	35,819	40,769	49,697	52,121	50,689	54,860	65,905	86,319	85,360	88,869	10.9%
machinery	20,755	25,290	27,405	30,336	36,563	34,296	33,309	37,023	31,442	29,017	27,815	3.0%
manufactures	24,265	26,793	27,694	39,981	37,957	37,227	38,441	42,115	56,154	65,859	71,368	11.4%
grain + other	9,383	9,306	10,167	2,547	9,941	9,273	7,442	10,286	8,798	8,875	8,104	-1.5%
total full	123,909	142,372	152,698	173,449	194,787	191,266	199,323	231,304	268,347	272,520	279,827	8.5%
empties	19,733	16,571	15,106	13,694	24,089	22,335	19,962	13,410	10,869	10,428	14,373	-3.1%

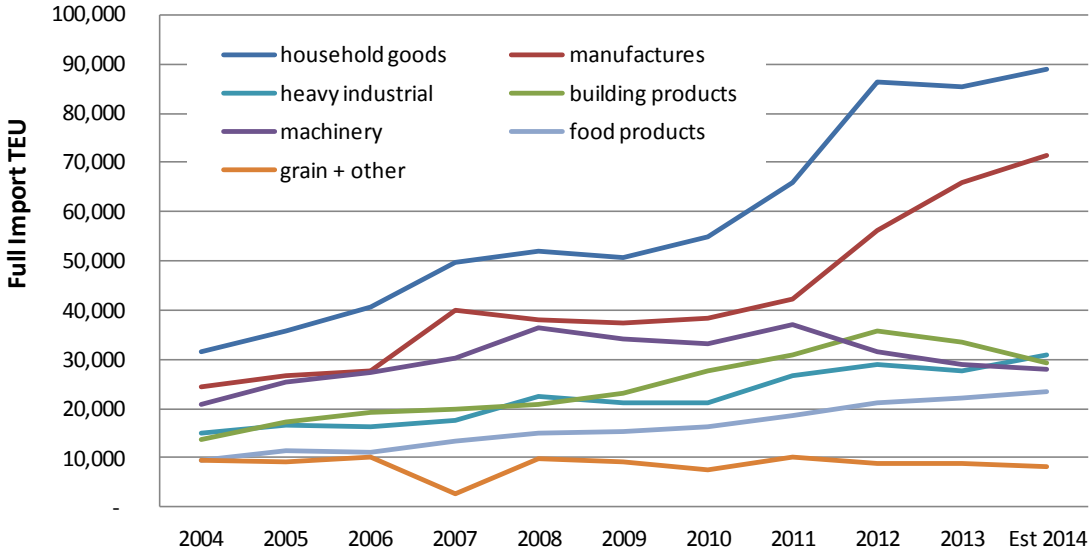
** Average Annual Growth Rate*

Note: data in the this table and those following excludes transhipped containers

This table excludes imports originating in Australian ports. It shows that international import volumes have risen by an average 8.5% per year since 2004, with particularly high rises in household goods, building products and general manufactures. Growth has been lower in the past two years than previous years, as evidenced in all categories other than manufactures.

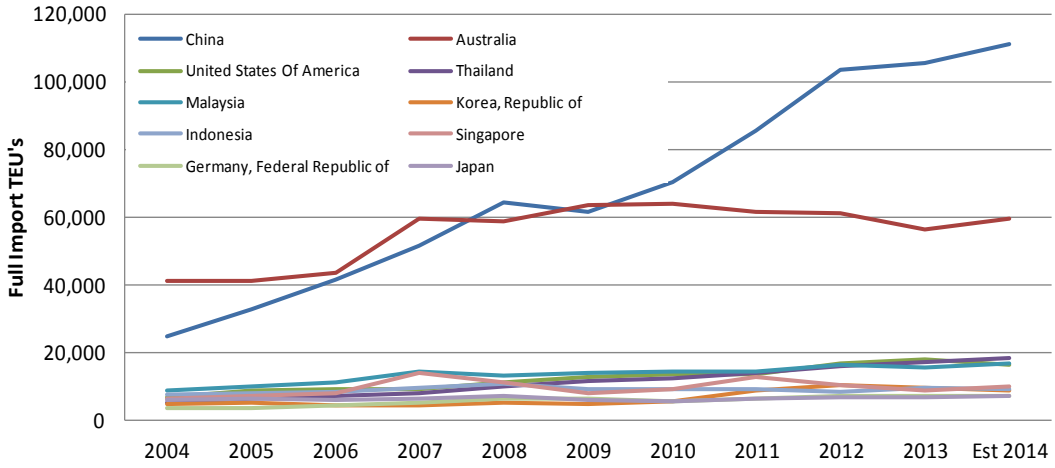
Household goods and food products make up about 40% of all containerised imports (112,000 TEU in 2013/14).

Table 13 – International imports by commodity (TEU)



In the figure below, import data is broken down by country of origin.

Table 14 – Fremantle imports by country of origin (full TEU)



The rise of China as a source of imports into Perth is clearly indicated in this figure, which also shows how Australian import figures have stayed fairly static, especially since the GFC, in the era of the higher Australian dollar. The reduction in the importance of Singapore as Malaysia and Thailand imports continue to grow, suggests that some importers are able to bring goods directly into Fremantle from north Asia, rather than hubbing through Singapore. The development of new hubs in Malaysia and Thailand may also be influencing this.

The table and figure below show a breakdown of Chinese imports into their commodity type groupings.

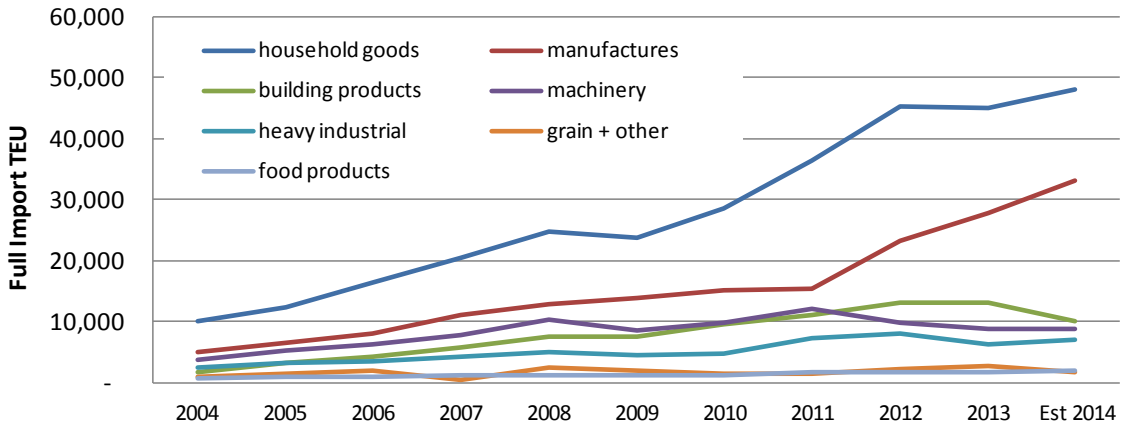
Table 15 – Fremantle imports from China by commodity (TEU)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Est 2014	AAGR*
household goods	10,075	12,251	16,353	20,512	24,714	23,704	28,543	36,326	45,239	45,021	48,011	16.9%
manufactures	5,035	6,446	8,177	11,176	12,954	13,825	15,070	15,325	23,303	27,915	33,225	20.8%
building products	1,810	3,319	4,384	5,816	7,532	7,616	9,470	11,135	13,146	13,244	10,142	18.8%
machinery	3,857	5,317	6,370	7,866	10,264	8,686	9,852	12,158	9,857	8,764	8,931	8.8%
heavy industrial	2,610	3,147	3,588	4,373	5,084	4,635	4,744	7,194	7,954	6,401	7,117	10.6%
grain + other	917	1,468	1,969	410	2,596	2,055	1,423	1,592	2,264	2,684	1,821	7.1%
food products	664	846	912	1,350	1,331	1,263	1,307	1,682	1,809	1,637	1,936	11.3%
total full	24,968	32,794	41,753	51,503	64,475	61,784	70,409	85,412	103,572	105,666	111,182	16.1%
empties	19	255	78	220	592	203	628	1,910	3,282	2,622	1,842	58.0%

** Average Annual Growth Rate*

They show that the categories most responsible for the overall growth are household goods, manufactures and, until recently building products. Household goods account for over 40% of the overall volume, and about 920 TEUs per week in 2013/14.

Figure 5- Fremantle imports from China by commodity (full TEU)



Coastal Shipping

By contrast, volumes delivered from Australian origins other than WA are shown in the tables and figures below both by commodity and origin. Full import volumes from Australian sources have remained virtually static since 2006/07, although empty boxes have fallen dramatically, reflecting the significant fall in Coastal 'exports' that has occurred over the same period.

Falls in the volume of resource sector related products such as machinery and chemicals are balanced by a sustained increase in building products over the period. More fine-grained analysis indicates that the category "fabricated construction materials" accounts for most of this steady growth. This possibly relates to a single product or company activity. Food products have also shown steady sustained growth.

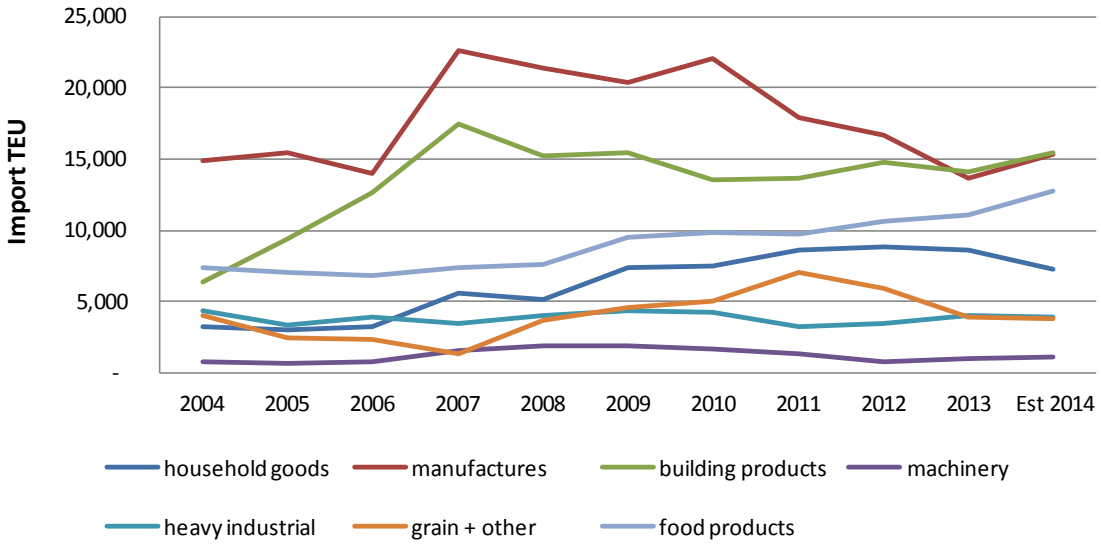
The volume of household goods sourced in Australia has increased by 8% per year, but slowed down in 2010/11 and declined markedly in 2014. This possibly explains some of the increase in the importation of Chinese household goods into Western Australia.

Table 16 – Coastal imports by commodity (TEU)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Est 2014	AAGR*
building products	6,379	9,365	12,677	17,429	15,226	15,444	13,565	13,623	14,745	14,078	15,462	9.3%
heavy industrial	4,301	3,321	3,843	3,430	3,977	4,311	4,225	3,261	3,494	3,973	3,929	-0.9%
food products	7,407	6,980	6,801	7,395	7,593	9,480	9,863	9,747	10,606	11,029	12,756	5.6%
household goods	3,247	2,964	3,262	5,600	5,066	7,359	7,426	8,599	8,840	8,639	7,240	8.3%
machinery	719	581	722	1,580	1,826	1,852	1,652	1,343	775	942	1,039	3.8%
manufactures	14,831	15,486	13,992	22,668	21,356	20,396	22,112	17,937	16,630	13,673	15,312	0.3%
grain + other	4,011	2,419	2,303	1,304	3,711	4,567	5,060	7,010	5,953	3,863	3,770	-0.6%
total full	40,895	41,116	43,600	59,406	58,755	63,409	63,903	61,520	61,043	56,197	59,508	3.8%
empties	16,133	12,390	11,982	10,153	18,941	9,834	4,796	3,310	3,598	3,535	6,945	-8.1%

** Average Annual Growth Rate*

Figure 6 – Coastal imports by commodity (full TEU)

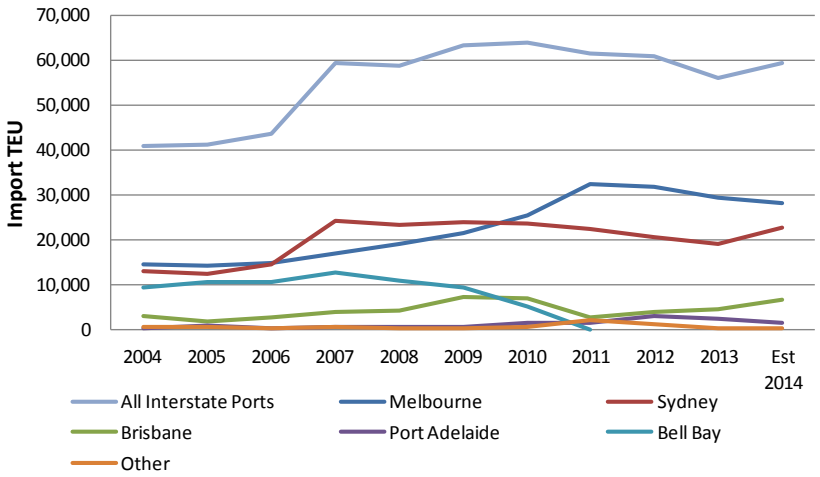


The table and figure below shows how the origins of Australian 'imports' have changed over the period. Sydney and Melbourne together have grown at an average annual 6.5%, although their roles reversed as Melbourne became a more significant distribution hub over the last decade. Bell Bay exports to Fremantle ceased in 2010, and probably consisted of aluminium and/or timber products, rather than general freight.

Table 17 – Coastal imports by origin port (full TEU)

Port	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Est 2014
Melbourne	14471	14328	14780	17029	19271	21435	25553	32468	31870	29444	28070
Sydney	13036	12449	14673	24393	23225	24056	23825	22500	20572	19083	22810
Brisbane	2965	2010	2803	3922	4195	7365	7065	2793	4123	4691	6664
Port Adelaide	347	1024	279	815	669	761	1504	1486	3153	2589	1525
Bell Bay	9555	10761	10654	12686	10905	9468	5193	1			
Other	521	544	411	561	490	324	763	2272	1325	390	439
All Ports	40895	41116	43600	59406	58755	63409	63903	61520	61043	56197	59508

Figure 7 –Coastal imports by port of origin (full TEU)



For completeness, the reduction in containerised exports to Australian destinations is summarised in the table below.

Table 18 –Fremantle exports to Australian ports (excl WA)

TEU	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	est 2014	AAGR*
building products	637	464	118	168	123	90	74	60	55	28	1	-46.6%
heavy industrial	246	99	363	609	555	420	697	401	13	25	32	-18.4%
food products	63	36	67	182	105	199	172	65	42	25	15	-13.1%
household goods	92	24	36	114	89	290	60	32	9	13	29	-11.0%
machinery	24	20	34	63	60	93	53	20	17	18	1	-25.9%
manufactures	92	24	117	168	196	239	199	71	46	48	39	-8.2%
grain + other	748	502	699	1,006	830	651	269	206	92	40	61	-22.2%
total full	1,902	1,169	1,434	2,310	1,958	1,982	1,524	855	274	197	179	-21.1%
empties	2,844	3,002	3,011	4,762	2,392	2,818	2,666	2,083	8,338	6,205	6,218	8.1%

The reduction in full 'exports' is largely due to the drop-off in grain, heavy industrial and building products by sea to interstate destinations. The opposing trends for full and empty volumes in this table is a good illustration of the disconnect between the two, and demonstrates how carefully container trade volumes should be treated in freight studies.

3.5 East West Freight Volume Summary

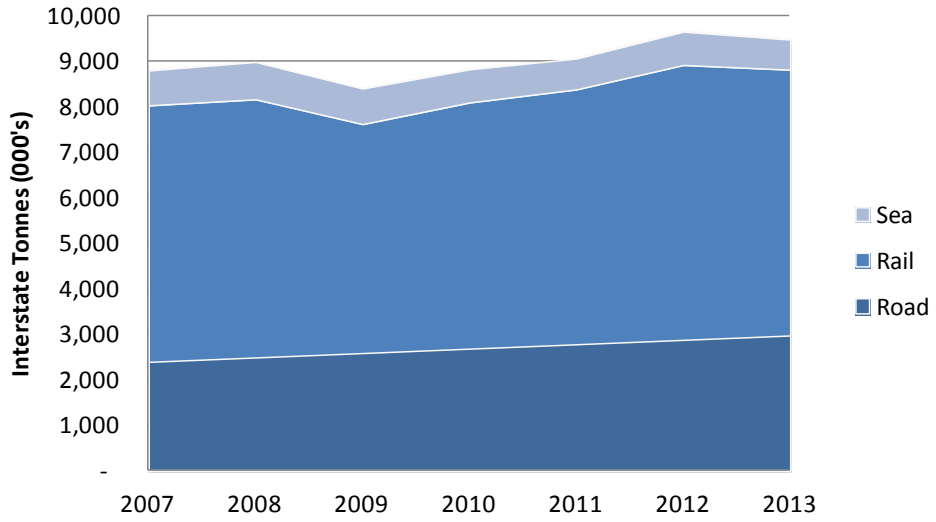
The Fremantle Ports data is undoubtedly the most complete and detailed dataset about freight coming into WA. It is unfortunately not matched by rail and road to enable a clear picture of overall freight movement to emerge. However, by examining the data available some broad conclusions can be abstracted which can provide an indication of emerging trends.

By including the actual shipping volumes provided by FP for 2007 onwards, the rail estimates derived from Brookfield's data for 2013 and adopting the BITRE estimates for road freight only, the 2013 modal split becomes that shown below.

Table 19 – East west freight estimates by mode ('000 tonnes)

	2007	2008	2009	2010	2011	2012	2013	AAGR	Modal Share
Road	2,398	2,494	2,591	2,687	2,784	2,880	2,977	3.7%	32%
Rail	5,641	5,678	5,036	5,414	5,606	6,046	5,834	0.6%	62%
Sea	617	607	654	654	624	613	564	-1.5%	6%
All Modes	8,656	8,780	8,281	8,756	9,014	9,540	9,375	1.3%	100%

Figure 8 – East west freight estimates by mode ('000 tonnes)



These tables and figures show that freight on rail has grown at a higher rate since 2007 than expected by BITRE and sea freight has grown at a lower rate. The anticipated growth for rail was estimated to be lower than that of road which seemed counterintuitive given rail's advantage over the long East-West corridor. The data all confirms:

- the dominance of rail in the East West freight corridor,
- a low market share for coastal shipping (est 6%),
- a trend towards general solid growth in the corridor that may be showing signs of slowing down over last two or even three years, and
- the general inadequacy of the data in detecting changes in trends in the intermodal and general freight sectors