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Tasmanian Empty Container Movement Study

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Document prepared by:
 Aurecon Australia Pty Ltd
 ABN 54 005 139 873
 Level 8, 850 Collins Street
 Docklands VIC 3008
 PO Box 23061
 Docklands VIC 8012
 Australia

T +61 3 9975 3000
F +61 3 9975 3444
E melbourne@aurecongroup.com
W aurecongroup.com

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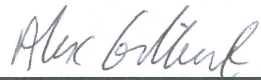
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| Author Signature | |  | |
| Approver Signature | |  | |
| Name | Dr Guy Eitzen | Name | Alex Gilbert |
| Title | Technical Director | Title | Technical Director |

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1 Executive summary

In 2010, the AAA shipping consortium ceased its direct international service call to Bell Bay in the north of Tasmania. Without a reliable and frequent direct alternative, international importers and exporters have been effectively forced to tranship containers through the Port of Melbourne. This has added time and cost to each supply chain. In addition, getting access to empty containers at certain times of year has posed a problem for some exporters.

A recent study conducted for the Tasmanian Freight Logistics Coordination Team (FLCT) has shown that a high proportion of empty containers are being repositioned (in both directions). Therefore, the aim of this study is to identify the reasons for this large number of repositions and make recommendations on ways this can be improved. In this way, importers and exporters may be able to get access to the containers when required and costs associated with repositioning of containers can be reduced.

To achieve this, Aurecon has engaged with a small number of targeted businesses (importers, exporters and shippers) to better understand their issues, supply chains and freight transport requirements.

The issues

There are a number of complexities that add time, cost and complexity to the supply chains of Tasmanian importers and exporters and also increase the number of empty containers that need to be repositioned one way or the other across Bass Strait. These complexities are:

1. **International services.** With the exception of Swire Shipping (which operates on a roughly monthly basis), there are no (containerised) international shipping lines making direct calls to Tasmania. Importers and exporters, therefore, have to tranship their cargo via the Port of Melbourne. While the service offered by the coastal shipping lines is good, it adds time and significant cost to the supply chain.
2. **Pallets and containers.** The standard Australian pallet was developed before a standard was determined for international shipping containers. Consequently Australian (or domestic) containers are slightly wider than international versions. This reduces the ability to interchange container types for efficient freight movements. There is also a wide variety of different container types (some can be interchanged, but most cannot), which also adds to the observed mismatches.

The mismatches

Analysis of the data provided by the Tasmanian Ports Corporation and businesses engaged in the study has shown there are a number of genuine mismatches in containers, which are driving the empty container repositions. These are:

1. **Trade imbalance.** There is more freight (in full containers and trailers) entering Tasmania on the coastal shipping services than leaving. This higher demand means that empty containers and trailers have to be repositioned back to Melbourne, mainly for domestic re-use.
2. **Seasonality.** There is significantly more demand for southbound (to Tasmania) freight movements compared to northbound movements from July to January each year.
3. **Container types.** Analysis of container types has shown that domestic full 20' and 40' General Purpose (GP), tanktainers and trailers all have higher demand southbound, but 20' and 40' reefer containers have higher demand northbound.
4. **International versus domestic.** The majority of both full southbound and northbound container movements are domestic (between Tasmania and mainland Australia); only a minority having international origins or destinations. However, there is a greater demand for full domestic containers southbound and a greater demand for full international containers northbound; these containers are not readily interchangeable due to their different sizes.
5. **Melbourne discharged containers.** Although not technically a mismatch, international containers discharged in Melbourne but then shipped to Tasmania for unpacking, will, in general, need to be shipped back to Melbourne to be de-hired. This causes an empty container movement, even if the

container could have been back-loaded. An opposite empty container movement occurs for export containers ex-Melbourne that need to be packed in Tasmania.

Through the engagement process, it became evident that the coastal shippers, in cooperation with some import and export businesses, are already working towards developing solutions to allow various businesses to use empty containers that would otherwise need to be repositioned.

A good example is Nyrstar, which uses 20’ domestic containers to transport zinc ingots from its plant at Risdon Road, Hobart to the Melbourne Metal Centre in West Melbourne, where they are stored and cross-docked into international export containers.

Possible improvements

There are further opportunities to improve productivity and reduce the need to reposition empty containers. This will have flow-on savings for importers and exporters, increase container availability and allow the coastal shippers to increase the overall percentage of full (and paying) containers. These are presented in the table below.

The recommendations described are given in the context of the majority of importers and exporters continuing to tranship through the Port of Melbourne because there are no suitable direct international shipping services to Tasmania. The resumption of direct international services would very likely change the benefit or impact of these interventions.

| Type | Improvement | Impediments | Quantity & conclusion |
|---|---|--|--|
| 1. Domestic freight in international containers | Ship domestic freight southbound in international containers. This saves moving an empty international container southbound and an empty domestic container northbound. | Pallet size incompatibility between container types, commodity types, additional coordination and longer hire to ensure the international container arrives at the exporter to meet export movement. | Good reduction in repositions, but issues with implementation. This improvement would be most easily implemented for non-palletised commodities, other than bulk commodities. |
| 2. Cross-dock containers in Melbourne | As there is an excess of empty domestic containers in Tasmania and a shortage of international containers, international export freight could be packed into domestic containers, shipped to Melbourne, then unpacked and repacked into the correct containers. | There are cost and timing issues with implementing this method, in that a cross-dock facility would need to be established. There are also re-handling issues, which mean this method cannot be used for certain commodities. | This method is already being applied by one of the coastal shippers. It may work best if a common-user facility could be established, or when large quantities are being shipped. This improvement would work with almost any commodity, except those that cannot be reasonably re-handled, including onions (in high pallets), recycled materials and bulk materials. |

| Type | Improvement | Impediments | Quantity & conclusion |
|---|---|--|--|
| 3. Reefer containers to carry dry freight | Pack dry or ambient freight for the southbound trip in reefer containers (instead of GP). This saves moving an empty reefer container southbound and an empty domestic container northbound. | Due to the refrigeration units built into the reefer containers, the container is not able to transport the same amount of freight as a GP. The number of reefer containers 'in the fleet' would also need to be increased, which would be expensive. | This method is already being applied by one of the coastal shippers, but only a small number of container repositions is being saved. This improvement could be implemented for any commodity; however, it would work best with non-palletised commodities. |
| 4. Convertible containers | Convertible and multi-purpose containers should reduce the number of empty repositions. Collapsible containers may also reduce reposition space requirements on coastal vessels. | Capital and operational costs would be the main impediment to implementation. Would require additional effort to keep track of and optimise empty container positioning. | Good way to improve flexibility, but would require additional effort to keep them in position. May only be applicable for a small quantity of containers also. This improvement could be implemented for any type of non-refrigerated commodities. |

As explained, some of these recommendations are already occurring to some degree and so the possibility is there for an increased shift to the use of those methods, either with some type of intervention, or if and when the necessity presents itself.

These interventions, however, do come at a cost. Either through capital and operation costs (e.g. additional equipment), or increases in complexity (using available containers for one part of the journey and cross-docking into another for a different part of the journey).

Concluding remarks

The feedback from industry engagement and the analysis of the data made available to Aurecon for this project, suggest that there are genuine reasons for many of the empty container repositions. In addition, some actions are already being undertaken to reduce their numbers, most of which involve adding cost and complexity to the supply chains.

Ongoing challenges still exist to ensure reliable container availability (particularly for exporters) and to restrain overall transport and shipping costs, to maintain competitiveness for Tasmanian businesses. Cooperation between government, the coastal shippers and industry is required. Ultimately, individual businesses will need to find the right balance between their primary function (e.g. manufacturing or primary production) and the cost and complexity involved in getting their cargo to or from their markets.

2 Introduction and purpose

In 2013, Aurecon completed a study on Supply Chains in Tasmania for the Freight Logistics Coordination Team (FLCT), managed by the Tasmanian Department of Infrastructure, Energy and Resources (DIER). The aims of this study were to undertake a detailed analysis of transport and logistics supply chains across key commodity groups, benchmark them on quality and cost and analyse the cost of shipping as a modal component of the supply chain.

The impetus for this study was the departure of the AAA shipping partnership from weekly direct international calls to Bell Bay (northeast Tasmania) in 2010, the effect on importers and exporters, and the flow-on negative impact to the Tasmanian economy.

Although Swire Shipping has introduced a limited direct international service recently (with focus on break bulk), by-and-large, without the AAA service, Tasmanian importers and exporters have been forced to tranship their freight through the Port of Melbourne, adding costs and time to their supply chains.

The Aurecon Supply Chain Study showed a number of important outcomes, most notably, that the number of empty containers being shipped across Bass Strait between Tasmanian ports and the Port of Melbourne is high in both directions. Exporters (in particular) have trouble accessing empty containers in the early months of the year (February to May), when the capacity of shipping across Bass Strait is reached.

The movement of empty containers across Bass Strait also has financial implications for some importers and exporters, as it adds time and costs to their supply chains. Therefore, any efficiency improvements that can remove these bottlenecks and costs will significantly benefit Tasmania's competitiveness, both against similar businesses operating from mainland Australia and those overseas.

The Tasmanian Empty Container Movement Study has therefore been conducted with the following primary aims (note that while empty containers are the primary focus of the study, empty truck trailers have also been considered):

1. **Understand the reasons (Sections 4 and 5).** The first aim is to better understand the movements of empty containers within Tasmania and between Tasmania and the Port of Melbourne. This includes, for example, the: commodities moved, container ownership, container sizes and types. Also, associated with this, is gaining an understanding of the business decisions in the supply chains, e.g. where to source containers; when to reposition them; what is required to get the freight to the consumers in the best condition and at the lowest cost.
2. **Determine the legitimacy (Section 6).** Based on the business decisions and reasons, determine the legitimacy of empty container repositions from: the perspective of an individual business supply chain; an overall Tasmanian perspective; and from the point of view of logical necessity. For example, some types of containers may be specially constructed for a particular purpose or commodity. Having them loaded in both directions (across Bass Strait) may not be possible, depending on the commodities actually needing to be transported.
3. **Make recommendations (Section 7).** Finally, based on the information and reasons previously described, formulate some recommendations where efficiency measures can be implemented, government initiatives or interventions are required, or where physical equipment may improve efficiency and reduce overall supply chain costs.

To achieve these aims, Aurecon has engaged with a small number of Tasmanian businesses to understand their similarities and differences, and the business decisions undertaken when designing and refining their supply chains. The businesses involved in this study are detailed in Section 3.

The Tasmanian Empty Container Movement Study should provide FLCT and DIER with the necessary information and understanding to make real changes where it can.

3 Survey methodology and participants

To achieve the aims stated above, the Tasmanian Empty Container Movement Study has sought to gain a detailed understanding of the business decisions of both importers and exporters of freight in Tasmania. To this end, Aurecon has undertaken 15 targeted qualitative interviews and quantitative data collections from a selection of businesses operating within Tasmania and those operating between mainland Australia and Tasmania.

Aurecon used a cooperative model and has drawn upon some of the relationships formed in the Tasmanian Supply Chain Study. The surveys were undertaken in person, with representative(s) from each business which had a detailed understanding of commodity production or consumption, the freight supply chains and logistics partners used, and the cost and rationale for doing business a particular way.




Many businesses were also able to discuss differences to supply chains pre- and post- the direct international AAA service operating out of Bell Bay, as well as possible future changes to their supply chains and the cost or service drivers for these possible changes.

Businesses supplied (often sensitive) operational information in good faith for the study and Aurecon has respected this. Therefore, with the exception of supply chain descriptions, if it forms part of the study report and findings, the information is either de-identified, or aggregated with other business data and explanations.


For the Tasmanian Empty Container Movement Study, targeted businesses were selected to participate. This was undertaken to ensure a good representative cross-section of importers, exporters and transport operators. Due to cost, time and scope requirements, small businesses have been omitted. Their supply chains, in theory, should be covered (partially or wholly) by the transport operators and coastal shipping lines represented in the study. Their views and issues, however, may be different from those surveyed and presented in this report.

The businesses that participated in the Tasmanian Empty Container Movement Study are shown in Table 1.

Table 1 - Businesses supporting and contributing to the study

| Business | Description |
|--|---|
| <p>AJL</p>  | <p>AJL operates facilities that include an empty container park, truck and trailer heavy repairs and maintenance. There are 3 locations: Burnie - stevedoring equipment and repairs; Melbourne - Toll ANL equipment repairs and maintenance; and Devonport - empty container park, heavy repairs and maintenance, including cassette maintenance and repairs.</p> |
| <p>Fonterra</p>  | <p>Fonterra is a dairy manufacturer, which operates two facilities in Tasmania, one at Spreyton, and the other at Wynyard. They produce milk powders (e.g. skim, whole, lactose, buttermilk, 25kg and bulker bags), butter, AMF (in drums), cheese (cheddar 20kg blocks), and whey powder (20kg bags)</p> |
| <p>Impact Fertiliser</p>  | <p>Impact Fertiliser provides storage and wholesale for bulk fertiliser (used for farming) for the whole of Tasmania. They have two facilities in Tasmania, one at Burnie and another at Devonport (which also has retail).</p> |
| <p>Mondelez (Cadbury)</p> | <p>Mondelez makes chocolate associated with the Cadbury brand. It has 2 plants in Tasmania, one at Burnie and another at Claremont, Hobart. It is a major importer of cocoa butter (and other raw materials), and exporter of chocolate.</p> |

| Business | Description |
|---|--|
| Nyrstar  | Nyrstar produces zinc ingots, produced from zinc ore. The Risdon Road, Hobart site (Risdon Road) contains one of the company's most efficient plants, and exports to mainland Australia and Asia. |
| OOCL  <i>We take it personally</i> | OOCL is an international shipping line (originally part of the AAA consortium) with a significant presence in Tasmania. It ships a diverse range of products, including exporting recycled materials to Asia, sand to Korea, metal to the US, and meat to Japan. |
| PIL / PAE  <small>PACIFIC ASIA EXPRESS</small> | PIL / PAE is an international shipping line (originally part of the AAA consortium) which also maintains a significant presence in Tasmania. It ships a diverse range of products, including onions to Hong Kong, timber to South East Asia, and recycled materials to China. |
| SeaRoad Shipping  <small>keeping Tasmania connected</small> | SeaRoad Shipping is a coastal shipping provider between Melbourne and Tasmania. It operates two vessels, the Tamar and the Mersey, providing an overnight service, 6 days per week, and an additional service via King Island on Sundays. |
| Skretting  | Skretting is a manufacturer of fish food, and part of the global company Nutreco. From its Hobart plant, it ships to Tasmania, mainland Australia and New Zealand. |
| Statewide Independent Wholesalers  <small>'Delivering The Goods'</small> | Statewide Independent Wholesalers (SIW) is a distribution centre operation in Tasmania for Woolworths (WW), BWS and IGA (independent grocers). They have two distribution centres, one at Western Junction that stores ambient products (i.e. unrefrigerated) and produce. The second is for refrigerated products, located near Launceston airport. These two DCs service the entirety of Tasmania. |
| Tasmanian Ports Corporation (Tasports)  TasPorts | Tasports is responsible for the operations and management of all ports in Tasmania. Its purpose is to facilitate trade for the benefit of Tasmania, through the commercial provision of infrastructure and services. |
| Temco / BHP Billiton  <small>resourcing the future</small> | Opened in 1962, Temco manufactures and exports manganese alloy from its Bell Bay plant. It exports both in bulk and in containers, depending on the destination and urgency of the freight. |

| Business | Description |
|---|--|
| Toll ANL  | Toll ANL is a joint venture between Toll and ANL, and operates a coastal shipping service between Webb Dock and Burnie. It also operates 2 vessels, 6 nights per week. |
| TT Line | TT Line operates the Spirit of Tasmania service between Melbourne and Devonport. The ships are purpose-built ferries, carrying passengers, cars and truck trailers, and capture time sensitive freight (e.g. fresh produce). |
| Veolia  | Veolia collects recyclable materials from Tasmania's curb-side collection. The materials are then taken to depots in Hobart, Spreyton and Launceston, where they are sorted and baled into like materials (paper, plastic, etc) and exported to many countries, including Malaysia, China and Indonesia. |
| Webster Limited | Webster Limited provides domestic exports of Walnuts to mainland Australia and international exports of onions to Europe, Japan and South East Asia. |

Aurecon, the FLCT and DIER are extremely grateful to these businesses and for their time and effort in supporting the study. As mentioned previously, they have placed their trust in Aurecon to respect the information and data that they provided. This level of cooperation, for the greater good of Tasmania and its economy, should not be understated.

Disclaimer

While these businesses participated and were engaged in the study, the views and opinions (including the legitimacy of reasons and the recommendations) expressed in this report, are those of Aurecon. Those views are based on our understanding of freight transport both in Australia and internationally, which has been adapted to consider the unique local Tasmanian aspects revealed during the study. These individual businesses therefore may have differing views about issues, bottlenecks and recommendations.

4 Background information

4.1 Introduction

To appreciate the unique and complex supply chains that are part of the Tasmanian story, this section gives an important overview of the current international and domestic shipping (operating between Tasmania and the Port of Melbourne), with descriptions of trucks, containers and pallets. All of these are important considerations in understanding efficiencies, business decisions and typical supply chains, as they relate to mainland importers and exporters.

While mainland Australia is a net importer of international freight, Tasmania is a net exporter. This actually creates issues for the international shipping lines transporting the freight to and from international markets, which, in turn, affects Tasmanian freight movements.

In addition, a considerable amount of freight shipped to Tasmania has been sourced from, or manufactured by, mainland Australian producers, and a considerable amount of freight shipped from Tasmania is consumed by mainland Australian markets.

Tasmania, therefore, has additional complexity caused by servicing both domestic and international markets, which may require different handling, transport and storage equipment.

4.2 Shipping lines and services

Tasmania is serviced by three coastal services to and from Melbourne. These services provide the ability to transport both trucks/trailers and containers for the movement of domestic freight, as well as providing access to and from international markets through the Port of Melbourne.

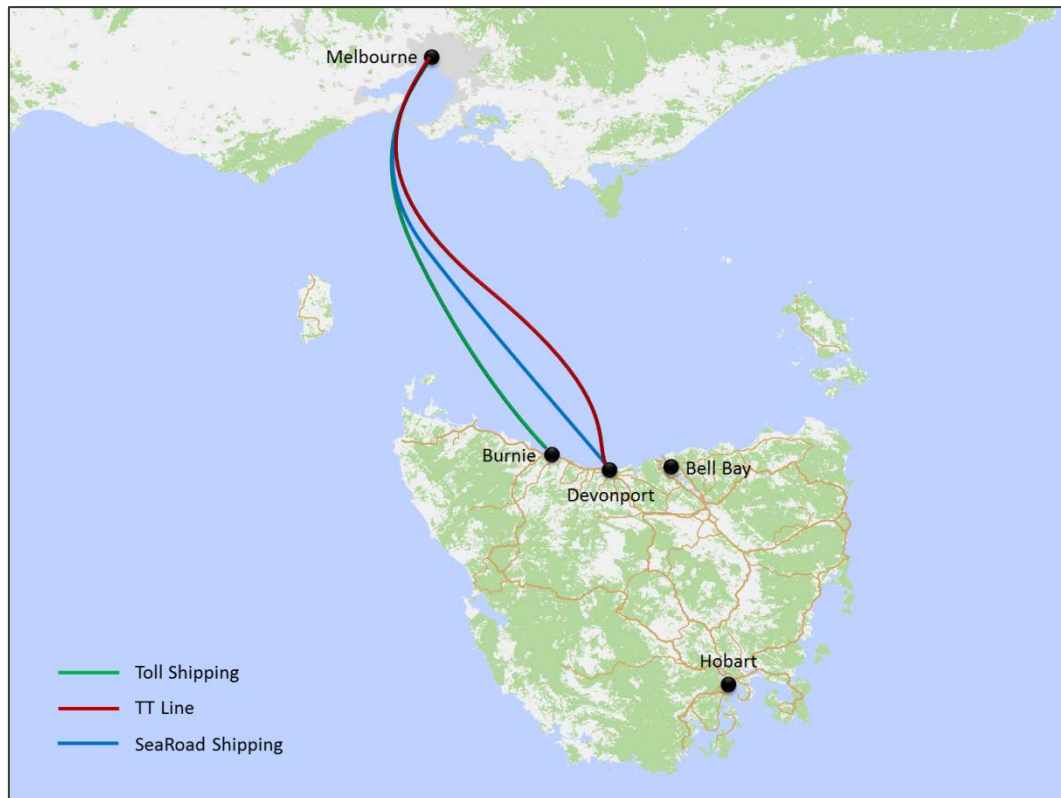
The following is a summary of the services provided by these carriers (refer **Figure 1**):

1. **Toll ANL Shipping.** Toll ANL operates a nightly service between Webb Dock in Port Melbourne and Burnie in Tasmania, operating 6 nights per week. The vessels used each have a capacity of 500 TEU and ship both containers and trailers.
2. **SeaRoad Shipping.** SeaRoad Shipping also operates a nightly service, between Webb Dock in Port Melbourne and Devonport in Tasmania, again operating 6 nights per week. In addition, on the seventh night, SeaRoad Shipping operates a service to King Island. The vessels used have capacities of 260 and 180 TEU, and, like the Toll ANL ships, are able to transport both containers and trailers.
3. **TT Line.** TT Line operates the Spirit of Tasmania service between Station Pier in Port Melbourne and Devonport in Tasmania. The TT Line service operates 7 nights per week, with 3-4 additional day sailings in peak times (December through to Easter). Unlike Toll ANL and SeaRoad Shipping, however, the Spirit of Tasmania's main business is passengers, but it is able to carry cars, trucks and trailers.

While the descriptions above for Toll ANL and SeaRoad Shipping have TEU capacities for their vessels, the vessels also have an overall weight capacity. Due to the heavy weight of the freight being moved (or rather the lack of lighter freight), we understand that these vessels reach their weight capacity before reaching their TEU capacity. The consequence of this is that reducing the number of empty container repositions may not automatically mean more full containers can be shipped.

To provide the (mainly) overnight services, each provider has two ships, one loading in Melbourne while the other is loading in Tasmania. During the night, the vessels pass each other in Bass Strait.

Figure 1 - Overview of coastal shipping services to Tasmania



All of the services operate what is called a RO-RO service (roll-on, roll-off) for loading and unloading. Toll ANL uses a Mafi system (4 TEU per Mafi), while SeaRoad Shipping uses a Cassette system (4 TEU per cassette). These Mafi or Cassettes are loaded with containers at the terminal, then when the ship loading commences, they are towed onto the ship and positioned.

This is substantially different to international container vessels, which typically use large cranes. The RO-RO system is used for these coastal services to facilitate the unloading and loading of the vessels in a short period of time, which is necessary to maintain a daily service.

Instead of using Mafi or Cassette systems for loading containers, TT Line tows truck trailers (mostly Pantech and tautliners) on and off its ships using terminal tractors.

The overnight coastal services provided by these three operators allow companies to deliver freight to the terminal in trucks or containers late in the day (e.g. to Devonport), and the freight is available for collection early the next day (e.g. in Melbourne) for delivery to the customer the same day. In this respect, the sea voyage across Bass Strait is efficient and does not account for any significant loss of time within the supply chain.

Containerised freight exported from Tasmania bound for international markets, is transported from the terminal of either Toll ANL or SeaRoad Shipping on Webb Dock, by truck to Swanson Dock for the international leg of the journey. This is referred to as *transshipment*.

Since early 2013, Swire Shipping has also introduced a direct international multi-purpose service (a combination of break bulk and containers) from Bell Bay to Taiwan via New Zealand and China. On the way to Bell Bay, this service calls at Brisbane, Newcastle and Geelong; it operates on a roughly monthly basis.

While this Swire Shipping service does provide access to international export markets in New Zealand, China and Taiwan, the current service and sail times are based on a break bulk operation, and therefore the vessel capacity and frequency of service are not sufficient for many container exporters. They need to rely on transshipments onto more frequent international services out of Melbourne.

4.3 Pallets and containers

The movement or transport of freight has undergone significant changes and evolved more efficient methods over the past 50 or so years. Just as rail in Australia has three different gauges in different parts of the country (which has serious efficiency issues), differences in standards between Australia and the rest of the world have implications for the coastal shipping trade between the Australian mainland and Tasmania. In short, these differences cause issues in using certain containers for certain movements.

Pallets are a common and versatile method for transporting freight, either: over short distances within a store or warehouse (using a Palletiser or forklift); between manufacturer, storage and point of sale (commonly in Pantech or tautliner trucks); or between states or countries (in containers).

Standard Australian pallets are 1165x1165mm, and were developed during World War II after the invention of forklifts. The adoption of an international pallet size (1016x1219mm) followed the development of the shipping container in the late 1950s. The intercontinental pallet was designed to minimise wasted space in a standard ISO container 20'x8' (6.10x2.44m) (there are various other lengths, with 40' being the next most common).

Because of the wider Australian pallets, containers used to transport freight within Australia are wider than their international counterparts. Coastal shipping lines operating between mainland Australia and Tasmania must therefore be able to accommodate both container sizes. In particular, the containers that they own and hire to manufacturers and wholesalers to transport their freight to and from Tasmania are designed for Australian pallets.

The consequence of the different pallet and container sizes is that domestic containers cannot be readily used for international pallets; similarly, international containers cannot be readily used for domestic pallets. When domestic pallets are loaded into international containers, or international pallets loaded into domestic containers, the amount of wasted space is higher; therefore the cost per tonne of freight moved is increased. For the expensive shipping leg across Bass Strait, this inefficiency cannot often be justified.


Some importers and exporters are using new systems and supply chains to reduce the issue of compatibility and wasted space. This includes, for example, slip-sheets (Cadbury) and container cross-dock (Nyrtar).

As described previously, there are also different length containers, with the general rule being that light freight will tend to use 40' containers, due to their overall lower transport and shipping costs. Heavy freight will normally use 20' containers.


There are also special purpose containers, which, due to their restricted uses, add an additional level of complexity into an already complex situation. Containers of one type cannot be simply interchanged with containers of another. This is sometimes a result of container shape, but often comes from either a reluctance to mix product types, using up available container volume, or the loading method of the container itself.

The descriptions below also contain general background information on what commodities are carried in them in the context of Tasmanian freight.

Table 2 - Summary of common container types

| Type | Description |
|---|---|
| <p>General Purpose (GP)</p>  | <p>'General Purpose' (GP) or 'Dry' containers are simple (single) end opening containers, which are suitable for any type of freight, but are best suited to carry freight packed onto pallets (such as non-refrigerated dairy products, beverages, cement (in bags), supermarket and other consumer products) for easy loading and unloading. Another variant is the 'tunnel' container, which can be opened from both ends.</p> <p>GP containers are not temperature or humidity controlled; they are therefore unsuitable for most perishable commodities.</p> <p>Most commonly, GP containers are 20' long for heavy freight and 40' long for light freight. Heights can vary, and 'high cube' containers provide additional height for more freight.</p> |

| Type | Description |
|---|---|
| <p>Refrigerative (Reefer)</p>  | <p>'Refrigerative' (Reefer) containers are able to store and transport chilled or frozen commodities (such as fruit, vegetables, dairy products and some hazardous goods). The external dimensions are the same as the GP containers, but internally they are smaller to accommodate the refrigeration components.</p> <p>Like GP containers, 20' and 40' are the most common lengths; they are available in both normal and 'high cube' varieties.</p> |
| <p>Bulk containers</p>  | <p>Bulk containers are very similar to GP containers, with the one significant difference that they have hatches on top that allow top loading of bulk materials, e.g. grain.</p> <p>Typically, these containers are loaded through the top, but unloaded from tipping container trailers, once the rear end doors have been opened.</p> <p>They are suitable for general purpose freight (and therefore more versatile); however, we understand some businesses do not like using them because they believe them to be less weather-proof than GP containers, due to the hatches on the top.</p> |
| <p>Side-door containers</p>  | <p>Side-door containers are a small adaptation of the GP container, in that, instead of doors located at the ends of the container, they have doors on the sides. Like GP containers, they can be used for any non-refrigerated commodity.</p> <p>This allows containers to be unloaded while still on the back of a truck, using a forklift, much like a tautliner. For a truck carrying multiple 20' containers, the rear container could be a normal GP container (rear opening) and the front container a side-door container, to allow both containers to be loaded or unloaded simultaneously.</p> |
| <p>Flat rack containers</p>  | <p>Flat Rack containers are container bases with collapsible ends. They are used for a variety of products, including timber, metal, and plastic piping. The collapsible ends allow them to be stacked on top of each other (more efficient use of ship space) when being repositioned.</p> |
| <p>Open top containers</p>  | <p>As the name suggests, 'open top' containers have open tops to allow freight to be loaded from the top. They are primarily used to transport bulk materials (such as sands, ore, scrap metal, etc.). Some 'open top' containers are convertible from GP containers (with a removable top, they therefore also have an opening end), while others cannot convert from one container type to another.</p> <p>If the container does not have an opening end, it is common to use a 'rotainer' crane to tip the container upside down to unload the contents.</p> <p>If the material being transported in open top containers is dense, they are normally lower than a standard container, often referred to as 'half heights'.</p> |

| Type | Description |
|--|--|
| <p>Tanktainers</p>  | <p>Tanktainers are purpose built containers for carrying liquid freight (although they can be used for carrying fine bulk products, such as sugar). The tank is enclosed in a cage the size and shape of a GP container, to allow easy transport and stacking.</p> |
| <p>Fantainers</p> | <p>Fantainers are converted GP containers that allow fresh air to circulate through the container during the sea voyage. They are normally used for the export of onions (although reefer containers are used for some types of onions).</p> |

This table is not an exhaustive list of container types, but includes those most commonly used in the transport of Tasmanian freight.

Some container types are more or less interchangeable, which gives shipping lines additional flexibility when hiring containers to transport certain commodities. For example, GP, bulk and side-door containers can all be used for shifting palletised freight. GP containers can also be used for bulk freight with some boarding up of the open door during loading.

Reefer containers can also be used to transport ‘ambient’ commodities, but this is less efficient due to the wasted space (not being able to put as many pallets inside).

4.4 Container ownership

Container ownership is an important factor in supply chains, both for international and domestic transport. International shipping lines own (or lease) the containers that their customers use. The customers ‘hire’ the container at the point of origin of the freight, and ‘de-hire’ it at the destination. Shipping lines would give, for example, 14 days from hire to allow the customer to transport the container to their business, pack the container, and transport it to the shipping terminal for the sea leg of the journey.

Once the container has been shipped to the destination port (port of discharge), the customer would normally have 3-5 days to collect, unpack and then de-hire the container at a terminal or empty container park chosen by the shipping line. Once a container has been de-hired, the cost of maintenance, refits, servicing and storage is borne by the shipping line.

The total ‘hire’ duration allowable (before additional hire penalties are applied) is a critical factor in the cost-efficiency of shipping lines. A longer hire will mean that shipping lines will need to own more containers to carry the same amount of freight. Minimising this hire duration, ensuring enough containers are available where they are needed and ensuring containers are not stored in one place for too long, are all important financial drivers.

If the number of full containers being shipped is out of balance (more full containers or containers of different types moving in one direction, compared to the other), then the shipping line will arrange for containers to be ‘repositioned’. This entails arranging for some containers to be collected from the empty container park (if not already at the terminal) and shipped empty to where they can be re-filled. The shipping line again is responsible for the costs associated with repositioning; therefore, in general, empty container parks are located in close proximity to the ports (to minimise the transport costs).

For Tasmania, if an exporter ships ex-Melbourne, they would need to arrange the hire of the empty container in Melbourne, transport it empty to Tasmania, pack the container and then ship it back to Melbourne for the international sea leg. This will be described in more detail in Section 5.

The process for domestic containers can be nearly identical to international ones, in that customers hire and de-hire containers, for example, to transport freight from the Australian mainland to Tasmania. Again, the coastal shipping lines (Toll ANL and SeaRoad Shipping) would be the container owners (or lessors). They would reposition empty containers to or from Tasmania to ensure the containers were available when needed.

The main difference for domestic shipping containers is that sometimes the operator provides a door-to-door service. In this case, the operator will collect the freight, pack the container, ship it, deliver and unpack the freight at the destination. In this case, the traditional 'hire' and 'de-hire' is not undertaken.

When a coastal shipper needs to reposition its own containers, can usually do this (subject to space on the vessel) very cheaply, as there is a fixed wharf labour cost and no port charges. In this way, repositioning of its own containers is an efficient way of minimising the number of containers required.

We found during this study, that a number of businesses own specialised containers, rather than hiring them from a coastal shipper. This is, for example, the case for 'Tanktainers' used to transport sugar to Tasmania for Cadbury and milk for Fonterra. In this case, these businesses own the containers to ensure the availability of the containers and that they are not used for commodities that could contaminate their materials. As they own the containers, they are responsible for maintenance and servicing costs, as well as any repositioning costs (if the containers are empty in one direction).

5 Tasmanian supply chain descriptions

To appreciate the supply chain complexity facing Tasmanian importers and exporters, this section describes the supply chains from the most simple, to the most complex and the reasons why they have been implemented. The supply chains here are generic in nature and may contain various options (each of which is described). The complete (normal) supply chains for each of the survey participants are shown in Appendix A.

To aid in understanding the diagrams, full international containers are shown as **grey** lines (solid for full containers, dashed for empty containers), domestic containers are shown in **red** (solid for full containers, and dashed for empty containers), tanktainers are shown in **orange** (solid for full containers, dashed for empty containers), and Pantech, flatbed and tautliner trucks (only full trucks are really considered here) are shown in **blue**.

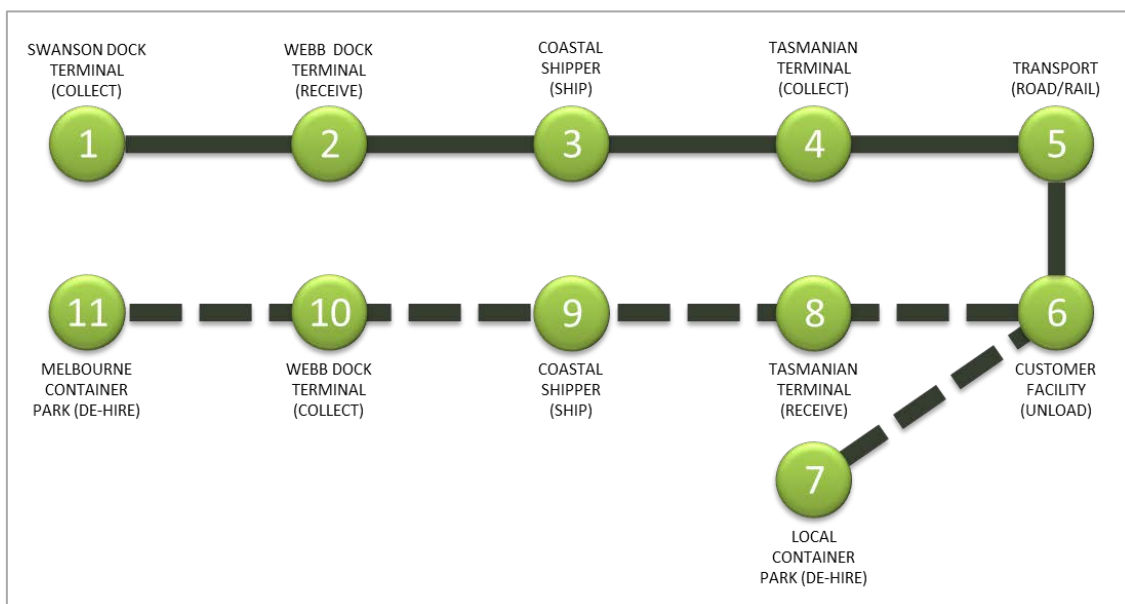
These supply chains are shown from the perspective of companies needing to tranship through Melbourne that participated in the study (although other businesses in Tasmania are also likely to have similar chains).

5.1 International import supply chains

A Tasmanian importer does not differ considerably compared to a mainland importer, with the exception that if they get the container discharged in Melbourne (as the international shipping line may not discharge in Tasmania), then the importer has to arrange and pay for the coastal legs to and from Tasmania.

In either case, there is a transshipment in Melbourne between Swanson and Webb Docks. In a case where the discharge port is in Tasmania, the importer will normally be allowed to de-hire the container near the discharge port. Figure 2 shows a generic international import supply chain for containerised freight.

Figure 2 - Generic international import supply chain



In this figure, the importer either gets to de-hire in Tasmania (7), or ship the container back to Melbourne for de-hire (8-11). Other variations also exist, such as unloading at a local warehouse and then transport to the importer using tautliners (Skretting, Figure 20). Cadbury has the most significant deviation to this, where containers are unpacked in its Derrimut warehouse, before re-containerisation into domestic containers to move to its Claremont plant (Figure 23) on a just-in-time basis.

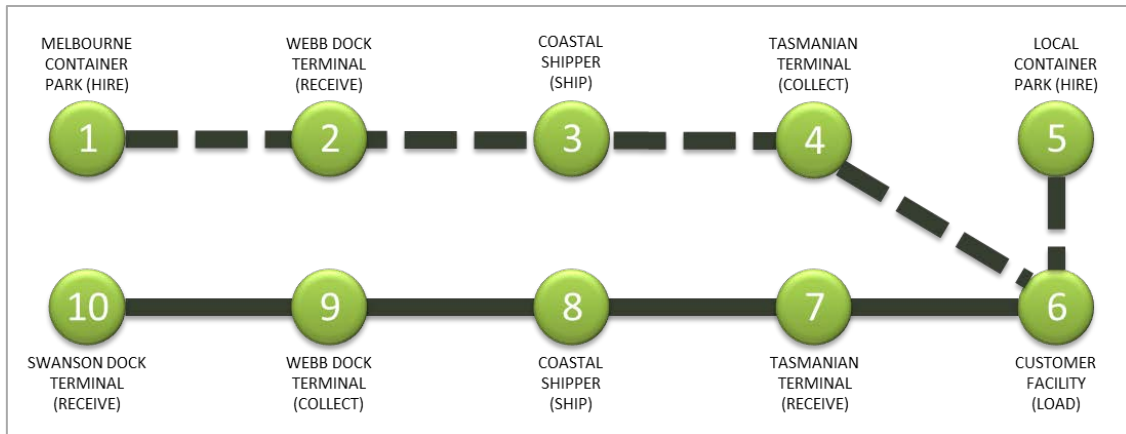
5.2 International export supply chains

International export supply chains essentially are the opposite of the import supply chain. Again, depending on the international shipping line, the exporter is either able to export from Tasmania, or must arrange their containers to be transported to Melbourne for export.

If exporting from Tasmania, the international shipper will normally hire the container in Tasmania (e.g. Veolia), but in some cases, they will need to reposition the container to Tasmania for the export shipment (e.g. Webster Limited), when there are insufficient containers on the island of the correct type.

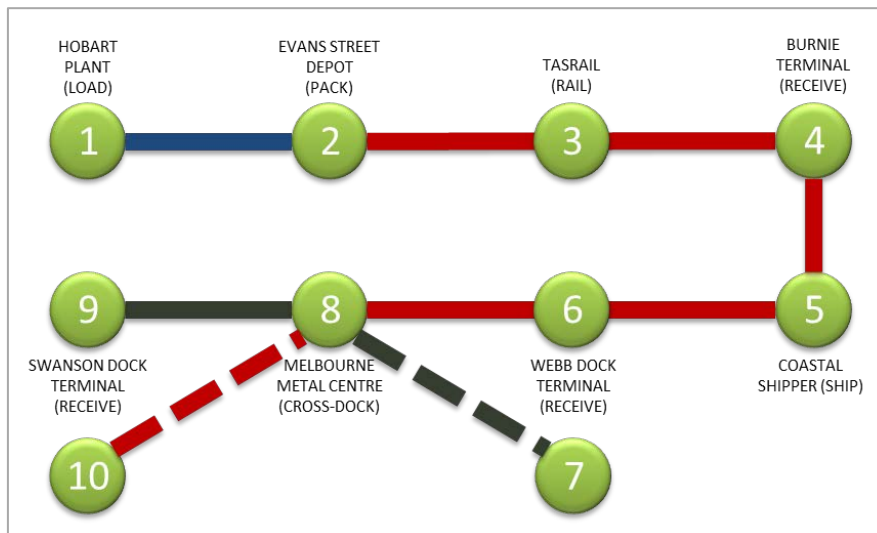
A generic export supply chain is shown in Figure 3.

Figure 3 - Generic international export supply chain



Again, variations would exist, such as collection from the exporter using tautliners and packing the containers at a warehouse or storage facility. The most complex export supply chain found during the engagement process was that for Nyrstar, shown in Figure 4.

Figure 4 - Nyrstar zinc ingots export supply chain (cross-dock in Melbourne)



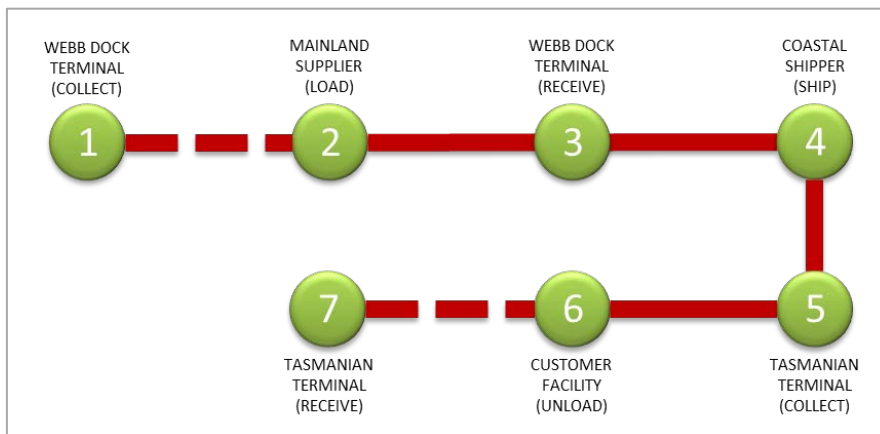
In this export supply chain, zinc ingots are trucked from the Risdon Road (Hobart) Plant to a depot, where they are loaded into 20' domestic containers and shipped to the Melbourne Metal Centre in West Melbourne. There they are effectively cross-docked into an international container (hired from a Melbourne empty container park). This supply chain was designed / arranged to use the excess of available domestic

containers in the southern region of Tasmania, which ensures the supply of containers and minimises delays in getting the freight to overseas markets.

5.3 Domestic import supply chains

For the purposes of this study, domestic import supply chains relate to the transport of freight from mainland Australia into Tasmania. Figure 5 shows a generic domestic import container supply chain, where the container is collected by the coastal shipper at Webb Dock and delivered to the coastal shipper’s Tasmanian shipping terminal.

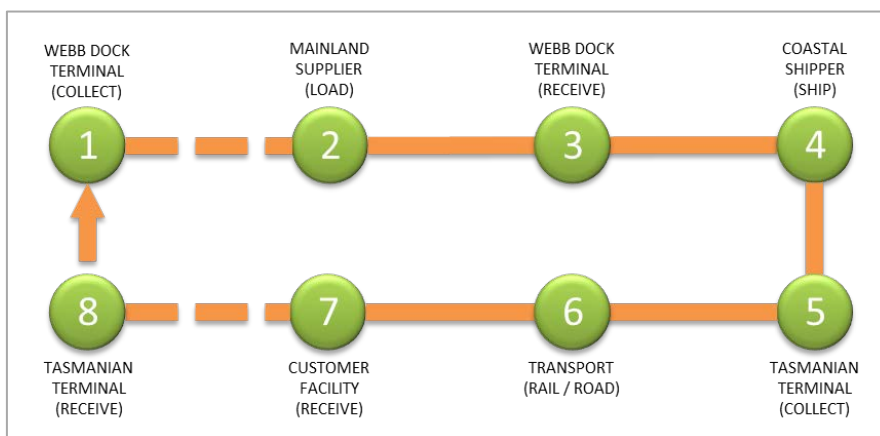
Figure 5 - Generic domestic container import supply chain



As with international imports and exports, some variations where freight is packed or unpacked at a facility other than the customer’s (and delivery is done by tautliner) is common (e.g. Skretting, Figure 22 and Fonterra, Figure 37).

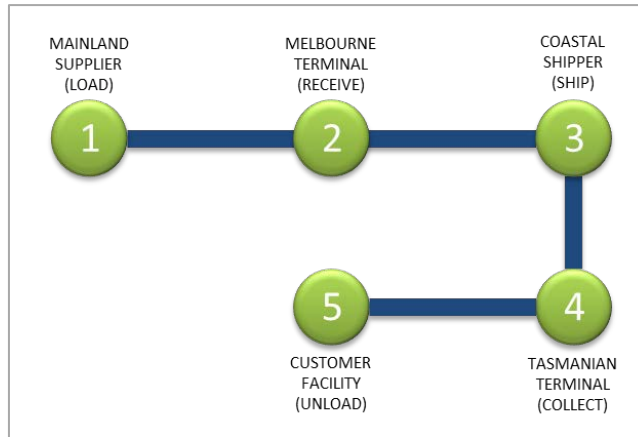
Tanktainers have a similar supply chain. For the companies surveyed, they were owned by the individual companies and operated in a closed loop, as shown in Figure 6.

Figure 6 - Generic tanktainer import supply chain



As described previously, the majority of all freight is transported in domestic (wider) containers, but given truck trailers can be carried on each of the coastal shippers, truck trailer transport (Pantech and tautliner) is also common, as shown in Figure 7.

Figure 7 - Generic truck trailer import supply chain



For the purpose of using concise descriptions, we have omitted the unloaded portion of the trips, but we understand that, where possible, truck trailers are back-loaded for the trip back to Melbourne.

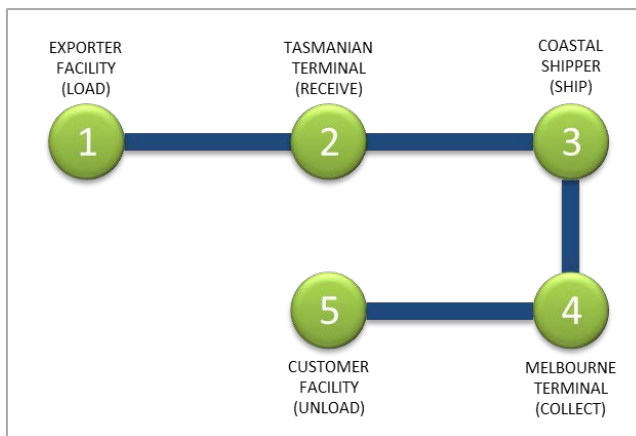
5.4 Domestic export supply chains

Domestic export supply chains behave essentially the same as import chains, in that containers are used for the majority of movements. Initially, these containers are collected from the Tasmanian terminal of a coastal shipper, filled, shipped to the customer, and then delivered (once emptied) back to coastal shipper's Webb Dock terminal. A generic domestic container supply chain is shown in Figure 8, and a truck trailer supply chain is shown in Figure 9.

Figure 8 - Generic domestic container export supply chain



Figure 9 - Generic domestic truck trailer export supply chain



There are other versions of these supply chains, which may involve rail legs and/or unpacking freight onto tautliners.

5.5 Why do they work like this?

International supply chains use containers to facilitate easy and cost-effective transport of freight across long distances. Containers can be efficiently stacked on ships and then again on marine terminals, thereby minimising space requirements. On leaving the marine terminal, they can be efficiently transported by road or rail, then unpacked while still on the truck, or unloaded from the truck and unpacked later.

Similar economies can be achieved for domestic transport, although the efficiency of container use is increased the further the freight needs to be transported. For coastal shipping to and from Tasmania, truck trailers can be transported, but containers are more efficient due to their ability to be stacked at the terminal and then stacked on the ship for the sea leg.

Once the decision has been made to use a container for either international or domestic transport, to make efficient use of shipping containers, they are most commonly hired from the operators of the shipping service (rather than every import and export business owning and maintaining their own set). It then follows, that containers must be hired and de-hired (minimising the time between the two) to ensure that the shipping lines can keep track of the individual containers and that they can optimise the number and position of their containers to suit their trade.

The ownership of the container, in conjunction with the hire and de-hire process at centralised points, means that often there are as many empty container movements as there are full container movements. Consequently, the number of steps in the supply chains is often considerably higher than for direct freight truck movements.

5.6 Possible efficiency improvements

There are two methods for improving the efficiency and reducing the number of empty container movements. These involve the elimination of one or more of the transport legs for empty containers. Both assume the access and availability of suitable freight to re-use the container within a short period of time after the original container has been unpacked. Both also assume that the containers do not require special pre-tripping to be used again and that they are in a fit-for-purpose state for the return leg.

Shipping lines (both international and coastal) typically use custom built software to keep track their containers. The formal hire and dehire process provides the transparency and traceability of individual containers. For in-use containers, information about the customer, the hire date, approximate duration, origin and destination is stored; while for empty containers, the container park and location, maintenance and condition, and dehire date are stored.

Empty container repositions are then optimised to ensure availability where and when the containers are required based on forecast demand, with the overall goal of ensuring containers that have been stored to

longest are repositioned first. In the proposed efficiency improvements below, there is no traditional hire and de-hire process, and therefore shipping lines must track and optimise their fleet of containers in a more complex way.

Back-loading (for the same business)

Back-loading is the process of loading the container in both directions (in this case, for the same business). It is an obvious efficiency improvement, as it saves the transport associated with de-hire and then the re-hire of the empty container.

It is frequently not possible because: most businesses either import or export, not both (and certainly not the same quantity); the type of freight being transported requires different containers (e.g. the inbound container may be a GP container, but the outbound may need to be a reefer), or the destination causes issues (i.e. the inbound container may come from China, but the outbound may need to be transported to the mainland, or to a different country using a different shipping line). Once it is finally empty, the container may be in the wrong place to be de-hired.

Triangulation

Triangulation of empty containers again saves the de-hiring and re-hiring operations, by transporting the empty container direct from an importer (after it has been unpacked) to an exporter (for packing). Again it is an obvious efficiency improvement, but it assumes a high degree of certainty about when the imported container will be available and that the customers are located near enough to each other to warrant the additional complexity. In addition, sometimes the importer will finish with the container before the exporter requires it; then there is the additional problem of who should store it.

If the businesses are arranging the transport of the container themselves (e.g. not a door-to-door domestic service), which user pays (or how is the cost apportioned) for the transport of the empty container between the two businesses? Triangulation also has the issue of whether the containers are immediately fit-for-purpose after unpacking; therefore any that require pre-tripping, servicing, maintenance or damage cannot use this system.

In general, the difficulties involved in aligning the re-use of the same container for either back-loading or triangulation, added to the additional complexity and possible issues if problems occur, usually mean this is only attempted if there is sufficient volume to smooth out some of these issues and to get sufficient overall cost savings.

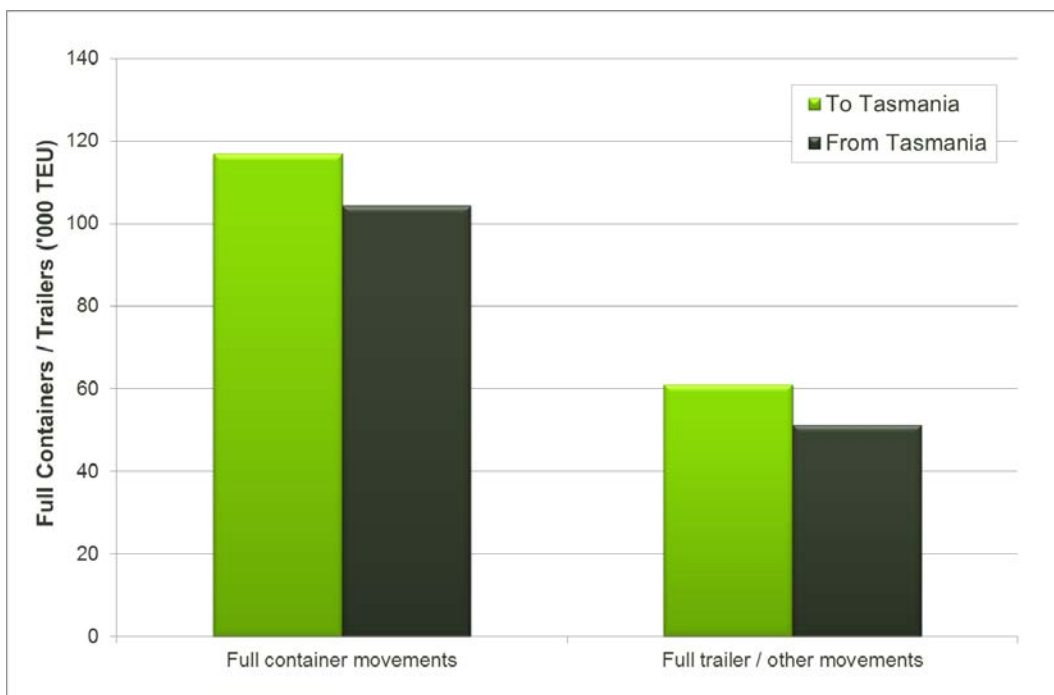
6 Genuine empty container (shipping) movements

Data supplied by the Tasmanian Ports Corporation (Tasports) and combined with that provided by other businesses that participated in the study, has been used to identify some of the reasons for empty container movements and quantify the number of genuine movements. These genuine reasons, in general, result from imbalances in container demand. These genuine empty container movements are, in effect, determined by the movements (or the mismatch) of full containers, as shown in the following sections.

6.1 Trade imbalance

Trade data (trailers and containers, rather than bulk) to and from Tasmania has shown that the number of full import containers and trailers is greater than the number of full export containers and trailers (Figure 10). Therefore, at the very minimum, empty containers and trailers will need to be repositioned (northbound) from Tasmania over the course of the year.

Figure 10 - Full container / trailer movements to and from Tasmania (2012-13)



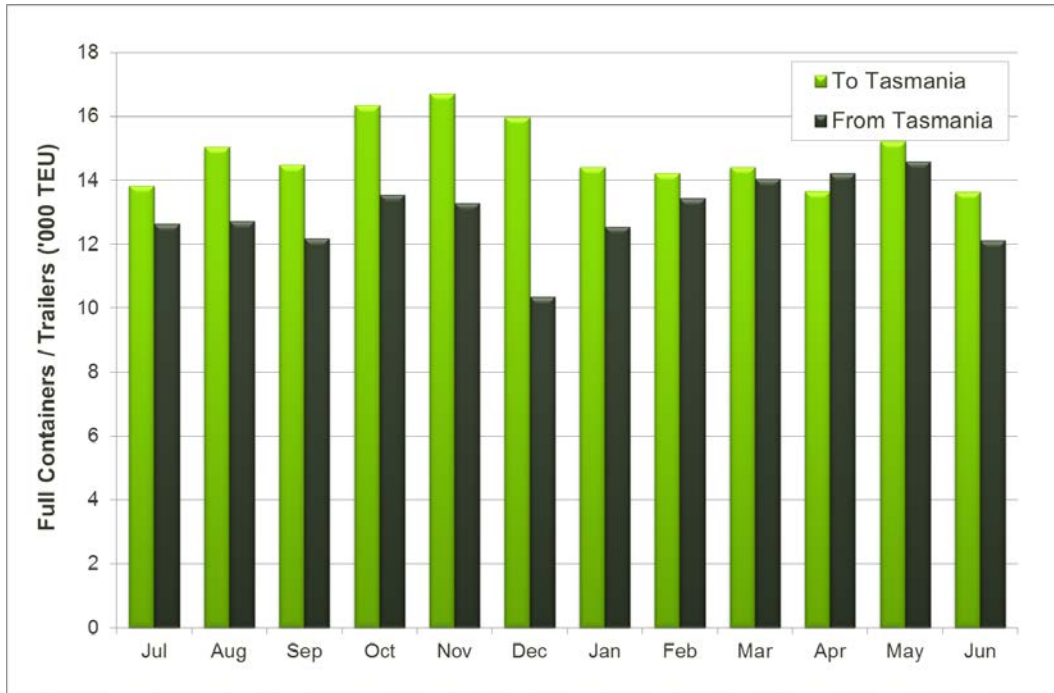
We are ignoring the type and ownership of containers at this stage, as these issues will be considered in more detail in Sections 6.3 and 6.4.

6.2 Seasonality

To complicate the trade imbalance, imported (southbound) freight is significantly stronger than exported freight (northbound) from July through to January, but from February to June, the trade is more balanced (Figure 11). Assuming compatibility in container type, the coastal shippers have less need to reposition empty containers during these earlier months.

In the latter months of the year, however, the shipping lines will need to reposition more containers from Tasmania to ensure enough supply for import freight.

Figure 11 - Seasonality of import and export freight (2012-13)

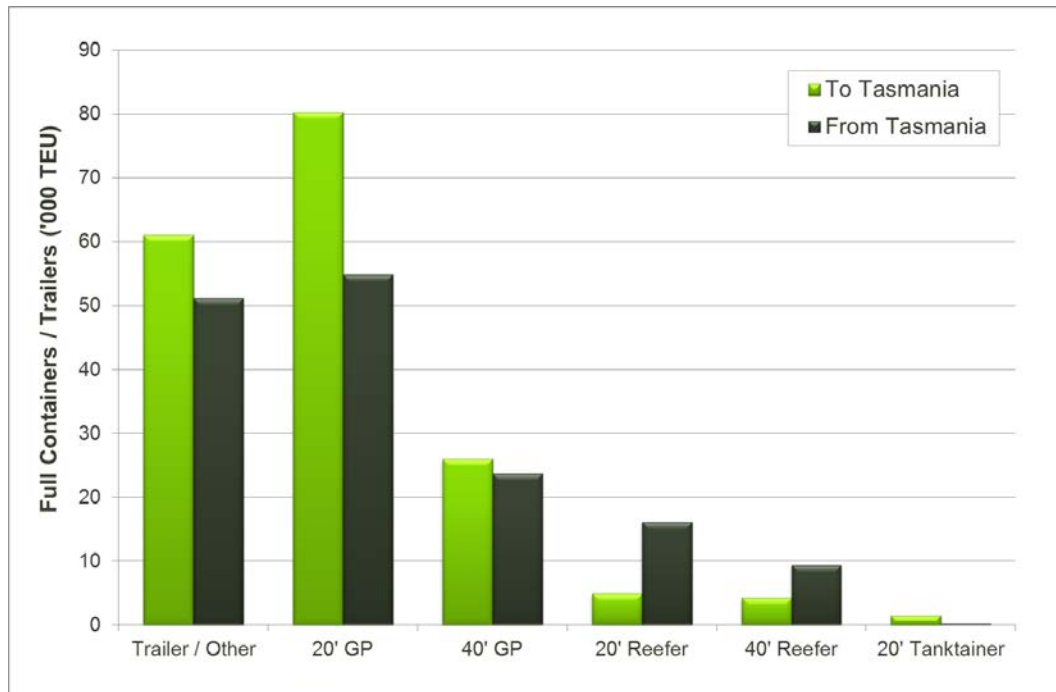


Analysis of the volume of containerised freight compared to the trailer freight movements also shows the same seasonal behaviour; the only observable difference is that the freight carried in trailers tends to have a greater gap or imbalance in the months leading up to Christmas.

6.3 Mismatch in container types

As described in Section 4.3, there is a wide variety of different container types. The container type used to import or export freight is based on the type and weight of freight to be transported. From data provided by Tasports and businesses participating in the study (and ignoring container ownership), Figure 12 shows the breakdown of full containers. The proportion of reefer containers has been estimated based on commodity information.

Figure 12 - Container types (full) for import and export freight (2012-13)

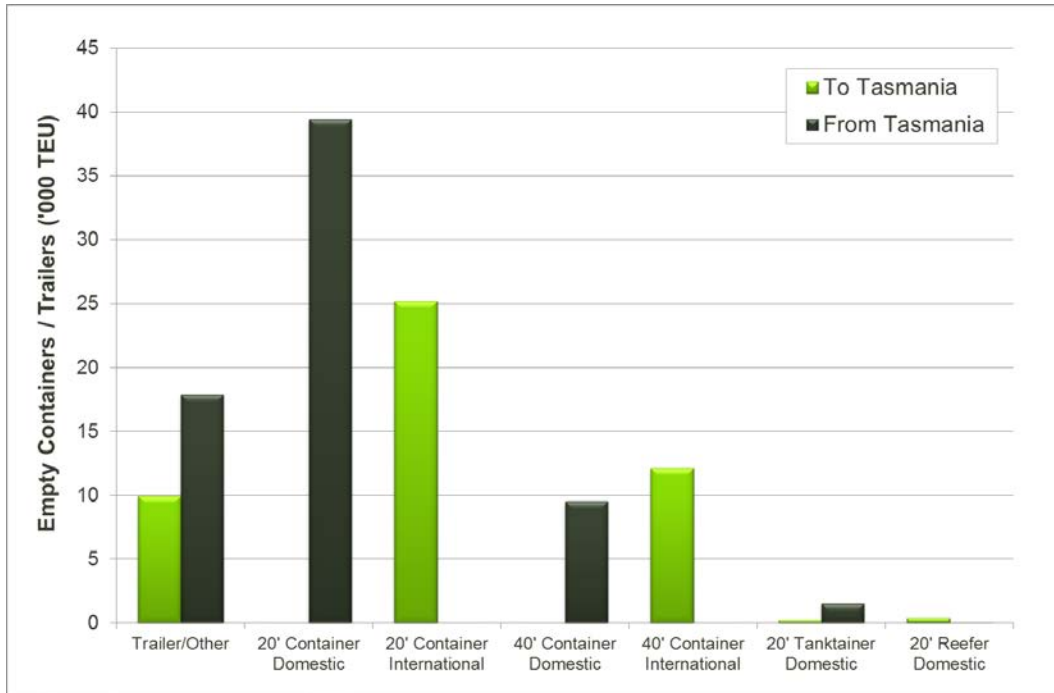


This figure highlights that the majority of containers are general purpose (compared to reefer container and tanktainers), with significantly more 20' GP and trailers required southbound to Tasmania (and slightly more 40' GP containers), while 20' and 40' reefer containers have stronger demand northbound from Tasmania. As a result, it must be expected that empty containers of different types will need to be repositioned in both directions to account for this mismatch.

Figure 13 shows the container types for the recorded empty container repositions across Bass Strait. As observed, while there are 20' and 40' containers being repositioned in both directions, analysis shows they are different types of container (repositions from Tasmania are domestic containers, and repositions to Tasmania are international containers).

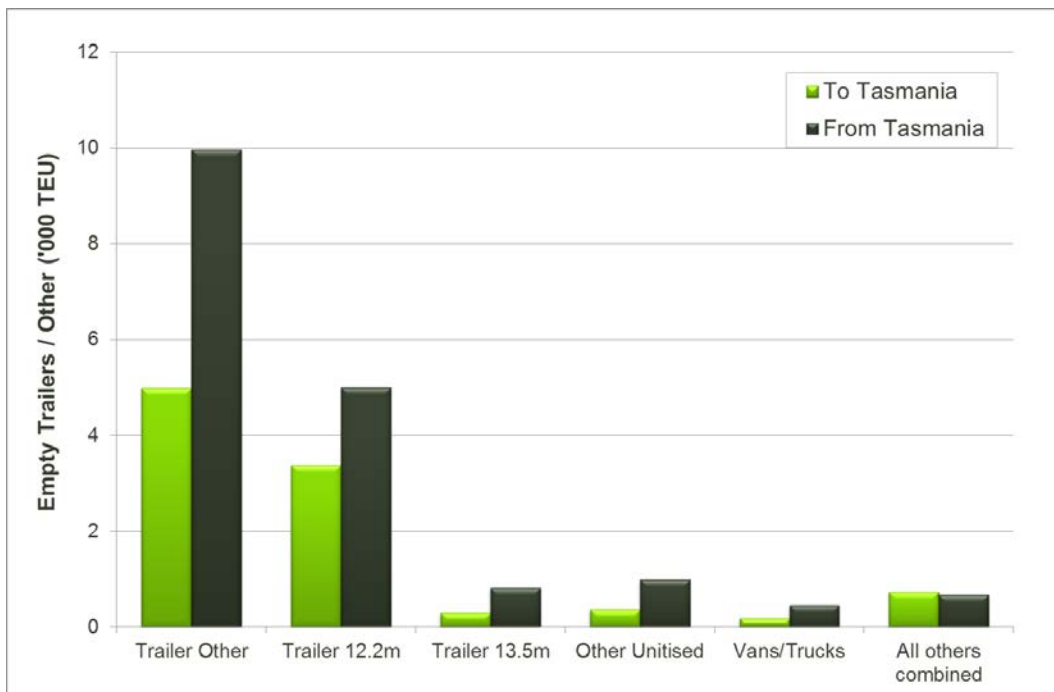
Note that while best efforts were made to obtain suitable quantitative data for this analysis, it is understood that not all empty container movement type data has been included from TasPorts, as they are not always recorded by the shipping lines. This analysis therefore gives an indication of the likely trends in those movements; however, actual numbers of specific container types have had to be inferred.

Figure 13 - Container types for empty container movements (2012-13)



This figure also shows that trailers are repositioned empty in both directions. A breakdown of empty movements is shown in Figure 14, which shows 'Trailer Other' has the biggest volumes of empty truck movements, and contributes the most to empty movements in both directions.

Figure 14 - Trailer types for empty trailer movements (2012-13)

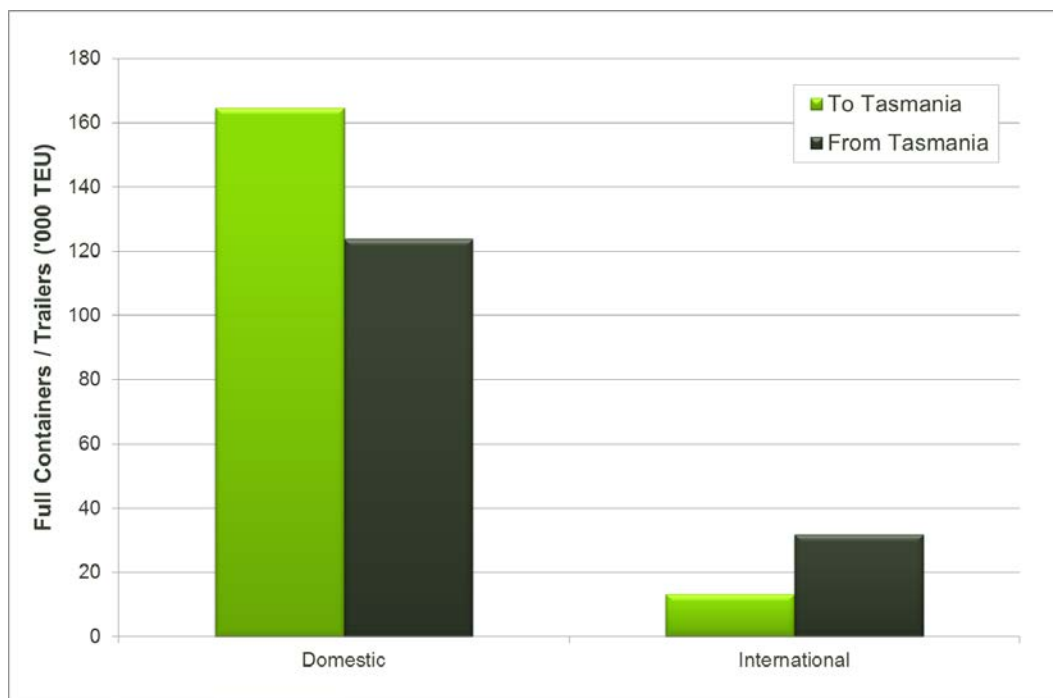


The top 5 commodities that are carried by this vehicle type are 'General Cargo', 'Foods', 'Timber' and 'Metals'. Of these top commodities, 'Timber' is the only commodity with a greater number of northbound movements than southbound.

6.4 Domestic versus international containers

As described in Section 4.4, primarily it is the shipping lines (international or coastal) that own the shipping containers and they hire them to businesses importing or exporting freight. International shipping lines will hire international sized containers, while the coastal shippers will use and hire domestic (wider) containers. Container types (domestic or international) are shown in Figure 15.

Figure 15 - Domestic versus international (full) container and trailer movements (2012-13)



As shown, there are significantly more domestic full containers and trailers southbound and more international full containers northbound, representing the different underlying demand drivers of the shipping movements.

The container owner is also a potential source of mismatch. For example, SeaRoad may capture a greater market share of full containers than Toll ANL in one direction, while Toll ANL may capture more in the other. The same may also occur for international shipping lines.

In each case, a mismatch in the trade of the individual owner of the container (due to trade market share imbalance, or access to certain export markets), will result in more repositioning of empty containers (potentially in both directions) than may otherwise be the case. Quantification of this type of mismatch has not been possible without disclosing commercially sensitive information.

6.5 Melbourne discharged import containers

Some businesses operating in Tasmania that import freight from international origins (e.g. China), may have the freight discharged in Melbourne, rather than a port in Tasmania. This may occur where the international shipper does not have significant (import or export) business in Tasmania and does not want the additional complexity of transporting containers to another port where its ships do not make a direct call.

In this case, the importer is responsible for the transport and cost of collection of the container from Swanson Dock in Melbourne, transport to Webb Dock, ship to Tasmania and then transport within Tasmania to where they want the freight. They are then required to coordinate and pay for the transport of the empty container back to Melbourne for de-hire (containers are usually de-hired in the place of discharge).

From the importer's perspective, it is normal to transport the container empty, to ensure that it is de-hired within the nominated window, unless the company has its own freight to transport back in the container

(which can be difficult because international containers are not suitable to transport freight on domestic pallets). It is simply too difficult and complex to arrange to back-load another company's freight to Melbourne before demurrage or additional hire costs are applicable.

Note, however, that this type of empty northbound movement (not quantifiable in the statistics that have been provided) is likely to make up a very small percentage of movements. This is because national retail chains would normally unpack the container in either Sydney or Melbourne, at a state or national distribution centre, before transporting individual consignments to Tasmania on a just-in-time basis.

Also, some international shippers do allow discharge in Tasmania (including OOCL and PIL), in which case container de-hire would be at an empty container park also in Tasmania.

6.6 Ex-Melbourne export containers

Similarly, shipping lines exporting freight to common export destinations may not have a large business based in Tasmania and therefore only accept full export containers in Melbourne. When this is the case, the exporter will be required to hire the empty container in Melbourne, transport it to Tasmania for packing and then transport it back to Melbourne for export. This movement results in a southbound empty container movement.

7 Efficiency improvements and recommendations

As shown in Section 6, there are genuine reasons for empty container repositions in both directions across Bass Strait. These are: a mismatch in trade (more freight to Tasmania than from Tasmania), particularly from July to January; and a stronger demand for reefer and international containers for exports than imports. This figure highlights that the majority of containers are general purpose (compared to reefer container and tanktainers), with significantly more 20' GP and trailers required southbound to Tasmania (and slightly more 40' GP containers), while 20' and 40' reefer containers have stronger demand northbound from Tasmania. As a result, it must be expected that empty containers of different types will need to be repositioned in both directions to account for this mismatch.

Figure 13 shows the container types for the recorded empty container repositions across Bass Strait. As observed, while there are 20' and 40' containers being repositioned in both directions, analysis shows they are different types of container (repositions from Tasmania are domestic containers, and repositions to Tasmania are international containers).

Note that while best efforts were made to obtain suitable quantitative data for this analysis, it is understood that not all empty container movement type data has been included from TasPorts, as they are not always recorded by the shipping lines. This analysis therefore gives an indication of the likely trends in those movements; however, actual numbers of specific container types have had to be inferred.

Figure 13 even demonstrates that for most container types, there are no unnecessary repositions in both directions.

That said, this section contains a number of measures and interventions that could improve the efficiency of the trans-Bass Strait supply chains to overcome or minimise the mismatches that have been described and quantified in the previous section. These are based on Aurecon's understanding of the types of supply chains, the types of commodities and containers used, and where businesses are able to make changes.

With all recommendations, there are impediments to implementation; be they cost, complexity or even sufficient quantities to warrant the investment and change. A number of the efficiency measures described below have already been implemented by individual importers, exporters or shipping operators. Where appropriate, these are discussed.

In the text below, estimations of possible reductions are supplied. Within the scope of the current project and available data, it has not been possible to estimate the cost savings per container that each intervention will bring. Qualitatively, the cost savings that will be achieved will, in all likelihood, not result directly from fewer empty containers being repositioned. Instead, freed up space on the coastal vessels at certain times of year will reduce the need to reposition containers earlier, which, in turn, reduces the number of containers required in the supply chain (saving capital costs), and how long empty containers will sit idle (reducing storage costs).

Another tangible benefit from freeing coastal shipping capacity is access to empty containers when required, increasing reliability of the supply chain, possibly allowing importers and exporters to maintain lower overall inventory levels.

7.1 International containers to transport domestic freight to Tasmania

Improvement and justification

As shown in Figure 15, there is more domestic freight currently transported southbound and more international freight is transported northbound. Using an international container to transport domestic freight to Tasmania potentially saves both a southbound empty international container reposition and a northbound empty domestic container reposition.

The best method for implementation of this improvement is for the international shipping lines to work with the coastal shippers to get their containers to Tasmania for a lower rate than current empty container movements. In return, the coastal shipper uses an international shipping container instead of its own domestic container.

Available quantities

According to our analysis of container types, there is an imbalance of international containers of approximately 20,000 TEU per annum. Assuming the ability to match container types for a swap operation, this would save approximately 40,000 TEU shipping movements per annum (9% of all movements).

This activity is already being undertaken to a small degree, but, due to pallet size issues, is most commonly undertaken on non-palletised freight, e.g. carpets.

Impediments to implementation

There are a number of impediments to implementing this efficiency improvement. These include:

1. **Pallet size.** The biggest problem with moving domestic freight in international containers is their inability to handle the same number of domestic pallets as a domestic container. This either means that the freight needs to be removed from pallets (e.g. slip-sheets), fewer pallets can be packed into the container, or only non-palletised freight can be moved.
2. **Coordination.** The coastal shipper (or the coastal shipper's customer) must get access to the international container when it is required, rather than when it best suits the international shipper or exporter. Landside transport costs may also be difficult to apportion between the parties. In addition, if there were any delays in the chain, the container may not be available to the exporter when it is required, which could have flow-on consequences. In the worst case, this would mean missing the international export slot.
3. **Longer hire.** If the international container needs to be filled southbound, then it is likely that it would need to be hired/collected from the empty container park in Melbourne a few days earlier than a simple reposition movement. This means the international shipping line would have less efficient overall use of their containers.

Conclusion

While being a way of reducing the number of empty container repositions in both directions, the additional complexity of coordination, the hire duration and the commodities that can be shipped, are all issues impacting a successful implementation.

While this method is already being used to a small degree, other methods are proving more successful (cross-dock freight in Melbourne, Section 7.2) in reducing the overall mismatch in domestic versus international containers.

The most likely chance of successful implementation is when international shipping lines (rather than the exporter) need to reposition containers to Tasmania (for example, for onion exports). The shipping lines could deliver the containers to Webb Dock terminal with flexible availability dates in Tasmania. The coastal shipper could use these containers if stock is available at the terminal (e.g. cross-dock), in return for discounted/no cost repositioning to Tasmania.

7.2 Cross-dock freight in Melbourne

Improvement and justification

As shown in Figure 15, there are more international export containers than international import containers. As a result, empty international containers must be repositioned into Tasmania for export.

This efficiency improvement is therefore to pack the international export freight into any available empty container (subject to fitness-for-purpose, e.g. cannot transport chilled freight in a GP container) for the sea leg to Melbourne. Once in Melbourne, the freight would be unpacked from the domestic container and packed into the proper type or owned container, akin to a cross-dock operation for container freight. This could also be extended to use empty trailers in the northbound direction also.

Available quantities

There is an approximate 20,000 TEU imbalance in availability of international containers for export (based on the full container movements), each one could possibly use the cross-dock method for getting international freight out of Tasmania, saving up to 40,000 (9% of all movements).

This method is already being employed by Nyrstar to export zinc ingots, via a storage and warehouse facility called the Melbourne Metal Centre in West Melbourne. It is also being trialled by Skretting, to export fish food to New Zealand. Estimates indicate that 50% of the 20,000 TEU mismatch is already applying this operation.

Impediments to implementation

There are a number of impediments to implementation of this efficiency improvement:

1. **Cost and quantity.** For this efficiency intervention to work, either individual businesses, or a common-user facility, must be established. This would require significant capital to establish, which would only be warranted if a large quantity of empty containers could be removed from the supply chain (as in the Nyrstar case).
2. **Time.** There would be 1-2 additional days added to the supply chain to ensure that there is enough time for the container to arrive in Melbourne, be unpacked and repacked for export.
3. **Rehandling.** This type of improvement relies on freight being rehandled during the cross-dock process. This precludes certain types of exports, including recycled materials (bales may fall apart), onions in tall pallets (as these pallets are difficult to move), and any bulky freight that is not palletised (as it would be too time consuming to unpack and repack the container).

The different widths of international and domestic containers are less likely to cause an issue in this case, because the domestic container is wider than the international. This is certainly not a problem with heavy exported commodities, where the weight is the limiting factor, not the volume.

Conclusion

As evidenced by Nyrstar, which is already undertaking this type of operation to ensure that export freight is not impeded by access to empty containers, this efficiency improvement can work where there is a sufficient quantity of export freight to warrant the capital and operational expense.

The coastal shippers could set up an operation at their terminal to provide a value added service to their customers (or a common-user facility could be established near the terminals), minimise the number of empty repositions and thereby increase overall shipping capacity.

7.3 Use reefer containers to pack dry freight

Improvement and justification

As shown in Figure 12, there are more reefer containers required for northbound freight (from Tasmania) than in the southbound direction (to Tasmania). Conversely, GP or dry containers have an imbalance in the other direction. Importing 'ambient' or dry freight in domestic reefer containers would therefore reduce the number of repositioned reefer containers.

Given the higher volumes of domestic containers compared to international, this system be most successful for domestic container movements, thereby reducing the complexity, pre-tripping and hire issues associated with using international reefer containers for GP freight movements.

Available quantities

We estimate that approximately 10,000 TEU of domestic reefer containers need to be repositioned into Tasmania each year. By implementing this improvement, up to 20,000 TEU reposition movements could be eliminated.

This method is already being used by at least one of the coastal shippers, to reduce the number of domestic reefer containers repositioned to Tasmania. Estimates indicate that 30% of the 10,000 TEU of reefer containers are already being shipped with dry freight.

Impediments to implementation

There are also impediments to implementing this efficiency improvement. These are summarised below:

1. **Number of pallets.** Due to the refrigeration equipment in a container, the internal storage space is smaller than in a GP container. Therefore, less freight can be carried per container and more containers are required to carry the same amount of freight.
2. **Number of reefer containers.** When reefer containers are being used to transport GP cargo, they have a longer cycle time (than direct reposition movements). This means that more reefer containers would be required, which has capital and operational cost implications.

Conclusion

This efficiency improvement is likely to succeed, with limited complexity, if the coastal shippers are using their own reefer containers instead of their own GP containers. Given that one coastal shipper is already using the method, it shows that it can be implemented, but expansion to greater market penetration is subject to the purchase of additional reefer containers.

7.4 Convertible containers

Improvement and justification

Special containers such as flat racks, open top and tanktainers commonly have more demand in one direction across Bass Strait compared to the other. This is due to the demand for particular cargo types that are unsuitable, or less suitable, for GP containers. The following describes the possibilities for using convertible containers and how they may reduce the number of empty containers:

1. **20' and 40' GP containers.** Convertible or flat pack containers have the ability to reduce space when not filled with freight. In that way, additional capacity can be released on the coastal service. It is likely that this could work better with domestic containers, rather than international. Containers that convert between 20' and 40' would not really benefit Tasmania's trade so much as they both currently have a mismatch in the same direction.
2. **Bulk containers.** As described previously, bulk containers are essentially GP containers that allow top loading. They are therefore more versatile than GP containers. Unfortunately, it has not been possible to quantify the number and use of bulk containers for this study.
3. **Flat racks.** Flat rack containers already fold up to a smaller volume, so multiple containers can occupy a single shipping vessel slot when empty. No other conversions are possible.
4. **Open top containers.** Some open top containers can be converted to and from normal GP containers; however, we understand that the current open top containers used for coastal shipping are not convertible (although future ones are likely to be).
5. **Tanktainers.** Tanktainers are specialist containers and cannot be converted; however, they can be used for different materials. As they are commonly owned by the importers or exporters themselves (as opposed to the coastal shipper), it is unlikely they would want other commodities in them, due to the need for cleaning and for overall control. It may also mean needing a larger number of tanktainers to move the same amount of freight, because the back-load operation would increase the length of the supply chain cycle.

Available quantities

With the exception of convertible open top containers, convertible containers would not, per se, reduce the number of empty movements; however, they would reduce the space required to transport the empty containers on coastal vessels. As shown previously, the number of specialist container movements is very small compared to GP containers and any improvement is likely to be very small.

Impediments to implementation

The capital and operational costs associated with convertible containers would be the biggest impediment to more widespread use. In addition, ensuring that the coastal shippers have purchased the right number to allow efficient use would be difficult to assess without further, more detailed, access to data and analysis.

Conclusion

Convertible containers and more flexible containers are likely to both reduce the number of empty container repositions and increase the availability of coastal shipping slots. The quantity of each type required (for each coastal shipper) will require further analysis, but the overall increase in benefit is likely to be small.

7.5 Other recommendations

Throughout the engagement process of the Tasmanian Empty Container Movement Study, a number of other possible improvement or efficiency suggestions became apparent, which could reduce overall coastal shipping costs and enhance the ability of exports (in particular) to get to markets. They are not necessarily concerned with the movement of empty containers, but it is appropriate to include them as part of the engagement process.

Better data

The analysis undertaken and recommendations put forward in this report have been based on data supplied by TasPorts, international and coastal shippers, as well as importers and exporters. The completeness and accuracy of the data, particularly for empty containers, is sufficient to understand trends only. More detailed and comprehensive data is required to quantify these movements more fully, to get a more accurate picture of what is happening and to allow analysis and monitoring over time.

This would require the assistance of the shipping lines to supply more detailed empty container movement data when repositioning containers (including the reason for the reposition), and the ability of TasPorts to extract the data into a useable format.

Increasing loading

Minimising the cost of freight per tonne shipped is about maximising use of existing space. As shipping containers have both a volume capacity and a maximum weight limit, importers and exporters can minimise the number of containers needed to transport a given amount of freight by ensuring that they are packing their containers as full as possible.

For those transporting heavy or dense cargo, there is less scope to put more in, but for light cargo and commodities, greater loading capacity can be achieved by not using pallets. Pallets (both domestic and international) are effectively unusable space, so loading a container without using pallets could allow 10% or more additional space for freight. Cadbury and Fonterra both use slip-sheets to maximise container space, which has the additional benefit of reducing compatibility issues between international and domestic containers.

This slip-sheet method does require investment in slip-sheets and special forklifts to transport what would otherwise be palletised freight. Another method of increasing freight in a container is to use 'high cube' containers. Both of the coastal shippers already own/lease this type of container.

Extension of the Tasmanian Freight Equalisation Scheme

The Tasmanian Freight Equalisation Scheme (TFES) is designed to reduce freight costs for companies transporting freight between mainland Australia and Tasmania, so as to remove or reduce the disadvantage of these companies, compared to their mainland counterparts.

For northbound freight to be eligible, it must be manufactured in Tasmania for use or sale on the mainland, be non-bulk (e.g. containerised) and incur a sea freight disadvantage, compared to mainland only movements.

For southbound freight to be eligible, it must be eligible raw materials or equipment for use in a production or manufacturing process, have been produced or manufactured on the mainland, be non-bulk and incur a sea freight disadvantage. Importers of freight from international origins, and exporters of freight to international destinations, are ineligible to make claims under the scheme.

The extension of the scheme to include international exports would, no doubt, reduce some of the costs associated with businesses needing to ship to Melbourne prior to the international sea leg. In effect, the extension would enable Tasmanian exporters to overcome their disadvantages, compared to their mainland counterparts (this is effectively the whole idea of TFES for domestic freight).

Aurecon understands there are significant barriers to the extension of the scheme, not the least of which is ensuring that Australia does not inadvertently break any international free trade agreement. We also understand that some are opposed to the current scheme.

Direct international shipping calls to Tasmania

From the engagement process, it was made very clear by many of the (export-based) participants, that the cost of coastal shipping to get their freight to Melbourne and then on to export markets, was extremely high compared to the previous direct AAA service. While beyond the scope of the study, a resumption of a regular, reliable direct international service would significantly reduce overall export shipping costs and make Tasmanian exports more competitive.

This, in turn, would alleviate some of the capacity issues of the current coastal service, so empty container repositioning (for domestic containers) would become less of an issue. We must consider, however, that a reduction in coastal volumes may impact the viability of the coastal shipping services.

The resumption of direct international shipping calls to Tasmania would not necessarily make issues with empty containers disappear. A supply of empty containers to Tasmania will still be required for export freight and is likely to be sourced from excess mainland containers. The transport to Tasmania will either still be on Toll ANL or SeaRoad coastal services, or a coastal reposition on an international vessel (this possibility is dependent on the route the international service would take).

Port charges

Port charges in Melbourne also materially contribute to costs for companies importing and exporting. This is a double blow for these companies compared to a reliable, regular, direct international shipping call. Importers and exporters are paying for an expensive coastal shipping leg, plus charges at a port which (if they had a choice) their containers would not need to visit.

Through the industry engagement, it was also discussed that any future Tasports charge for full or empty containers, to raise money for government coffers, may have perverse consequences in reducing the competitiveness of Tasmanian exports, to the possible detriment of the state economy.

8 Summary and conclusions

There are a number of issues that add time, cost and complexity to the supply chains of Tasmanian importers and exporters. There are no longer any frequent direct international shipping services operating out of Tasmania; pallets and containers are different sizes (and difficult to efficiently interchange different container types); and (in the majority of cases) containers are owned and managed by either the coastal or the international shipper.

In addition, there is an imbalance in the amount of freight that needs to be shipped to and from Tasmania, with a similar imbalance in the types of equipment needed for this task. These imbalances result in a large number of empty container repositions (in both directions) across Bass Strait. The genuine reasons that have been identified during the study include:

1. **Trade imbalance.** There is more freight entering Tasmania than leaving it.
2. **Seasonality.** July to January has significantly more containers and trailers transported southbound, while February to May is more even.
3. **Container types.** GP, flat racks and tanktainers are in higher demand for freight to Tasmania, where reefer containers are higher in demand from Tasmania.
4. **Domestic versus international.** Domestic freight has greater demand for movements to Tasmania, while international freight has greater demand from Tasmania.

There are, therefore, some genuine reasons for needing to reposition empty containers and trailers in both directions; consequently, eliminating them completely may not be possible. In fact, it is evident from the engagement process, that companies are already responding to the mismatch challenges described above and finding ways of using otherwise empty containers (that would need to be repositioned).

As a result, import and export businesses have a wide variety of different supply chains to get their freight to and from their markets. Some of them are simple and use the most appropriate container or vehicle for the task, while others are more complex and require more freight rehandling to reduce these mismatches.

It is also apparent from the engagement process that the issue of the cost of repositioning containers only affects a small number of international containers (mainly export), where the demand for certain containers is greater than the supply. This is not to trivialise the issue, but to identify that the majority of empty container repositions do not actually materially add direct cost to the customer.

Therefore, possibly the more important issue with repositioning containers in both directions, is ensuring there is sufficient capacity on the coastal shipping vessels to cope with the combined full and empty container demand. In the short-term, this is a real issue at certain times of the year. In the longer-term, the possible introduction of larger capacity coastal vessels (or even the re-introduction of a direct international service) will ensure that the Bass Strait shipping capacity is not an ongoing issue.

There are however, some recommendations that have been identified through the consultative process, so that empty container repositions can be minimised. Some of these are already being employed to use the excess number of empty domestic containers in Tasmania. A summary of these interventions is set out below:

1. **Domestic freight in international containers.** Transporting domestic freight to Tasmania in international containers. This will reduce the number of full domestic containers and the number of empty international containers travelling southbound to Tasmania.
2. **Cross-docking containers in Melbourne.** This intervention is to ship some international freight in domestic containers for transport to Melbourne (thereby using an empty domestic container), unpack it and then repack into the correct container type (and owner) for its onward journey.
3. **Use reefer containers to transport dry freight.** Again, as the demand for reefer containers is stronger for exports from Tasmania (than for imports), it would be possible to reduce the number of empty reefer container repositions by using reefer containers to transport dry or ambient freight to Tasmania.

4. **Convertible containers.** This involves using containers (where possible) that are: able to switch purpose (e.g. GP container converting to open top); multi-purpose (bulk containers are also able to carry dry freight); or collapsible (and therefore able to reposition more efficiently).

Each of these recommendations will have some impediments to implementation, some based on increased costs, some on adding additional time and complexity to minimise the need to reposition empty containers. With a greater proportion of full containers being shipped and less chance of businesses facing problems in getting empty containers, the coastal shippers would be able continue to grow the total amount of freight shipped.

9 Glossary

| | |
|-------------------------|--|
| AAA Shipping | A consortium of shipping lines including Malaysian International Shipping Corporation (MISC), Mitsui OSK Lines (MOL), Pacific International Line (PIL) and Orient Overseas Container Line (OOCL), which used to make direct international shipping calls to Bell Bay until 2010. |
| Ambient freight | Freight that does not require refrigeration when being transported. |
| Coastal shipping | A term denoting the same shipping vessel calling at multiple ports (in the same country) and loading and discharging that country's containers at each. For the purpose of this report, coastal shipping normally relates to the Toll ANL, and SeaRoad services that operate between Webb Dock in Melbourne and Tasmania. |
| Container De-hire | This refers to the 'de-hire' of an empty container after the container is imported and unpacked, usually at an empty container park for international containers, and at a coastal shipping terminal for domestic containers. |
| Container Hire | The hire of an empty container, which is then packed by an exporter for export. This is usually from an empty container park for international containers and from a coastal shipping terminal for domestic containers. |
| Cross-dock | The action where two trucks (or two containers) are positioned to allow the unpacking of one and the direct packing of the other. A cross-dock for a container, for example, could be done to transfer freight from a domestic container to an international container. |
| DIER | Tasmanian Department of Infrastructure, Energy and Resources. |
| Domestic container | A container designed to efficiently carry Australian domestic pallets. Domestic containers are slightly wider than international containers. |
| Export | Freight shipped from Australia to an international destination. For the purposes of this study, export will also relate to freight shipped from Tasmania to the Australian mainland. |
| FLCT | Tasmanian Freight Logistics Coordination Team, established by the Tasmanian government to provide expert advice and guide the completion of a long-term freight strategy for Tasmania. |
| Import | Freight shipped to Australia from an international origin. For the purposes of this study, import will also relate to freight shipped to Tasmania from the Australian mainland. |
| International container | A container designed to efficiently carry international pallets. International containers are slightly narrower than domestic containers. |
| Reefer | A container capable of chilling or freezing the enclosed cargo, to ensure that it remains in good condition for a road, rail or ship voyage. |
| Reposition | This term relates to the transport of an empty container from one location (where it is not needed) to another (where it is). For the purposes of this study, containers can be repositioned within Tasmania, but are more likely to be repositioned from Melbourne to Tasmania, for export freight, or from Tasmania to Melbourne, for import and domestic freight. |

| | |
|---------------|---|
| RO-RO | Roll-on, Roll-off. Refers to the method by which a shipping vessel is loaded and unloaded. RO-RO vessels use terminal tractors, in conjunction with trailers (Mafi or Cassettes), to load or unload 4 TEU at a time. These ships are not loaded or unloaded by crane. |
| TEU | Twenty-foot Equivalent Unit. A measure in which the size (length) of a container is measured. A 20' container is 1 TEU, while a 40' container is 2 TEU. For consistency, trailers can be measured in TEU also, with semi-trailers normally 2 TEU and B-Doubles 3 TEU. |
| Transshipment | <p>For the purposes of this study, a container which has arrived on one ship, unloaded, and is then loaded onto another ship to be transported to its final destination.</p> <p>A common type of transshipment in Melbourne is a container exported from Tasmania arriving at Webb Dock, loaded onto a truck to Swanson Dock, then loaded onto a ship to be exported to an international destination.</p> |

10 References

TFES: <http://www.humanservices.gov.au/business/services/centrelink/tasmanian-freight-equalisation-scheme/>

Pallets: <http://en.wikipedia.org/wiki/Pallet>

Containers: <http://www.marineinsight.com/sports-luxury/equipment/16-types-of-container-units-and-designs-for-shipping-cargo/>

Appendix A - Participant supply chains

This appendix contains an overview of supply chains for each of the import and export businesses that participated and contributed to the study.

Nyrstar

Figure 16 - Nyrstar bagged oxide international import supply chain (international containers re-used for exports)

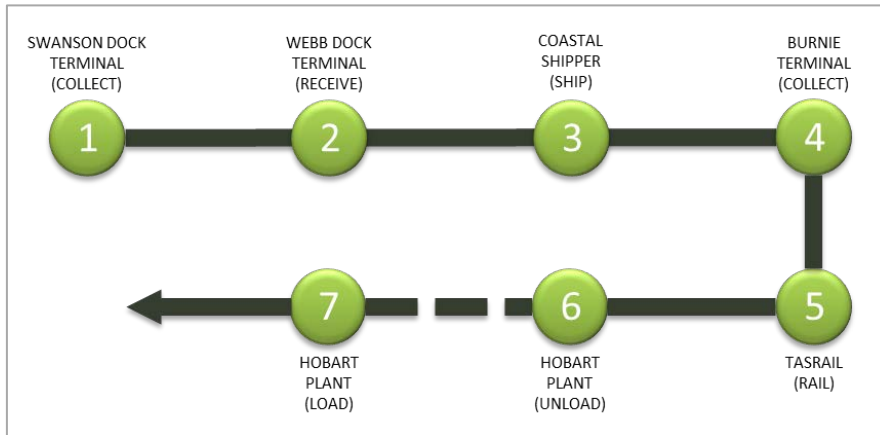
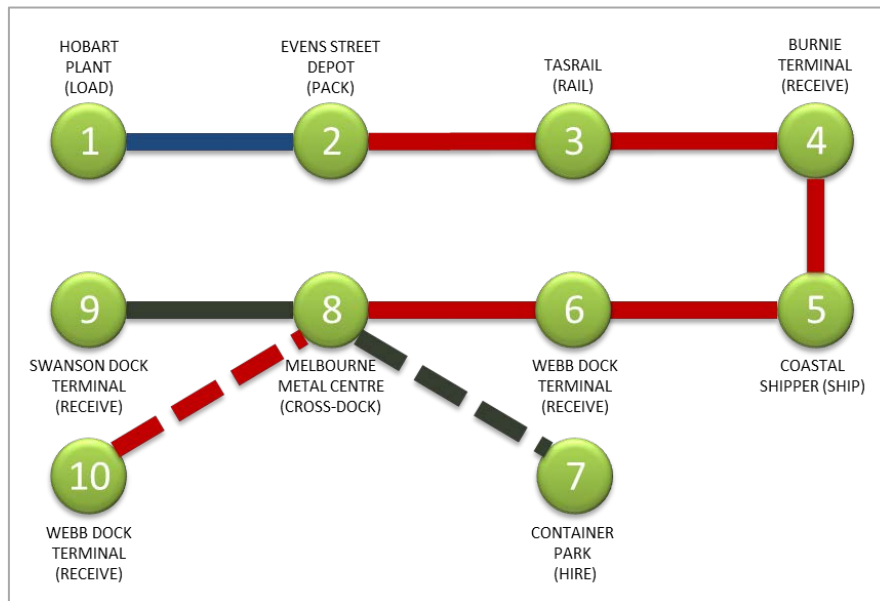


Figure 17 - Nyrstar zinc ingots international export supply chain (cross-dock in Melbourne)



Skretting

Figure 18 - Skretting meal international import supply chain (international containers de-hired in Tasmania)

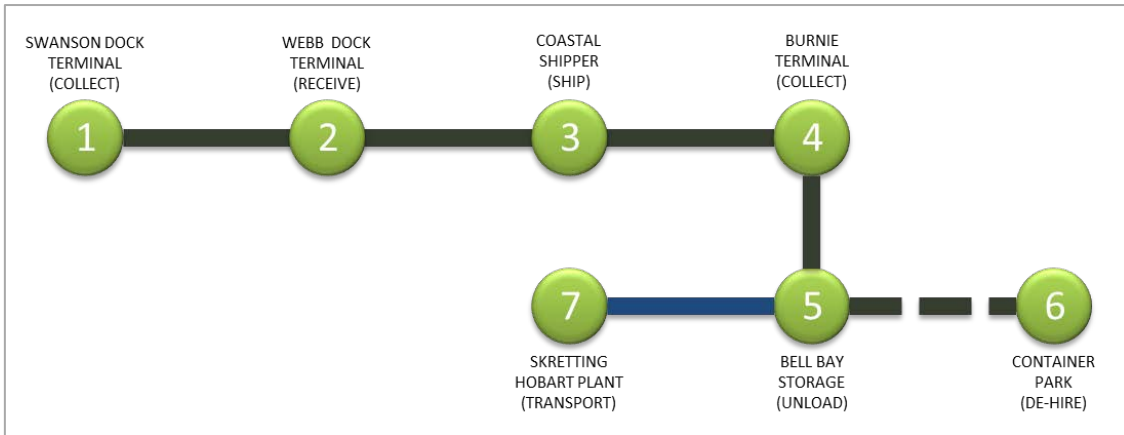


Figure 19 - Skretting fish food international export supply chain (cross-dock on Webb Dock)

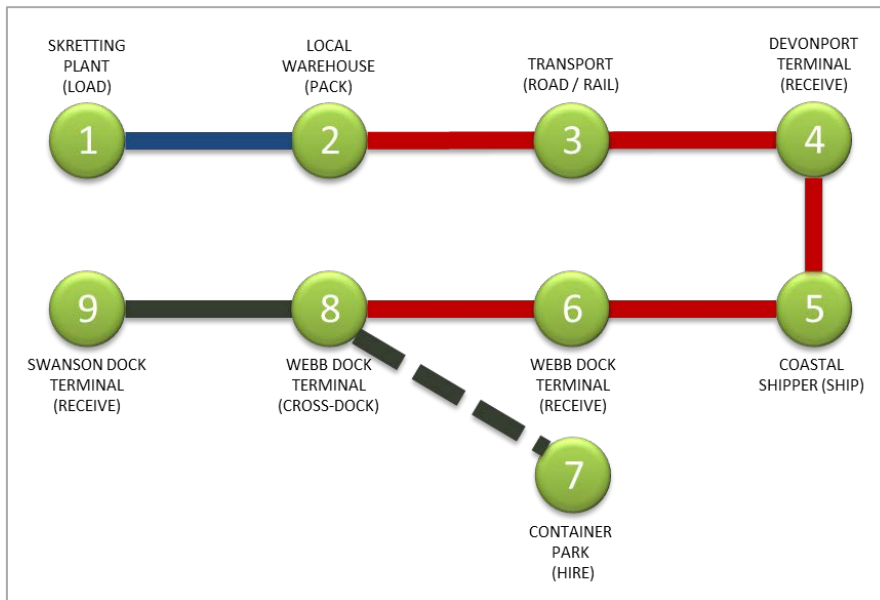


Figure 20 - Skretting meals import supply chain (sourced from mainland)

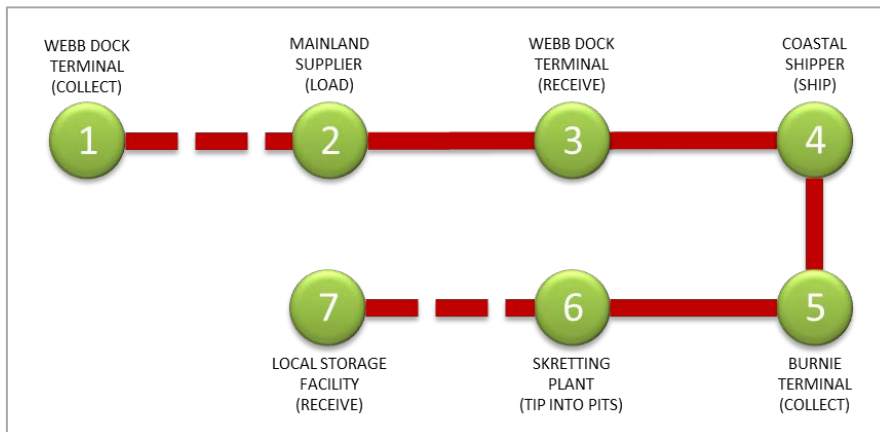


Figure 21 - Skretting oil import supply chain (sourced from mainland)

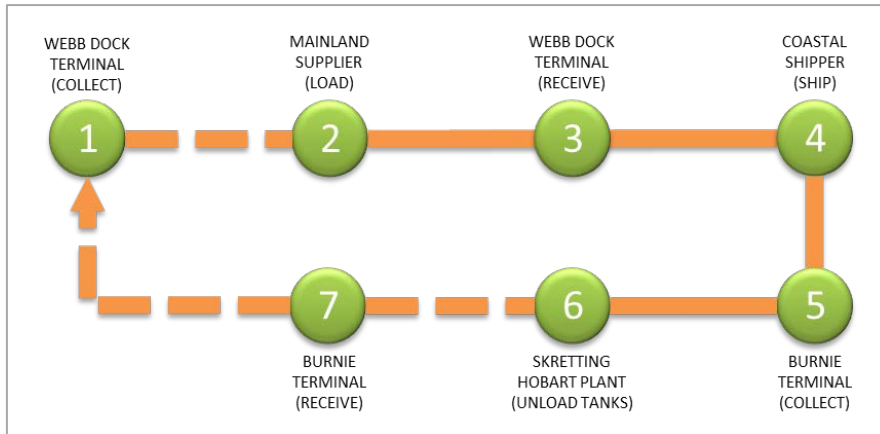
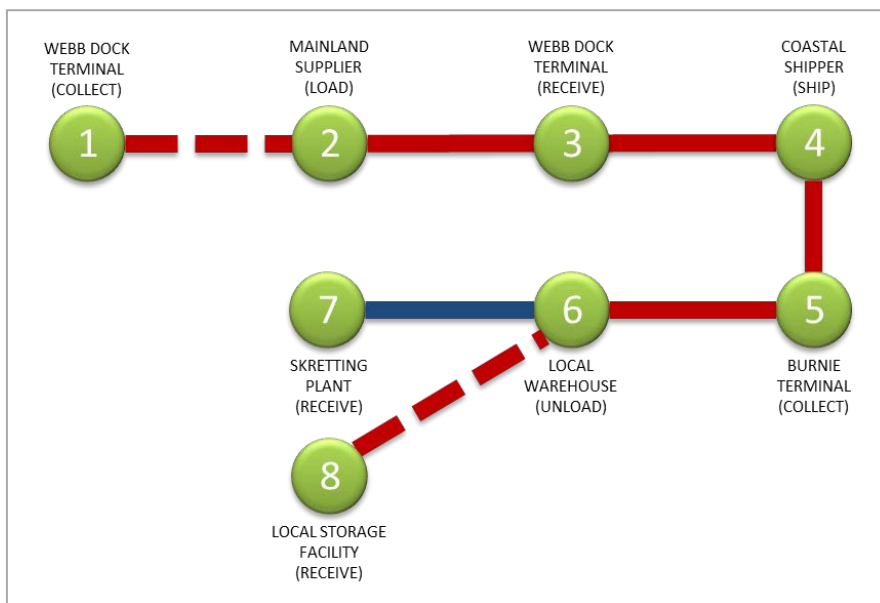


Figure 22 - Skretting other materials import supply chain (sourced from mainland)



Cadbury (Mondelez)

Figure 23 - Cadbury raw material international import supply chain (international containers de-hired in Melbourne)

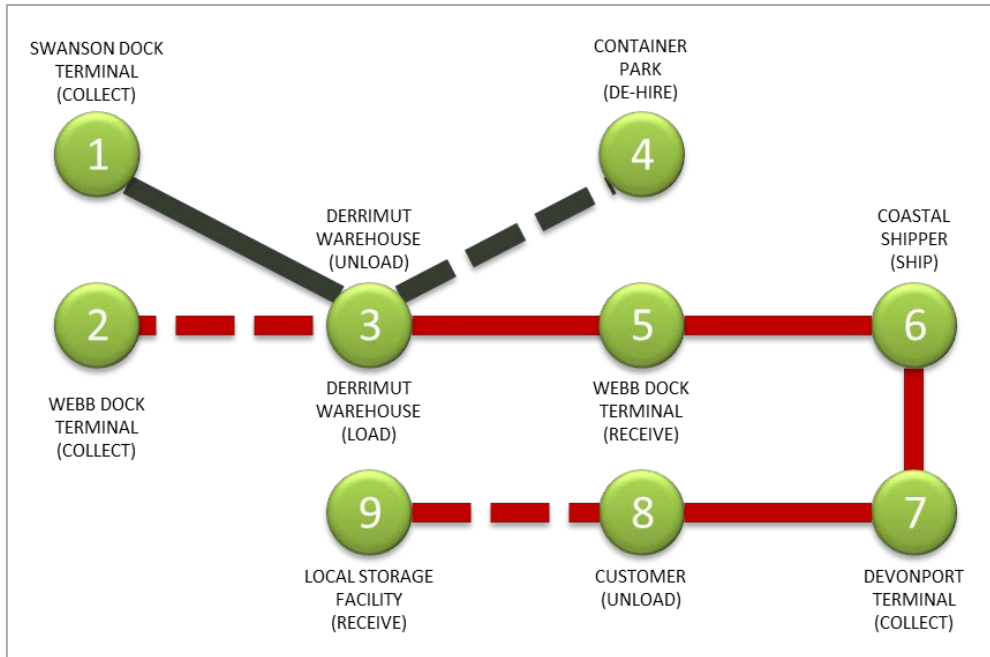


Figure 24 - Cadbury finished product export supply chain (20' international reefer)

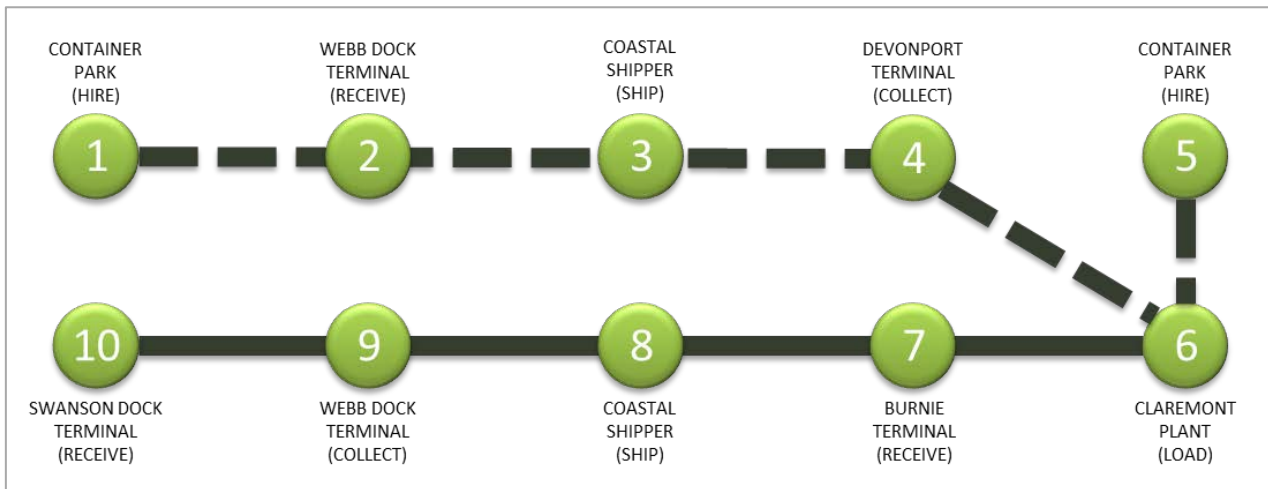


Figure 25 - Cadbury sugar import supply chain (sourced from mainland)

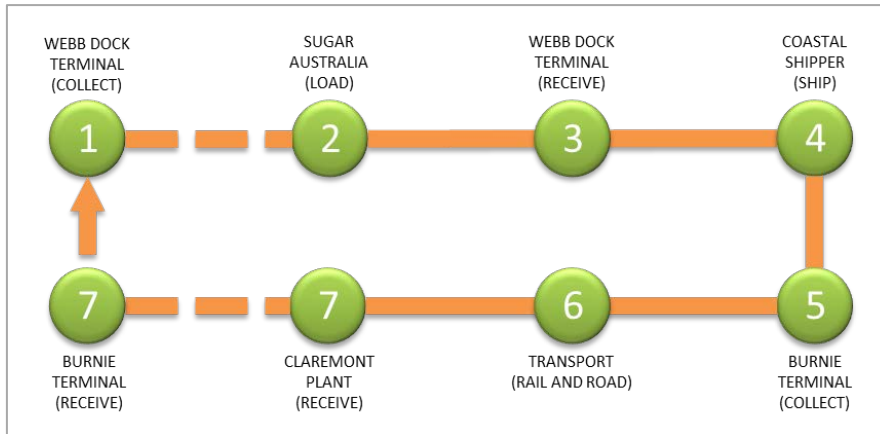


Figure 26 - Cadbury raw material and packaging import supply chain

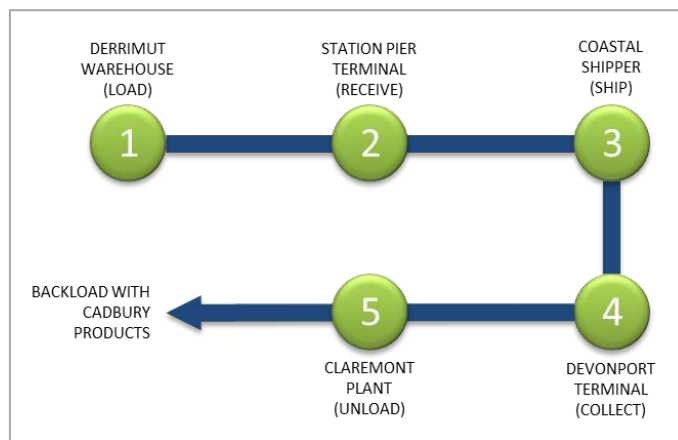
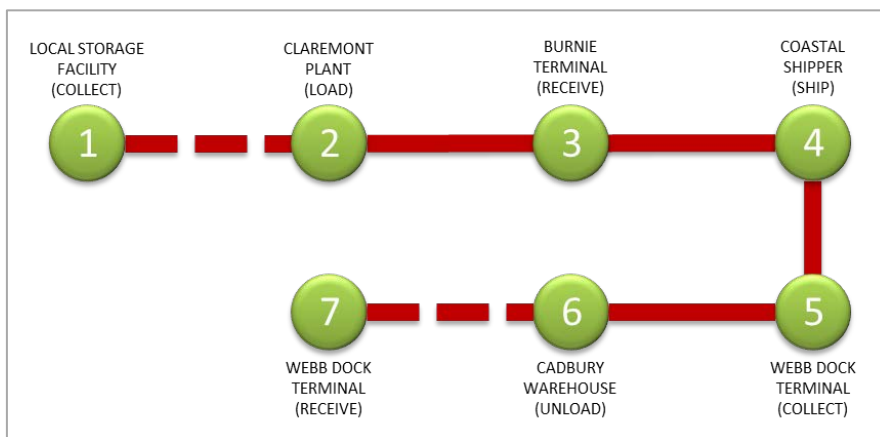


Figure 27 - Cadbury finished product domestic export supply chain (domestic 20' reefer)



Impact Fertiliser

Figure 28 - Impact Fertiliser international import supply chain (international containers de-hired in Tasmania)

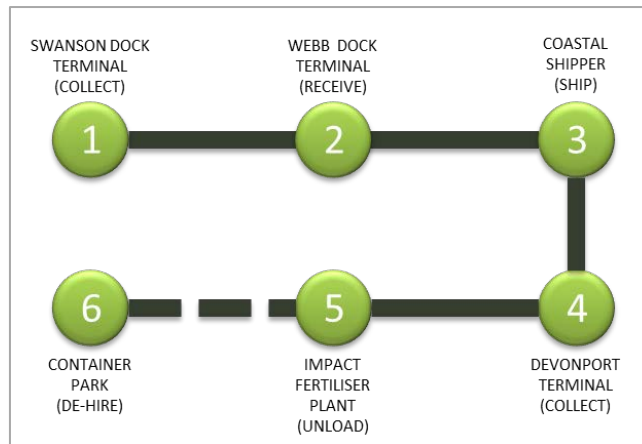
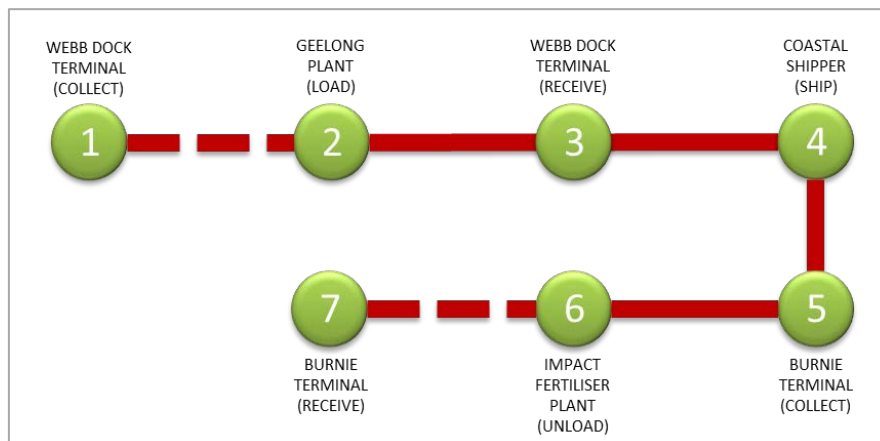


Figure 29 - Impact Fertiliser interstate transfer import supply chain (20' bulk containers)



Webster Limited

Figure 30 – Webster Limited onion international export supply chain (international containers sourced from Melbourne)

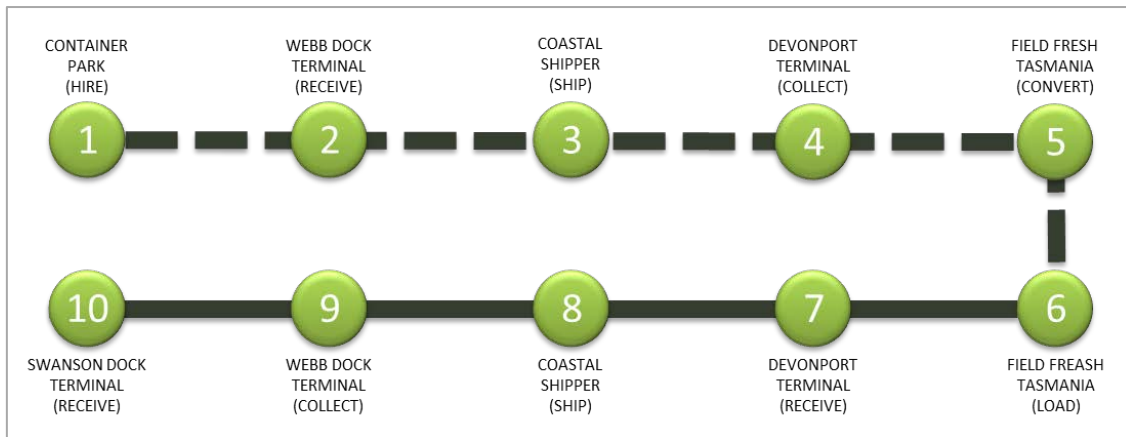
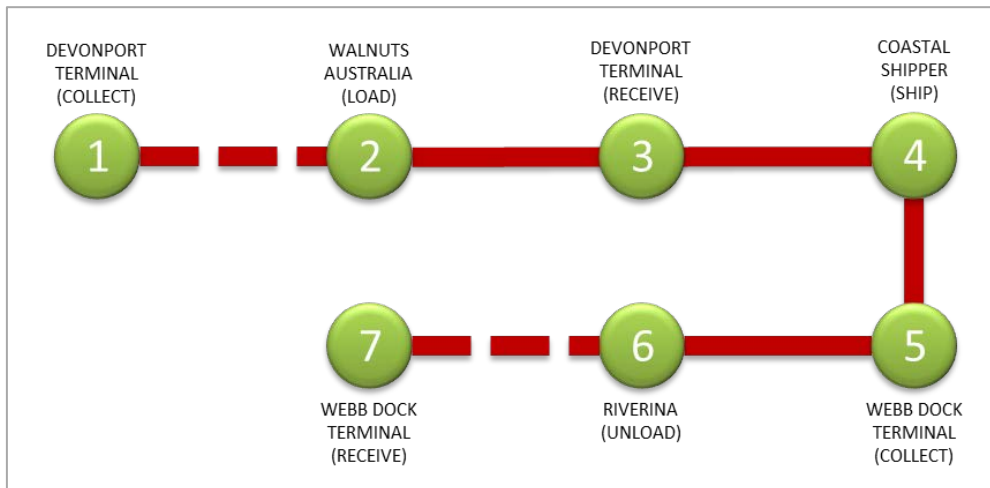


Figure 31 – Webster Limited domestic walnut export supply chain (domestic reefer containers)



Temco

Figure 32 - Temco manganese alloy export supply chain (international containers sourced from Melbourne (1) or Tasmania (5))

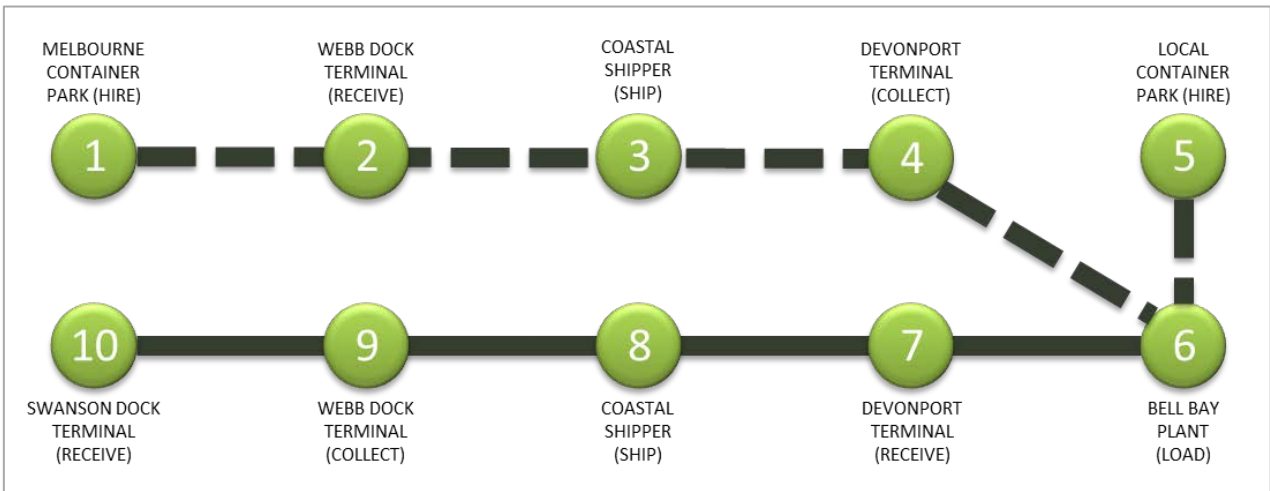
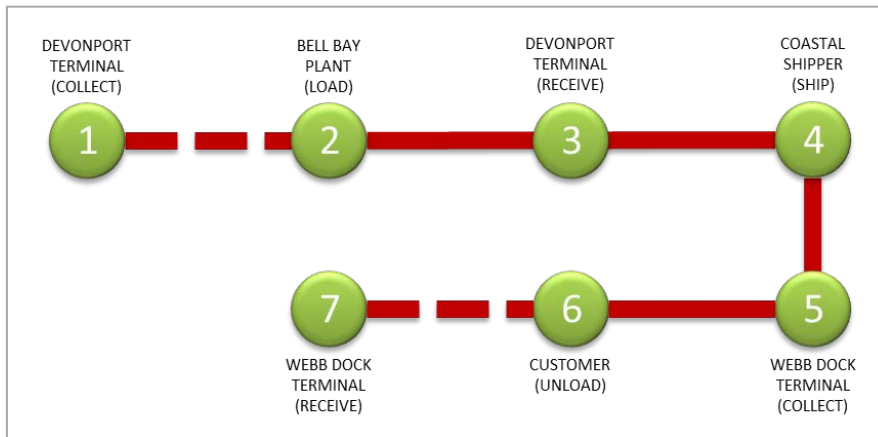


Figure 33 - Temco manganese alloy domestic export supply chain (domestic 20' containers)



Veolia

Figure 34 - Veolia recycling export supply chain (international containers sourced from Tasmania)

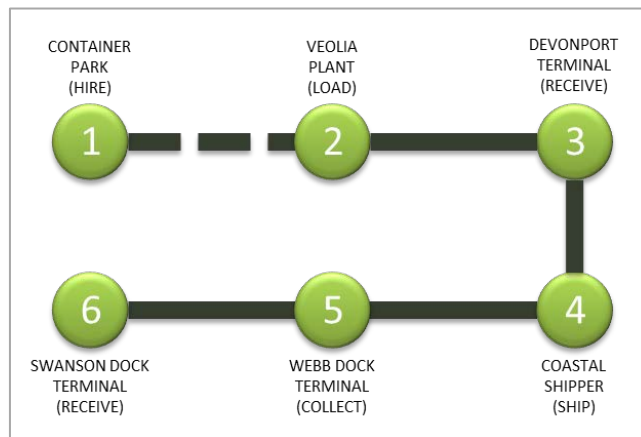
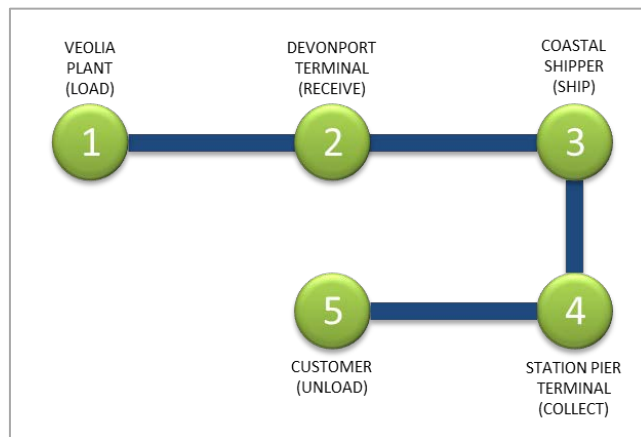


Figure 35 - Veolia recycling export supply chain (tautliners to Melbourne)



Fonterra

Figure 36 - Fonterra pallets, packaging and raw materials import supply chain (containerised)

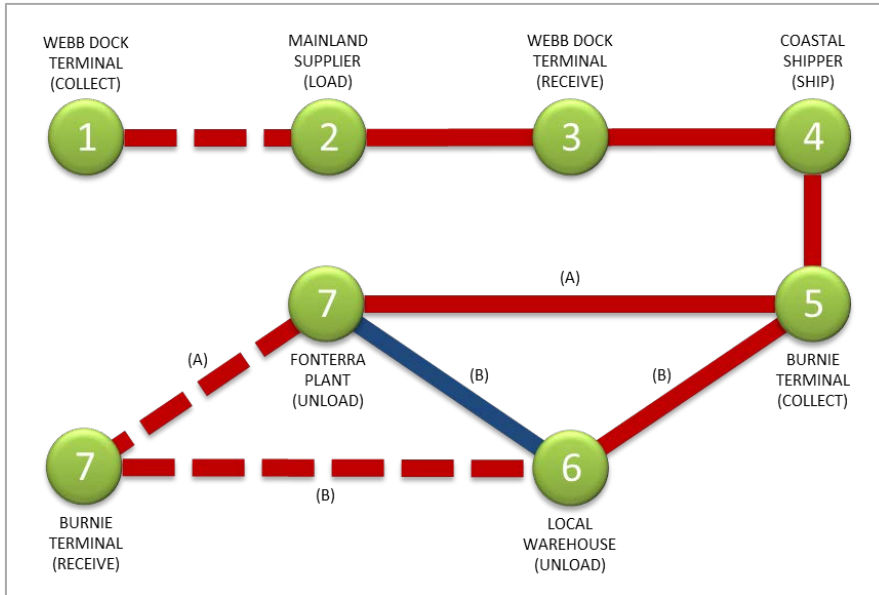


Figure 37 - Fonterra raw materials import supply chain (non-containerised)

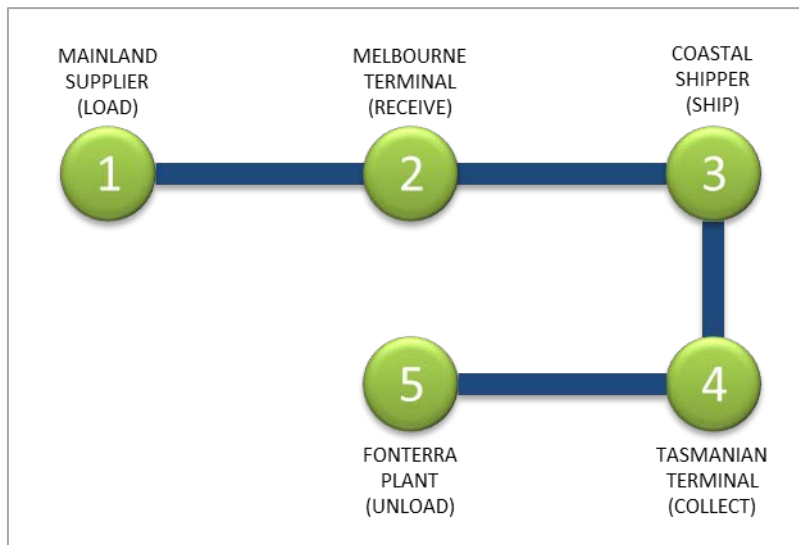


Figure 38 - Fonterra finished product export supply chain (20' international dry and reefer)

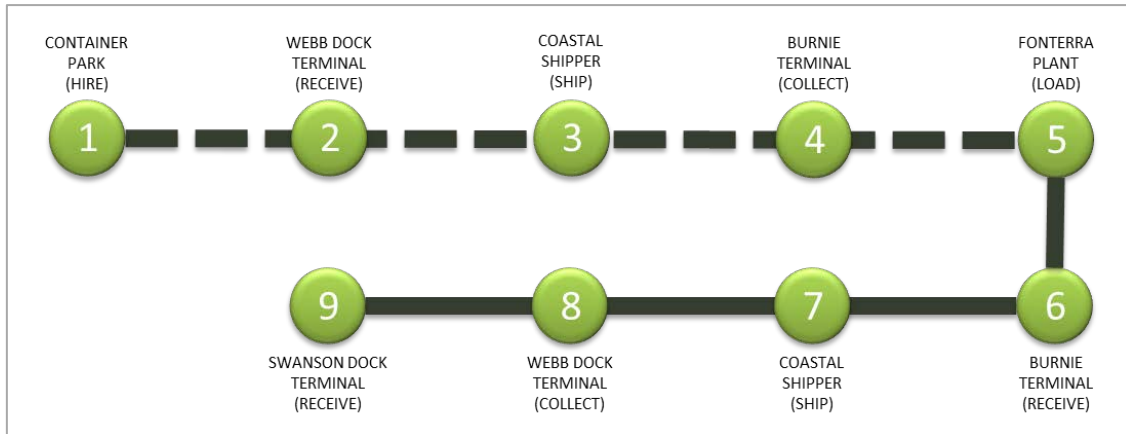
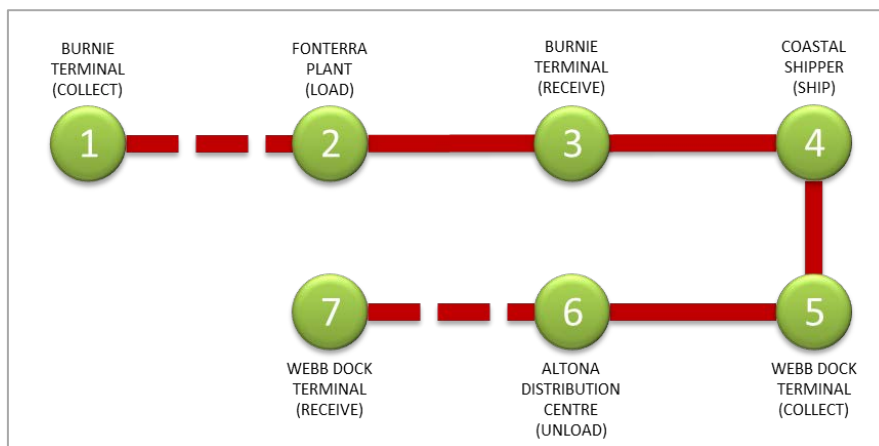


Figure 39 - Fonterra finished product export supply chain (domestic 20' GP and reefer)



Statewide Independent Wholesalers

Figure 40 - Statewide Independent Wholesalers freight import supply chain (containerised)

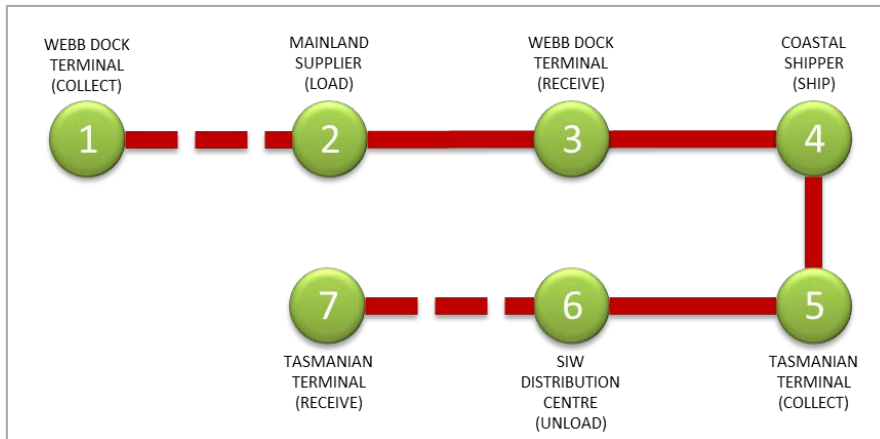
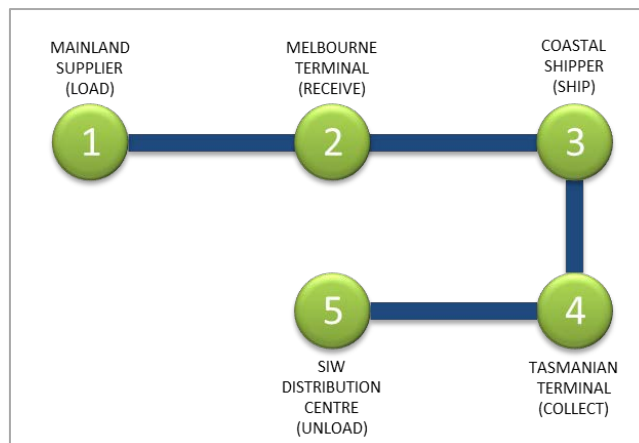


Figure 41 - Statewide Independent Wholesalers freight import supply chain (non-containerised)





Aurecon Australia Pty Ltd

ABN 54 005 139 873

Aurecon Centre
Level 8, 850 Collins Street
Docklands VIC 3008

PO Box 23061
Docklands VIC 8012

Australia

T +61 3 9975 3000

F +61 3 9975 3444

E melbourne@aurecongroup.com

W aurecongroup.com

Aurecon offices are located in:
Angola, Australia, Botswana, China,
Ethiopia, Hong Kong, Indonesia,
Lesotho, Libya, Malawi, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam.