Australian Government
Department of Infrastructure and Regional Development
Bureau of Infrastructure, Transport and Regional Economics

STATISTICAL REPORT

Maritime

Waterline 53

Bureau of Infrastructure, Transport and Regional Economics

Waterline 53

January 2014

Department of Infrastructure and Regional Development
Canberra, Australia

ISSN: 1324-4043
ISBN: 978-1-922205-55-1
January 2014/INFRA2032

An appropriate citation for this report is:

Bureau of Infrastructure, Transport and Regional Economics (BITRE), 2014, Waterline 53, Statistical Report, BITRE, Canberra ACT

Contact us

Bureau of Infrastructure, Transport and Regional Economics (BITRE)
Department of Infrastructure and Regional Development
GPO Box 501, Canberra ACT 2601, Australia

Telephone: (international) +61 2 6274 7210
Fax: (international) +61 2 6274 6855
Email: bitre@infrastructure.gov.au
Website: www.bitre.gov.au

Foreword

Waterline is published by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) and provides information on container movements on both the wharf-side and the landside of five Australian major port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. This Waterline covers port terminal activity up to the June quarter 2013.

Waterline reports on trends in container handling productivity on the waterfront in Australia as well as the cost of importing and exporting containers. It covers both the unloading of container ships and the transport of containers from container terminals. This Waterline provides the latest data available on stevedoring productivity and landside performance.

A number of changes are introduced with this issue of Waterline. An enhanced "At a glance" summary section puts Waterline data in a broader context. All throughput measures at the wharf-side, landside and whole of container terminal are presented in one chapter (Chapter 1). Similarly, all productivity measures at the wharf-side, landside and the level of the whole of container terminal are presented in one chapter (Chapter 2). The issue also introduces new productivity measures related to the two areas: time ships wait at anchorage and the number of lifts per hour of stevedoring operations.

This issue of Waterline was prepared in the Infrastructure and Surface Transport Statistics Section by Dr Adam Malarz and Shunpeng Wang. Peter Kain updated selected maps in Appendix A. For further information on this report please phone (02) 6274 7312 or email maritime_stats@infrastructure.gov.au

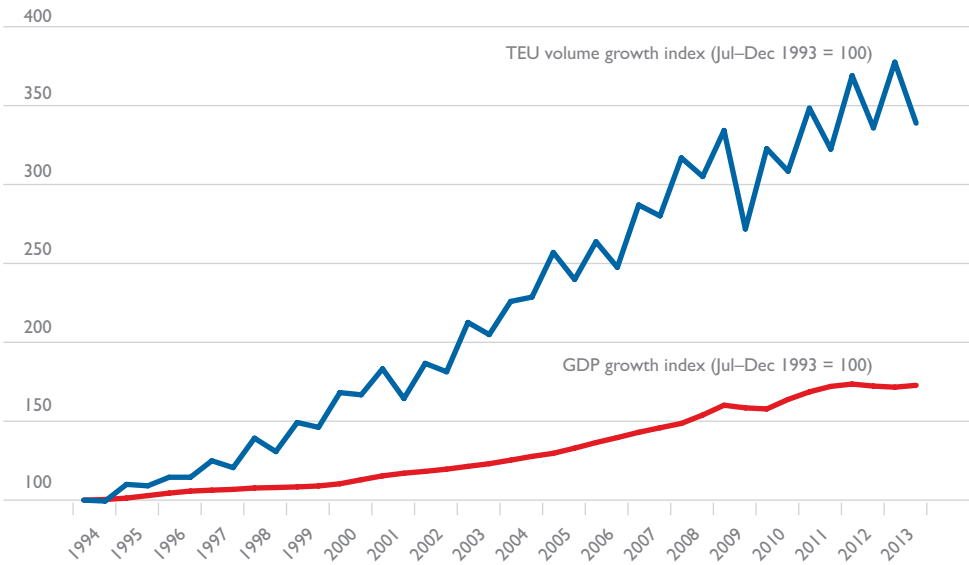
Gary Dolman
Head of Bureau
Bureau of Infrastructure, Transport and Regional Economics
Canberra
January 2014

At a glance

Throughput

- "Whole of port" TEUs exchanged at Australia's five container ports increased by 0.9 per cent to a total of 3.2 million TEUs for the period January to June 2013 compared to the previous year. The per cent increase varied by container port: Adelaide increased by 5.4 per cent, Brisbane by 4.0 per cent, and Sydney by 3.3 per cent. The measure declined in Melbourne (-2.0 per cent) and Fremantle (-2.6 per cent);
- The "wharf-side of port" measure of the total number of containers handled counts only containers transported in specialised container ships as reported by the three main stevedoring companies. This measure declined by 1.1 per cent. About half of these containers were larger, 40 foot containers;
- The "whole of port" measure of the number of ship visits declined by 1.7 per cent to 1 934 ship visits in the period January to June 2013.
- While throughput at container ports in Australia is volatile over the short term partly due to seasonality, container port throughput over a longer time period has grown faster than GDP. Figure A.1 illustrates that over the period January 1993 to June 2013, the GDP increased by about 75 per cent while container throughput grew by 250 per cent.

Figure A.1 Growth in the whole of port TEUs handled compared to GDP growth

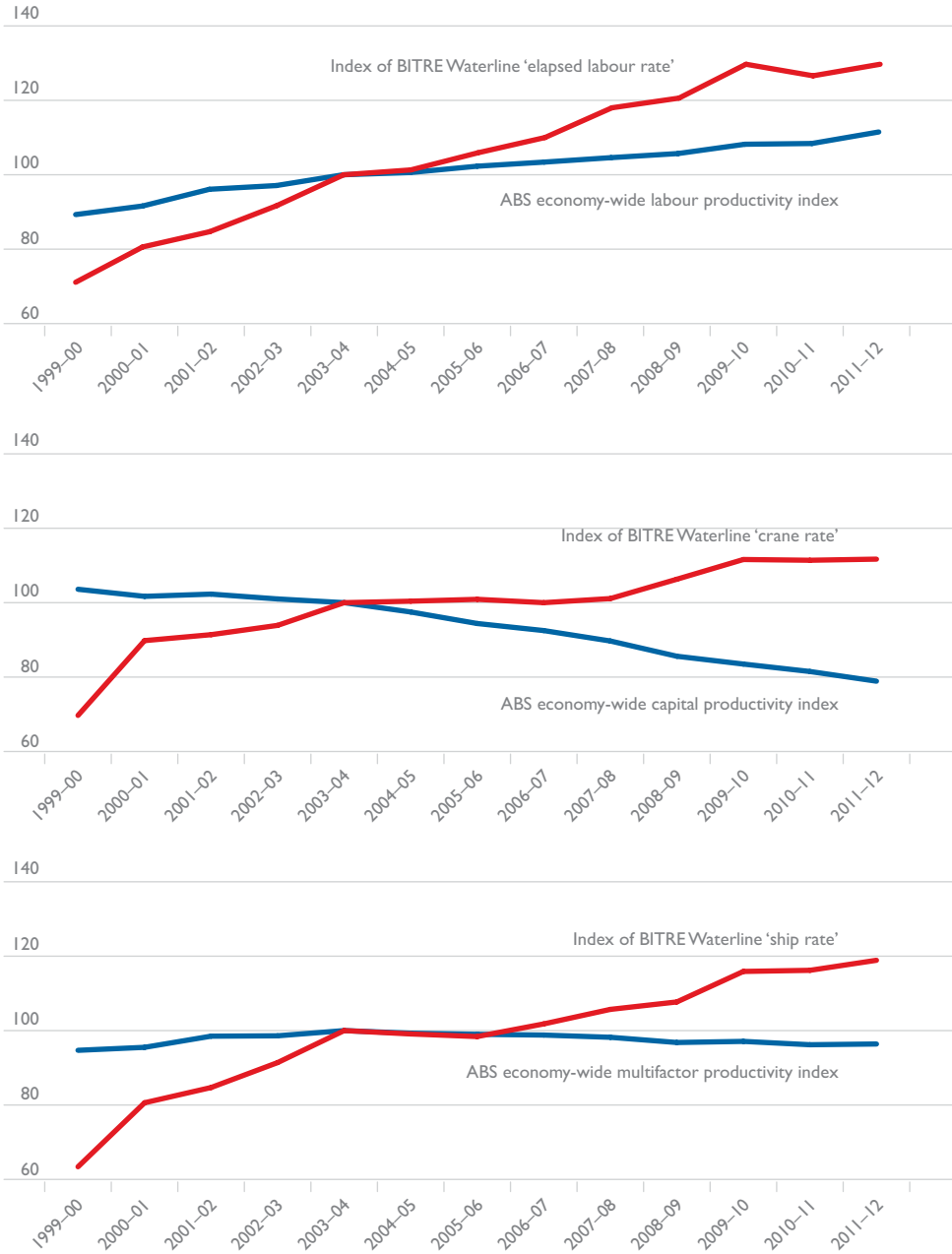


Sources: BITRE estimates (2013) and ABS (2013).

Productivity

Productivity improved against all the traditional Waterline indicators, for January to June 2013 compared to the same period in 2012, except for containers per truck which declined slightly.

Figure A.2 Productivity: Container ports and the rest of the Australian economy



Notes: Financial year 2003–04 is used as base year for indexing the time series data.

ABS economy-wide productivity measures relate to 16 selected market sector industries. They are indexes of gross value added per hour worked.

Sources: BITRE estimates (2013) and ABS (2012).

Container ports and the Australian economy

Figure A.2 shows three comparisons between productivity at the five container ports and economy-wide measures of productivity:

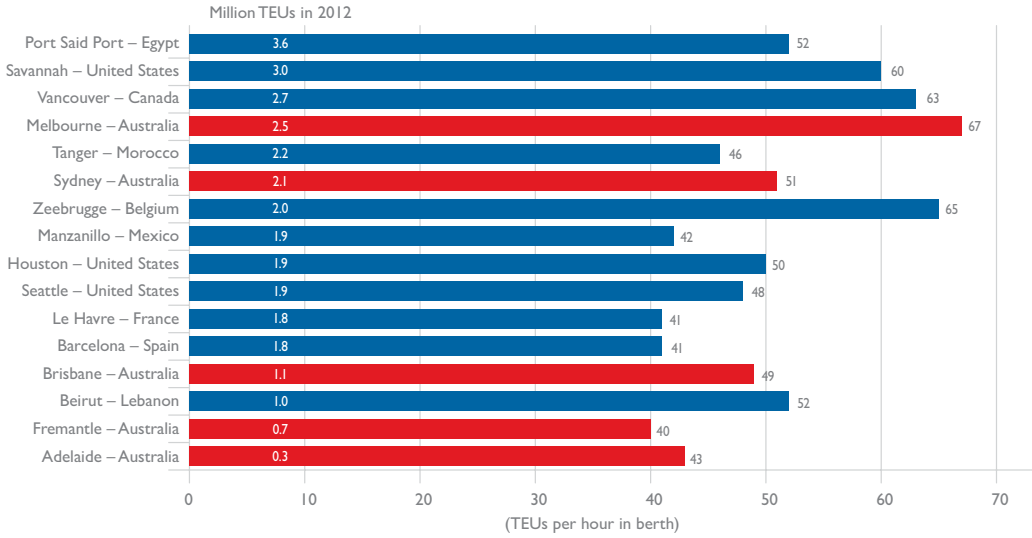
- The top part of Figure A.2 compares labour productivity at Australia's five container ports, approximated by the elapsed labour rate, with the Australian Bureau of Statistics (ABS) measure of Australia's economy-wide labour productivity;
- The middle part of Figure A.2 compares capital productivity at Australia's five container ports, approximated by the crane rate, with the ABS measure of Australia's economy-wide capital productivity;
- The bottom part of Figure A.2 compares multifactor productivity at Australia's five container ports, approximated by the ship rate, with the ABS measure of Australia's economy-wide multifactor productivity.

Figure A.2 shows that over the last 9 to 10 years productivity at Australia's container ports has exceeded economy wide measures of productivity.

Australian container ports and overseas ports

Figure A.3 shows estimates of "Average TEUs processed per hour a ship spent in berth" for Australian and selected similar size overseas ports. Mongelluzzo (2013) estimated the indicator for overseas ports.

Figure A.3 Berth productivity: Australian and similar overseas ports



Note: Only overseas ports of similar size to the Australian container ports are selected for comparison.

Sources: BITRE estimates and Mongelluzzo (2013).

Figure A.3 shows that performance of five Australian container ports is comparable to similar type and size foreign container ports (based on 2012 TEU throughput).

While Figure A.3, as a simplification, relates "TEUs per hour in berth" to port volumes, a number of factors other than volume could impact significantly on this relationship. These include, for example, the number of cranes, whether all containers on a ship are unloaded or all loaded ("all off/all on") as compared to partial exchanges, the extent of transhipment, amount of empty container repositioning, and mix of import and export cargoes.

Additional productivity indicators

BITRE has initiated a process of reviewing, adding to and enhancing Waterline indicators. In this issue of Waterline, two additional sets of productivity measures are introduced relating to:

- Average number of lifts per hour of stevedoring operation; and
- The time ships wait at anchorage.

Average number of lifts per hour of stevedoring operation is estimated as the number of lifts exchanged divided by the total number of hours a ship was available to stevedores for loading and unloading operations. This new indicator is a refinement of "average lifts processed per hour a ship spent in berth". Between the March and June quarters of 2013:

- Average lifts per hour ships spent in berth improved from 39.1 in March quarter to 42.4 in June quarter 2013;
- Average lifts per stevedore's hour increased from 46.9 in March quarter to 49.8 in June quarter 2013.

If the ships' time in berth is equal to the time a ship is available for loading and unloading containers the average lifts per hour ship spent in berth and average lifts per stevedore's hour would be identical. However, time available for loading and unloading containers is often shorter than the ships' berth time for various reasons including operational, adverse weather, labour availability, administrative and safety requirements.

The time ships wait at anchorage for more than 2 hours

In the six months period January to June 2013, 13.4 per cent of container ships visiting five ports waited in excess of 2 hours before entering the port for a median waiting time of 15.2 hours; the median waiting time improved from 16.5 hours in the March quarter to 14.0 hours in the June quarter.

Time of the day when trucks access container terminals

The total number of available truck timeslots in five ports declined by 8.8 per cent in January to June 2013, as compared with the corresponding period of 2012. Similarly, the number of used truck slots in January to June 2013 was 6.6 per cent less than a year ago. An increase in the percentage of trucks that access container ports during the off-peak period leads to reductions in peak period congestion on the roads near ports. Usage of off-peak and weekend truck timeslots increased in five ports from 47.9 per cent in January to June 2012 to 49.8 per cent in January to June 2013. This increase in off-peak truck time slots usage, however, varied by container port.

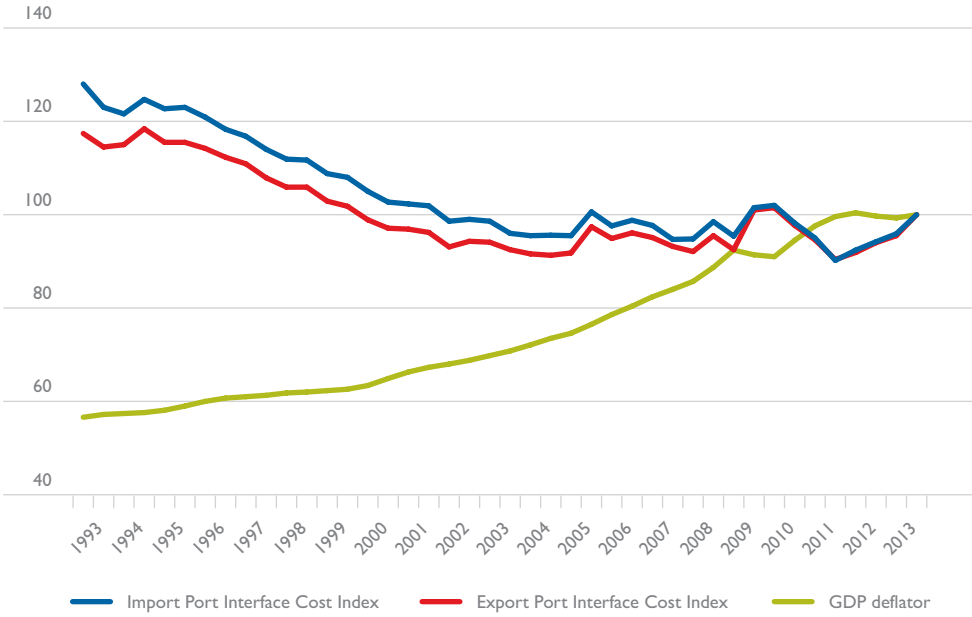
Port-interface cost

Historically, in Australia container handling costs have been declining while the general price level across the economy (measured by the GDP deflator) has been increasing (Figure A.4).

The port interface cost index increased during the period January – June 2013 due to increased fuel costs, higher road transport costs, and to a limited extent, port charge increases. The increase in costs varied by ship size:

- For small ships (5 000 to 20 000 GT) port interface costs increased by $49/TEU for both import and export TEUs;
- For medium size ships (35 000 to 40 000 GT) port interface costs increased by $39/TEU for imports and by $42/TEU for exports;
- For large size ships (50 000 to 55 000 GT) port interface costs increased by $43/TEU for imports but was unchanged for exports.

Figure A.4 Port interface cost indices compared to the GDP deflator



Notes: PICI data presented in this figure are for 35 000 to 40 000 GT ship category.
Data plotted in this figure are constant 2013 prices; 2013 is the base year for both the GDP deflator and PICI.

Sources: BITRE estimates (2013) and ABS (2013).

Abbreviations and terms

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BITRE	Bureau of Infrastructure, Transport and Regional Economics
DP World	Dubai Ports World
Five ports	Refers to the aggregation of the following major container terminals at the five mainland capital city ports: • Fisherman Island (Brisbane), • Brotherson Dock, at Port Botany (Sydney), • Swanson Dock (Melbourne), • Flinders Adelaide Terminal at Outer Harbor/ Pelican Point (Adelaide); and • North Quay in the "Inner Harbour" on the Swan River (Fremantle)
GT	Gross Tonnage, formerly known as Gross Registered Tonnage (GRT)
Infrastructure	Department of Infrastructure and Regional Development
n.a.	Not applicable
Mins	minutes
Pbm	Per berth metre
PICI	Port Interface Cost Index
Qtr	Quarter
TAS	Trucks appointments system (used by Hutchison Ports Australia to schedule trucks at a container terminal). Similar to the VBS system which is used by DP World and Patrick
TEU	Twenty-foot equivalent unit
TTT	Truck turnaround time
UCC	Unitized Cellular Container ship; a type of specialised container ship
VBS	Vehicle Booking System (used by DP World and Patrick to schedule trucks at a container terminal). Similar to the TAS system which is used by Hutchison Ports Australia

Acknowledgements

BITRE is particularly grateful for the assistance of the following in the provision of data used to prepare Waterline:

- stevedoring companies: DP World, Hutchison Ports Australia, and Patrick
- individual port authorities and corporations: Port of Brisbane Pty Ltd, Sydney Port Authority, Port of Melbourne Corporation, Port of Adelaide, and Fremantle Port Authority
- Ports Australia
- shipping lines
- customs brokers
- road transport operators
- pilot, tug and mooring operators

Contents

List of tables

List of figures

CHAPTER 1
Measures of container terminal throughput

Overview

Starting with this issue, Chapter 1 of Waterline presents in a consolidated format all container port throughput indicators previously reported in four different chapters. The indicators are in three groups—wharf-side, landside and whole of container terminal.

There are four wharf-side quarterly throughput indicators (previously reported in Chapter 2 of Waterline):

1.1 UCC ships handled, as reported by stevedores

1.2 Total containers handled by stevedores

1.3 Total TEUs handled by stevedores

1.4 40-foot containers as per cent of all containers handled.

There are eleven landside quarterly throughput indicators (previously reported in Chapter 1 of Waterline):

1.5 Number of trucks used in VBS/TAS operations

1.6 Total number of containers transported by trucks and rail

1.7 Total number of containers transported by trucks

1.8 Number of containers by VBS/TAS trucks

1.9 Number of containers by bulk runs trucks

1.10 Number of containers by rail

1.11 Total number of TEUs transported by trucks and rail

1.12 Total number of TEUs transported by trucks

1.13 Number of TEUs by VBS/TAS trucks

1.14 Number of TEUs by bulk runs trucks

1.15 Number of TEUs by rail.

At the whole of container terminal level, using data from port authorities, there is one quarterly throughput indicator:

1.16 Total number of container ship visits, as reported by Port Authorities

In addition, at the whole of container terminal level, there are eight throughput indicators:

1.17 Total cargo throughput

1.18 Non-containerised general cargo throughput

1.19 Total number of containers (lifts) exchanged

1.20 Total number of TEUs exchanged

1.21 Number of TEUs: Full import

1.22 Number of TEUs: Empty import

1.23 Number of TEUs: Full export

1.24 Number of TEUs: Empty export.

Indicators of these three groups are presented separately for Brisbane, Sydney, Melbourne, Adelaide and Fremantle, as well as for the five ports as a whole.

Container terminal

The movement of containers from/ to the container ship takes place on a wharf or pier known as a container terminal. Unlike a traditional wharf, a container terminal needs a large area adjoining the wharf for storing containers. The containers are placed in stacks of two, three or more and are kept there until they are moved away by truck or train for unloaded containers, or loaded onto a ship, from the container terminal. While in the terminal, the containers are the responsibility of a stevedoring company.

Stevedoring

The term stevedore can refer to a company which manages the operation of loading or unloading a ship. In Australia the people who work on the waterfront are referred to as waterside workers or stevedores. A stevedoring company typically owns equipment used in the loading or discharging operation and hires labour for that purpose. A stevedoring company also may contract with a terminal owner to manage all terminal operations. Many large container ship operators have established in-house stevedoring operations to handle cargo at their own terminals and to provide stevedoring services to other container carriers. In Australia, there are three major stevedoring companies: Toll/Patrick, Dubai Ports World and Hutchison Ports Australia.

Wharf-side throughput measures

Measures of throughput at the wharf-side relate only to containers moved by stevedoring companies from/to UCC ships at the container terminals.

Indicator 1.1 UCC ships handled, as reported by stevedores

Only fully cellular ships, or Unitized Cellular Container (UCC) ships, are included in this indicator. Normally these purpose built container ships are equipped with 40-foot cell guides below deck as a minimum requirement.

Indicator 1.2 Total containers handled

This is the total number of containers lifted on/off UCC ships. These counts are not standardised to account for different container sizes. Thus one 20-foot container and one 40-foot container are counted as two containers.

Indicator 1.3 Total TEUs handled

This indicator is derived from the total containers handled, taking into account different sizes of containers.

TEU stands for "Twenty-foot equivalent unit", a universally recognised measure of containers which converts containers of different sizes into standardised twenty-foot units. For example, a 20-foot container equals one TEU, and a 40-foot container is converted to two TEUs.

Indicator 1.4 40-foot container as per cent of all containers handled

This is the number of 40-foot containers as a percentage of all containers handled.

Landside throughput measures

Indicator 1.5 Number of trucks used in VBS/TAS operations

This is the count of trucks processed through either the vehicle booking system (VBS) or the truck appointments system (TAS). This count excludes trucks that perform bulk runs of empty containers between the container parks and container terminals. This indicator counts trucks on a round trip. That is, a truck entering a container terminal and the same truck exiting the container terminal is counted as one truck.

Indicator 1.6 Total number of containers transported by trucks and rail

This indicator includes the total number of containers transported in all modes on the landside, either by trucks or by rail. Counts of containers in this indicator are further broken down into Indicator 1.7 (containers moved by trucks) and Indicator 1.10 (containers moved by rail).

Indicator 1.7 Total number of containers transported by trucks

This indicator includes the total number of containers transported by trucks including VBS/TAS trucks and bulk runs trucks. Counts of containers in this indicator are further broken down into Indicator 1.8 (containers moved by VBS/TAS trucks) and Indicator 1.9 (containers moved by bulk runs trucks).

Indicator 1.8 Number of containers by VBS/TAS trucks

This is a count of containers processed through truck timeslot booking systems (VBS or TAS) at a container terminal.

Indicator 1.9 Number of containers by bulk runs trucks

This is the total number of empty containers transported in or out of a container terminal by bulk runs trucks.

Indicator 1.10 Number of containers by rail

This indicator counts the total number of containers carried by rail in or out of a container terminal. Counts may be understated where there is no "on dock" rail siding. "On dock" refers to situations where the rail siding is on dock in a container terminal. In contrast to "on dock" rail siding, "near dock" rail sidings are in the neighbourhood of the container terminal but not on the dock, and normally containers through "near dock" are not counted.

The count for Fremantle is provided by the Fremantle Port Authority which uses a "port precinct" approach and thus counts containers by rail to the rail terminal situated outside the container terminal. Counts for other ports are containers railed into or out of the rail sidings within the container terminal and exclude movements to other sidings within the port precinct.

Indicator 1.11 Total number of TEUs transported by trucks and rail

This indicator includes the total number of TEUs transported by VBS/TAS trucks, bulk run trucks, and by rail. Counts of TEUs in this indicator are further broken down into Indicator 1.12 (TEUs moved by trucks) and Indicator 1.15 (TEUs moved by rail).

Indicator 1.12 Total number of TEUs transported by trucks

This indicator includes the total number of TEUs transported by trucks including VBS/TAS trucks and bulk runs trucks. Counts of containers in this indicator are further broken down into Indicator 1.13 (TEUs moved by VBS/TAS trucks) and Indicator 1.14 (TEUs moved by bulk runs trucks).

Indicator 1.13 Number of TEUs by VBS/TAS trucks

This is a count of TEUs processed through truck timeslot booking systems at a container terminal.

Indicator 1.14 Number of TEUs by bulk runs trucks

This is the total number of empty TEUs transported in or out of a container terminal by bulk runs trucks.

Indicator 1.15 Number of TEUs by rail

This indicator counts the total number of TEUs carried by rail in or out of a container terminal.

Whole of container terminal throughput

Indicator 1.16 Total number of container ship visits

This is a count of all ships that visited and exchanged containers at the container terminal. It includes UCC ships as well as other ships that exchanged containers at the port.

Indicator 1.17 Total cargo throughput

This is the weight, measured in tonnes, of all container and non-container general cargoes that passed through the port.

Indicator 1.18 Non-containerised general cargo throughput

This is the weight of non-container general cargoes processed through a port. Non-container general cargo refers to break bulk commodities including machinery, iron and steel products, timber, paper and timber products and other general cargoes. It does not include bulk cargoes.

Indicator 1.19 Total number of containers (lifts) exchanged

This indicator is estimated using Indicator 1.4 (percentage of 40-foot containers) and total number of TEUs exchanged reported by ports.

Indicator 1.20 Total number of TEUs exchanged

This is a count of TEUs, exchanged through the container terminal. This count is further broken down into Indicators 1.22 to 1.24.

Indicator 1.21 Full import TEUs

This is a count of full containers in TEUs imported (unloaded) at the port.

Indicator 1.22 Empty import TEUs

This is a count of empty containers in TEUs imported (unloaded) at the port.

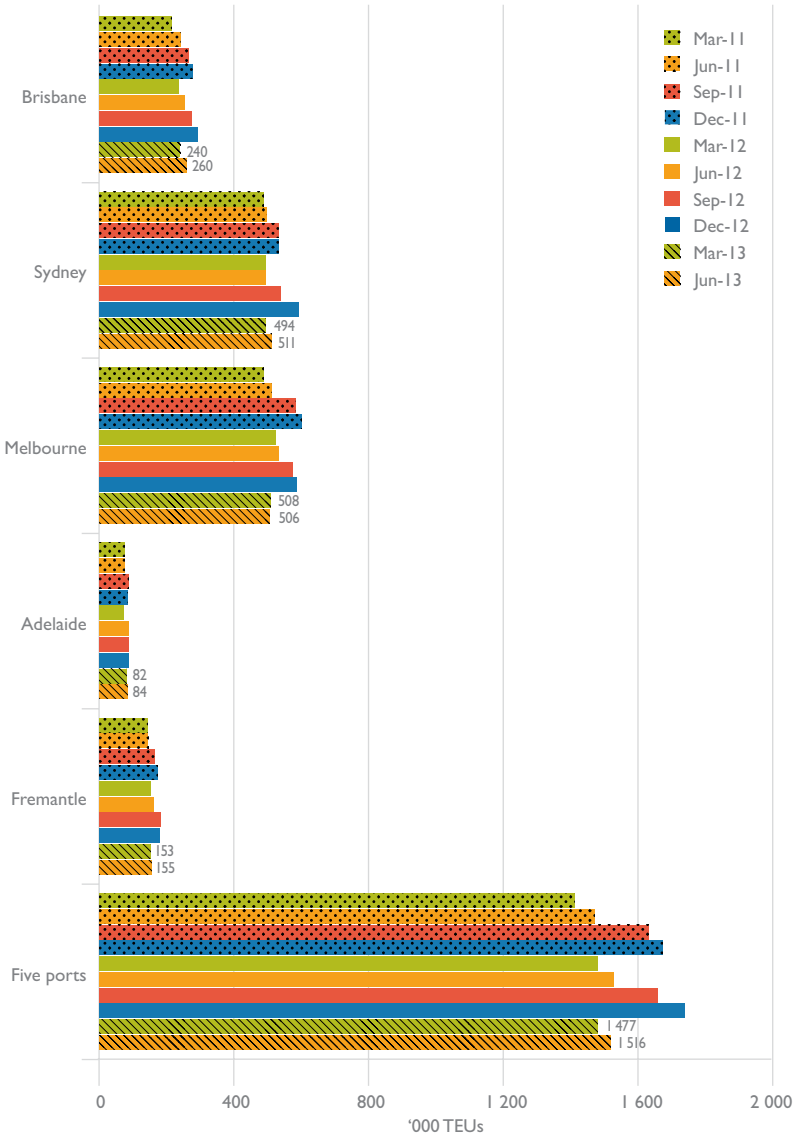
Indicator 1.23 Full export TEUs

This is a count of full containers in TEUs exported (loaded) at the port.

Indicator 1.24 Empty export TEUs

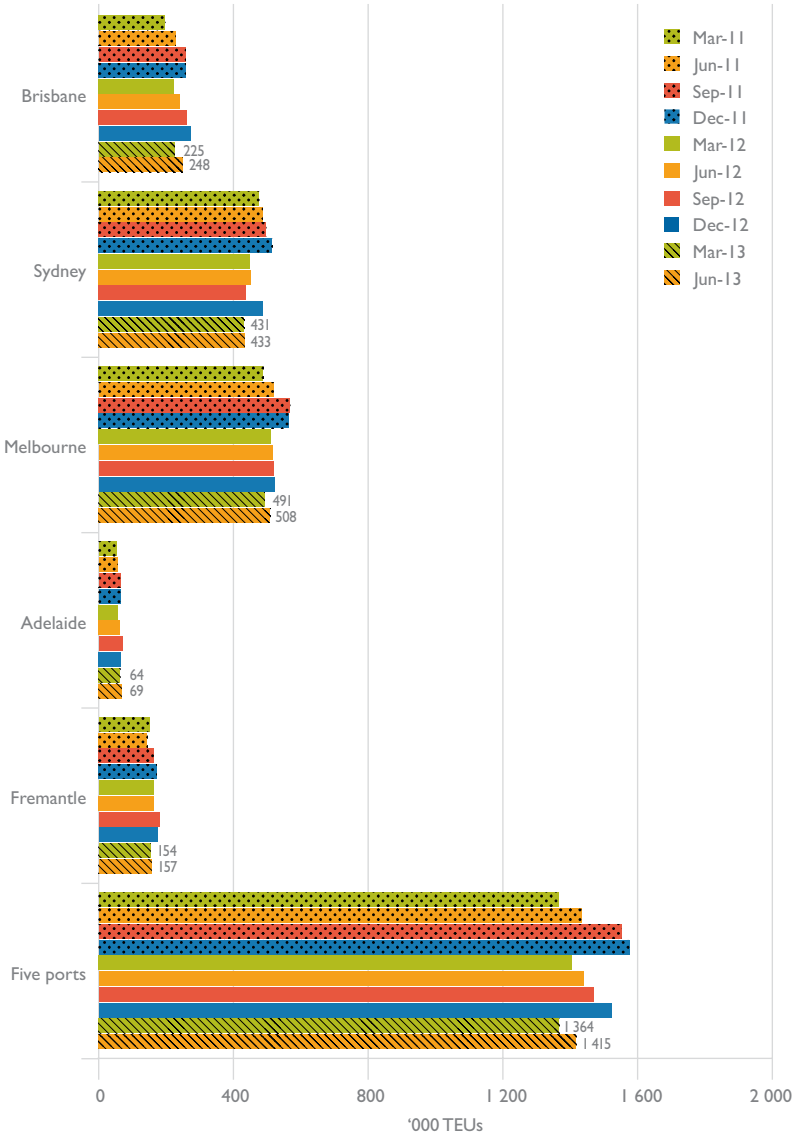
This is a count of empty containers in TEUs exported (loaded) at the port.

Figure 1.1 TEU throughput by container port: Wharf-side of port



Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

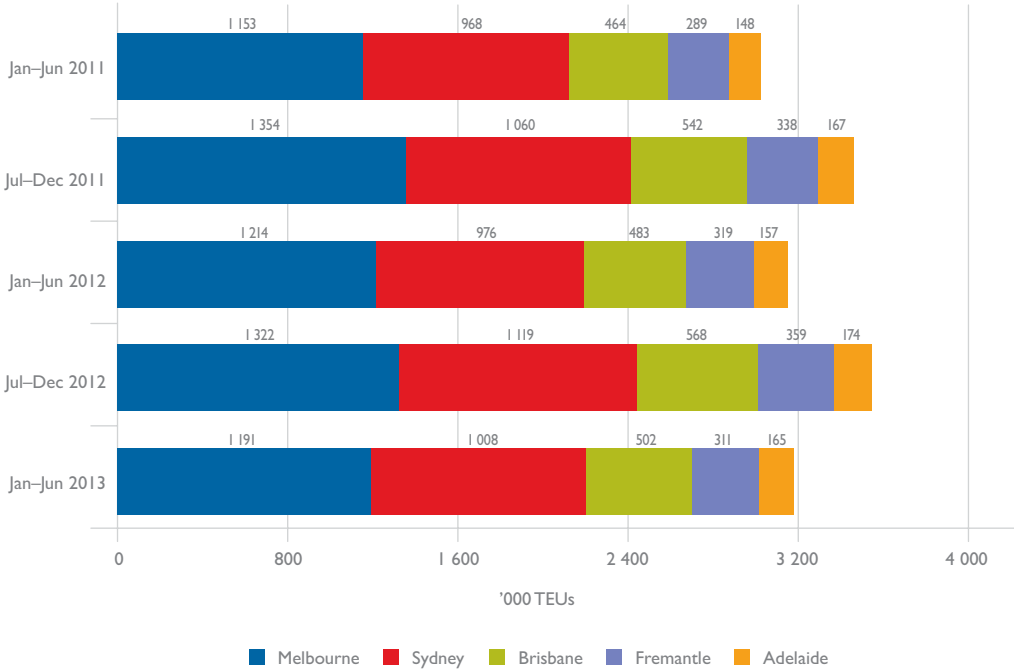
Figure 1.2 TEU throughput by contain port: Landside of port



Notes: The data in this figure shows the total TEUs moved on the landside by rail, by VBS/TAS trucks and bulk runs trucks where data are available.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

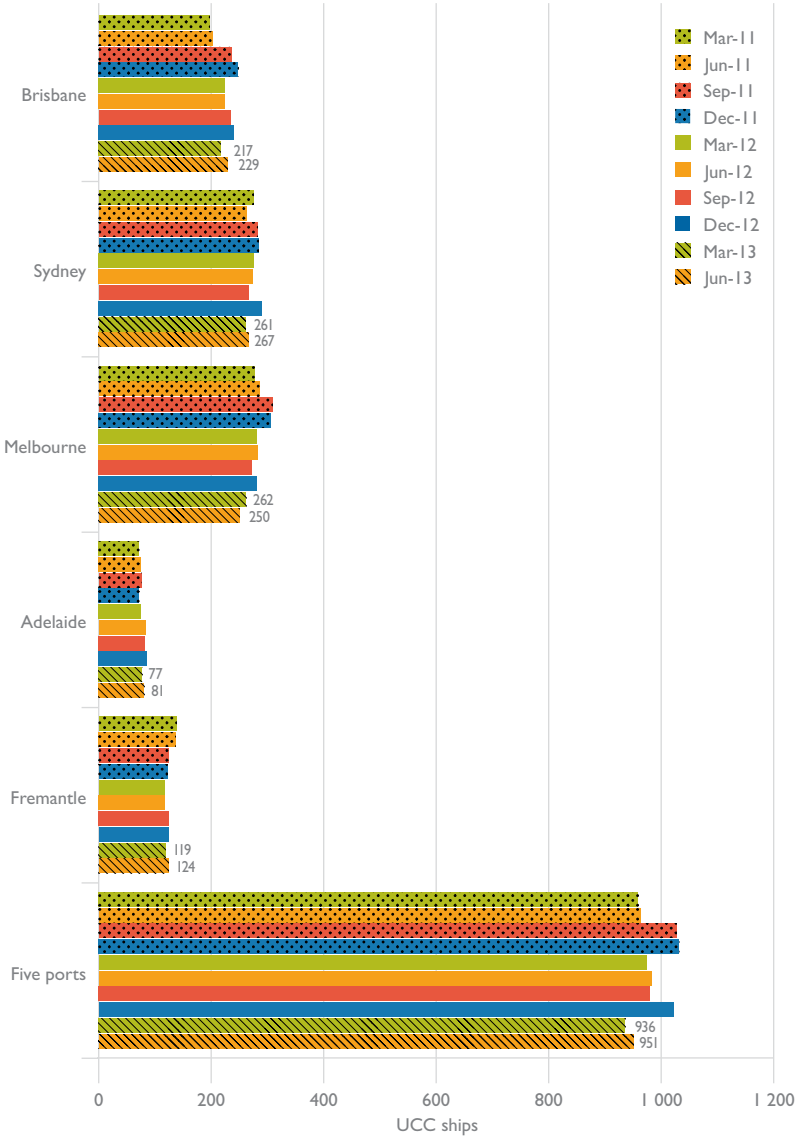
Figure 1.3 TEU throughput by container port: Whole of container terminal



Notes: The data relate to terminals at Fisherman Island (Brisbane), Brotherson Dock at Port Botany (Sydney), Swanson Dock (Melbourne), Flinders Adelaide Terminal at Outer Harbor/ Pelican Point (Adelaide), and North Quay in the Inner Harbour (Fremantle).

Sources: Port of Brisbane Pty Ltd (2013), Sydney Port Authority (2013), Port of Melbourne Corporation (2013), Port of Adelaide (2013) and Fremantle Port Authority (2013).

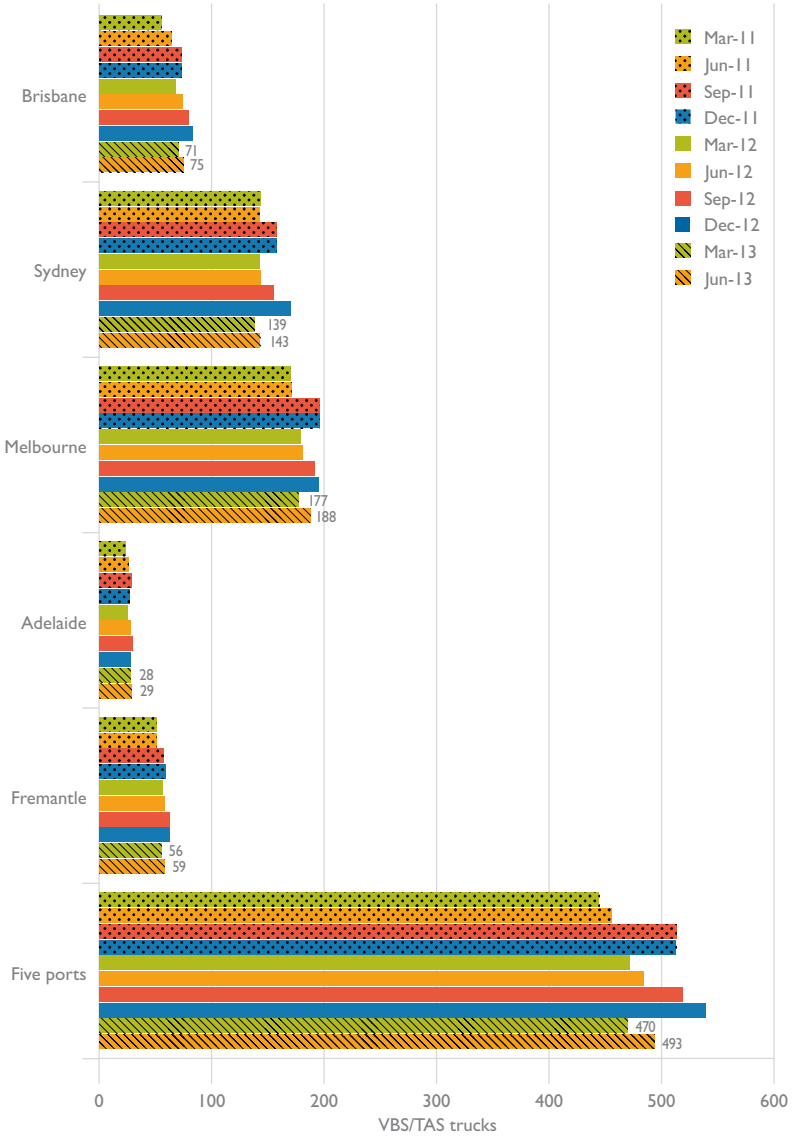
Figure 1.4 Container terminal traffic: Number of UCC ships handled



Notes: The data contained in this figure relates to Indicator 1.1 as defined in the explanatory notes and Table 1.1 to 1.6.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

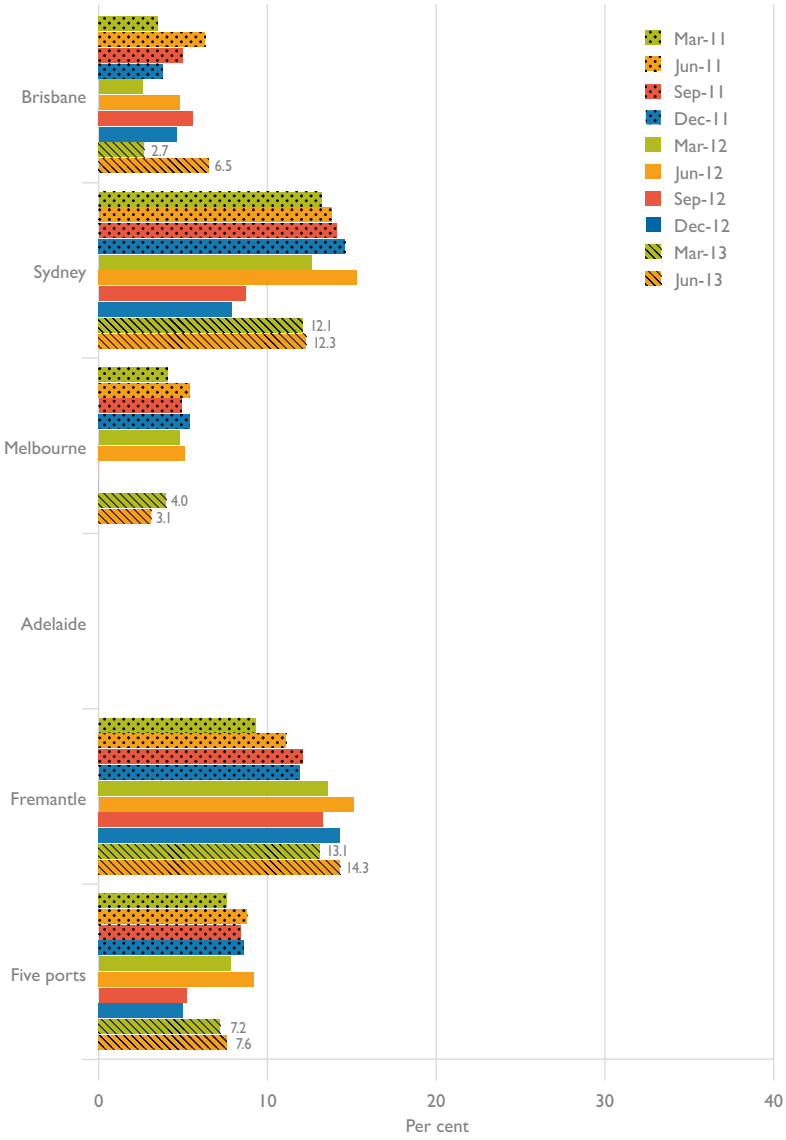
Figure 1.5 Container terminal traffic: Number of trucks used in VBS/TAS operations



Notes: Data on number of trucks used in bulk runs are not available.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

Figure 1.6 Containers by rail as per cent of containers on the landside



Notes: In this analysis not all rail data is available for Brisbane, Melbourne and Adelaide. Hence this analysis about rail share in transporting containers on the landside of the container terminals should be used with caution.

Sources: DP World (2013), Hutchison Ports Australia (2013), Patrick (2013) and Fremantle Port Authority (2013).

Table 1.1 Container terminal throughput: Brisbane

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
UCC ship handled, as reported by stevedores	197	202	**399**	236	248	**484**	225	225	**450**	234	241	**475**	217	229	**446**
Total containers handled *('000)*	146.4	164.2	**310.6**	178.2	185.5	**363.7**	158.2	169.9	**328.2**	182.1	193.7	**375.8**	159.5	175.1	**334.6**
Total TEUs handled *('000)*	215.8	241.8	**457.6**	265.6	277.1	**542.6**	234.7	254.0	**488.7**	273.6	291.7	**565.4**	240.4	259.6	**500.0**
40-foot container as per cent of all containers handled *(%)*	47.4	47.3	**47.4**	49.0	49.4	**49.2**	48.4	49.5	**48.9**	50.2	50.6	**50.4**	50.7	48.3	**49.4**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	55.4	64.3	**119.7**	73.7	73.1	**146.7**	68.0	74.1	**142.1**	79.4	83.0	**162.4**	70.6	75.0	**145.6**
Total containers transported by trucks and rail *('000)*	136.0	155.1	**291.1**	173.0	174.0	**346.9**	152.5	162.8	**315.3**	168.1	179.1	**347.1**	151.5	168.8	**320.3**
Containers by trucks *('000)*	130.9	144.5	**275.4**	163.7	166.8	**330.5**	148.0	154.4	**302.3**	158.2	169.8	**328.0**	147.0	157.3	**304.2**
Containers by VBS/TAS trucks *('000)*	98.1	115.0	**213.1**	129.9	129.7	**259.6**	118.9	128.6	**247.5**	128.9	138.3	**267.2**	117.0	132.6	**249.7**
Containers by bulk runs trucks *('000)*	32.8	29.5	**62.3**	33.8	37.0	**70.9**	29.1	25.8	**54.9**	29.3	31.5	**60.8**	30.0	24.6	**54.6**
Containers by rail *('000)*	5.1	10.5	**15.7**	9.3	7.2	**16.5**	4.6	8.4	**13.0**	9.9	9.3	**19.2**	4.5	11.5	**16.0**
Total TEUs transported by trucks and rail *('000)*	197.4	227.5	**425.0**	256.7	258.3	**515.0**	222.9	241.3	**464.2**	260.9	272.3	**533.2**	224.9	248.0	**472.9**
TEUs by trucks *('000)*	190.6	213.2	**403.8**	243.9	248.5	**492.3**	217.2	229.7	**446.9**	246.4	259.8	**506.1**	218.7	232.0	**450.8**
TEUs by VBS/TAS trucks *('000)*	138.9	167.3	**306.3**	191.1	187.8	**378.9**	169.4	187.3	**356.8**	199.6	207.7	**407.4**	169.4	191.3	**360.6**
TEUs by bulk runs trucks *('000)*	51.7	45.9	**97.6**	52.8	60.6	**113.4**	47.8	42.3	**90.1**	46.7	52.1	**98.8**	49.4	40.7	**90.1**
TEUs by rail *('000)*	6.8	14.3	**21.1**	12.8	9.8	**22.7**	5.7	11.6	**17.3**	14.5	12.6	**27.1**	6.1	16.0	**22.2**
Whole of Port															
Total number of container ship visits	208	206	**414**	198	210	**408**	221	224	**445**	240	244	**484**	221	222	**443**
Total cargo throughput *(million tonnes)*			**16.1**			**18.4**			**18.8**			**19.8**			**17.7**
Non-containerised general cargo throughput *(million tonnes)*			**0.5**			**0.6**			**0.7**			**0.9**			**0.6**
Total containers (lifts) exchanged *('000)*	164.6	181.0	**345.7**	166.6	178.0	**344.6**	174.4	181.9	**356.3**	220.7	237.3	**458.0**	177.4	188.7	**366.0**
Total TEUs exchanged *('000)*			**464.2**			**542.4**			**482.7**			**567.6**			**502.3**
Full import *('000)*			**204.7**			**242.9**			**216.0**			**255.5**			**224.3**
Empty import *('000)*			**30.2**			**30.2**			**26.7**			**34.0**			**29.1**
Full export *('000)*			**139.0**			**170.4**			**153.1**			**187.6**			**147.8**
Empty export *('000)*			**90.3**			**99.0**			**86.9**			**90.5**			**101.1**

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: DP World (2013), Hutchison Ports Australia (2013), Patrick (2013), Port of Brisbane Pty Ltd (2013) and BITRE estimates (2013).

Table 1.2 Container terminal throughput: Sydney

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
UCC ship handled, as reported by stevedores	275	263	**538**	282	284	**566**	276	274	**550**	266	290	**556**	261	267	**528**
Total containers handled *('000)*	329.0	333.5	**662.5**	354.5	353.4	**707.8**	327.4	328.5	**655.9**	355.2	387.7	**742.9**	325.6	340.8	**666.4**
Total TEUs handled *('000)*	486.2	494.9	**981.1**	531.4	533.1	**1 064.5**	492.3	492.8	**985.0**	539.0	592.5	**1 131.5**	493.6	511.2	**1 004.7**
40-foot container as per cent of all containers handled *(%)*	47.8	48.4	**48.1**	49.9	50.9	**50.4**	50.3	50.0	**50.2**	51.7	52.8	**52.3**	51.6	50.0	**50.8**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	143.7	143.0	**286.7**	157.5	157.4	**314.9**	142.9	143.5	**286.4**	154.8	169.8	**324.6**	138.5	143.1	**281.7**
Total containers transported by trucks and rail *('000)*	291.4	312.2	**603.5**	327.7	337.3	**665.0**	298.7	301.5	**600.2**	314.6	347.3	**661.9**	287.8	289.9	**577.7**
Containers by trucks *('000)*	242.5	262.4	**504.9**	274.5	284.3	**558.8**	255.4	250.0	**505.4**	262.3	292.9	**555.2**	247.5	250.3	**497.8**
Containers by VBS/TAS trucks *('000)*	186.5	202.5	**389.0**	221.4	224.6	**446.0**	208.9	208.3	**417.2**	211.9	232.4	**444.4**	189.3	193.8	**383.0**
Containers by bulk runs trucks *('000)*	56.0	59.9	**115.9**	53.1	59.7	**112.8**	46.5	41.7	**88.2**	50.3	60.5	**110.9**	58.2	56.6	**114.7**
Containers by rail *('000)*	48.9	49.8	**98.6**	53.2	53.0	**106.2**	43.3	51.5	**94.8**	52.3	54.4	**106.7**	40.4	39.6	**80.0**
Total TEUs transported by trucks and rail *('000)*	475.4	485.1	**960.5**	496.1	514.0	**1 010.1**	448.5	452.0	**900.6**	436.1	486.4	**922.5**	430.6	433.2	**863.7**
TEUs by trucks *('000)*	412.5	418.4	**830.9**	425.9	439.0	**864.9**	391.9	383.0	**774.9**	398.2	448.0	**846.2**	378.5	380.1	**758.5**
TEUs by VBS/TAS trucks *('000)*	281.3	302.0	**583.3**	342.5	346.5	**689.0**	315.0	313.9	**628.9**	316.5	348.3	**664.8**	283.4	289.8	**573.2**
TEUs by bulk runs trucks *('000)*	131.2	116.4	**247.6**	83.4	92.5	**175.9**	76.8	69.1	**146.0**	81.7	99.7	**181.4**	95.1	90.3	**185.4**
TEUs by rail *('000)*	62.9	66.7	**129.6**	70.2	75.0	**145.2**	56.7	69.0	**125.7**	37.9	38.5	**76.4**	52.1	53.1	**105.2**
Whole of Port															
Total number of container ship visits	269	256	**525**	277	284	**561**	275	273	**548**	268	289	**557**	262	271	**533**
Total cargo throughput *(million tonnes)*			**14.8**			**15.2**			**15.4**			**15.8**			**14.3**
Non-containerised general cargo throughput *(million tonnes)*			**0.0**			**0.0**			**0.0**			**0.0**			**0.0**
Total containers (lifts) exchanged *('000)*	315.2	320.1	**635.3**	348.7	364.1	**712.8**	322.2	327.8	**650.0**	365.4	400.0	**765.4**	339.1	347.2	**686.3**
Total TEUs exchanged *('000)*			**968.1**			**1 060.1**			**975.9**			**1 118.5**			**1 007.8**
Full import *('000)*			**479.4**			**535.3**			**481.6**			**564.1**			**499.9**
Empty import *('000)*			**10.2**			**4.7**			**5.7**			**2.9**			**7.4**
Full export *('000)*			**227.1**			**232.9**			**222.5**			**234.4**			**208.5**
Empty export *('000)*			**251.4**			**287.2**			**266.2**			**317.2**			**292.0**

Notes: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).
Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Sources: DP World (2013), Patrick (2013), Sydney Port Authority (2013) and BITRE estimates (2013).

Table 1.3 Container terminal throughput: Melbourne

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
UCC ship handled, as reported by stevedores	277	286	**563**	309	306	**615**	281	283	**564**	273	281	**554**	262	250	**512**
Total containers handled *('000)*	332.4	347.2	**679.6**	390.9	405.9	**796.9**	354.9	359.4	**714.2**	382.2	387.1	**769.3**	340.0	337.3	**677.3**
Total TEUs handled *('000)*	487.6	510.2	**997.7**	580.6	601.1	**1 181.7**	522.9	531.1	**1 054.0**	572.7	583.5	**1 156.2**	508.0	505.7	**1 013.6**
40-foot container as per cent of all containers handled *(%)*	46.7	46.9	**46.8**	48.5	48.1	**48.3**	47.4	47.8	**47.6**	49.8	50.7	**50.3**	49.4	49.9	**49.7**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	170.1	171.4	**341.5**	195.6	196.2	**391.8**	178.8	180.6	**359.4**	192.0	194.8	**386.8**	177.2	188.2	**365.5**
Total containers transported by trucks and rail *('000)*	333.4	353.2	**686.6**	382.7	382.4	**765.1**	347.4	350.6	**698.0**	368.0	386.0	**754.0**	330.2	339.9	**670.1**
Containers by trucks *('000)*	321.8	336.3	**658.0**	365.9	364.7	**730.6**	333.1	335.3	**668.5**	352.4	354.4	**706.7**	318.2	330.3	**648.5**
Containers by VBS/TAS trucks *('000)*	277.1	288.7	**565.8**	324.8	326.9	**651.6**	297.1	301.9	**599.0**	313.1	320.2	**633.2**	284.8	304.2	**589.0**
Containers by bulk runs trucks *('000)*	44.6	47.6	**92.2**	41.2	37.8	**79.0**	36.0	33.4	**69.5**	39.3	34.2	**73.5**	33.4	26.1	**59.5**
Containers by rail *('000)*	11.6	16.9	**28.6**	16.8	17.7	**34.5**	14.2	15.2	**29.5**	15.6	31.6	**47.2**	12.0	9.7	**21.7**
Total TEUs transported by trucks and rail *('000)*	487.2	518.1	**1 005.2**	566.5	564.0	**1 130.5**	510.6	515.1	**1 025.7**	518.0	520.9	**1 038.9**	490.8	507.8	**998.6**
TEUs by trucks *('000)*	467.3	489.8	**957.2**	538.7	533.8	**1 072.5**	486.1	489.0	**975.1**	518.0	520.9	**1 038.9**	471.3	491.9	**963.1**
TEUs by VBS/TAS trucks *('000)*	397.9	416.2	**814.1**	472.5	472.3	**944.7**	428.2	435.9	**864.1**	457.4	466.0	**923.4**	420.2	451.9	**872.1**
TEUs by bulk runs trucks *('000)*	69.4	73.7	**143.1**	66.3	61.5	**127.8**	57.9	53.1	**111.0**	60.6	54.9	**115.5**	51.0	40.0	**91.0**
TEUs by rail *('000)*	19.9	28.2	**48.1**	27.8	30.2	**58.0**	24.5	26.1	**50.6**	0.0	0.0	**0.0**	19.6	15.9	**35.5**
Whole of Port															
Total number of container ship visits	294	292	**586**	306	318	**624**	294	297	**591**	303	297	**600**	284	270	**554**
Total cargo throughput *(million tonnes)*			**16.2**			**18.1**			**17.8**			**17.8**			**17.2**
Non-containerised general cargo throughput *(million tonnes)*			**1.2**			**1.2**			**1.2**			**1.2**			**1.1**
Total containers (lifts) exchanged *('000)*	413.4	422.9	**836.4**	494.6	516.1	**1 010.7**	441.8	434.6	**876.5**	435.3	425.2	**860.5**	389.4	387.4	**776.8**
Total TEUs exchanged *('000)*			**1 152.9**			**1 353.8**			**1 214.3**			**1 322.4**			**1 190.6**
Full import *('000)*			**523.4**			**622.7**			**544.4**			**605.4**			**529.2**
Empty import *('000)*			**58.2**			**63.1**			**68.3**			**64.1**			**68.9**
Full export *('000)*			**403.6**			**454.6**			**430.5**			**435.6**			**428.5**
Empty export *('000)*			**167.7**			**213.5**			**182.0**			**217.2**			**164.0**

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: DP World (2013), Patrick (2013), Port of Melbourne Corporation (2013) and BITRE estimates (2013).

Table 1.4 Container terminal throughput: Adelaide

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
UCC ship handled, as reported by stevedores	72	75	**147**	76	72	**148**	75	83	**158**	82	86	**168**	77	81	**158**
Total containers handled *('000)*	55.8	54.4	**110.2**	62.0	60.5	**122.5**	53.5	62.4	**115.9**	63.0	62.4	**125.4**	58.5	61.1	**119.6**
Total TEUs handled *('000)*	75.8	75.3	**151.1**	86.1	84.5	**170.5**	74.1	85.9	**160.0**	88.0	87.9	**175.9**	81.6	84.4	**166.0**
40-foot container as per cent of all containers handled *(%)*	35.9	38.4	**37.1**	38.9	39.6	**39.2**	38.6	37.6	**38.1**	39.7	40.9	**40.3**	39.4	38.1	**38.7**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	23.8	25.8	**49.6**	28.7	27.4	**56.1**	25.3	27.7	**53.0**	29.6	28.4	**58.0**	28.0	28.6	**56.6**
Total containers transported by trucks and rail *('000)*	38.6	40.1	**78.7**	46.6	46.7	**93.3**	42.0	45.5	**87.5**	49.6	45.9	**95.5**	45.8	48.8	**94.7**
Containers by trucks *('000)*	38.6	40.1	**78.7**	46.6	46.7	**93.3**	42.0	45.5	**87.5**	49.6	45.9	**95.5**	45.8	48.8	**94.7**
Containers by VBS/TAS trucks *('000)*	38.6	40.1	**78.7**	46.6	46.7	**93.3**	42.0	45.5	**87.5**	49.6	45.9	**95.5**	45.8	48.8	**94.7**
Containers by bulk runs trucks *('000)*															
Containers by rail *('000)*															
Total TEUs transported by trucks and rail *('000)*	52.5	55.8	**108.4**	65.5	64.7	**130.1**	57.7	63.1	**120.7**	70.3	65.6	**135.9**	64.4	68.9	**133.3**
TEUs by trucks *('000)*	52.5	55.8	**108.4**	65.5	64.7	**130.1**	57.7	63.1	**120.7**	70.3	65.6	**135.9**	64.4	68.9	**133.3**
TEUs by VBS/TAS trucks *('000)*	52.5	55.8	**108.4**	65.5	64.7	**130.1**	57.7	63.1	**120.7**	70.3	65.6	**135.9**	64.4	68.9	**133.3**
TEUs by bulk runs trucks *('000)*															
TEUs by rail *('000)*															
Whole of Port															
Total number of container ship visits	68	69	**137**	71	63	**134**	74	80	**154**	82	84	**166**	76	82	**158**
Total cargo throughput *(million tonnes)*			**10.3**			**7.7**			**8.0**			**7.2**			**7.9**
Non-containerised general cargo throughput *(million tonnes)*			**0.1**			**0.2**			**0.1**			**0.2**			**0.1**
Total containers (lifts) exchanged *('000)*	59.7	57.7	**117.4**	68.1	63.8	**131.9**	58.4	66.4	**124.8**	69.9	67.0	**136.9**	64.8	68.9	**133.7**
Total TEUs exchanged *('000)*			**147.6**			**166.8**			**157.0**			**173.6**			**165.5**
Full import *('000)*			**51.8**			**60.6**			**57.2**			**66.5**			**60.5**
Empty import *('000)*			**21.9**			**21.5**			**20.0**			**19.5**			**22.2**
Full export *('000)*			**64.4**			**70.2**			**67.3**			**69.2**			**72.3**
Empty export *('000)*			**9.6**			**14.5**			**12.6**			**18.4**			**10.4**

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: DP World (2013), Port of Adelaide (2013) and BITRE estimates (2013).

Table 1.5 Container terminal throughput: Fremantle

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
UCC ship handled, as reported by stevedores	138	137	**275**	124	122	**246**	117	118	**235**	125	124	**249**	119	124	**243**
Total containers handled *('000)*	97.8	99.0	**196.9**	109.3	115.8	**225.1**	107.4	109.4	**216.8**	121.2	119.0	**240.2**	104.5	106.2	**210.7**
Total TEUs handled *('000)*	142.9	144.9	**287.8**	164.3	174.3	**338.6**	152.8	161.0	**313.8**	181.3	178.3	**359.6**	153.1	155.5	**308.6**
40-foot container as per cent of all containers handled *(%)*	46.1	46.3	**46.2**	50.3	50.5	**50.4**	42.3	47.1	**44.7**	49.6	49.8	**49.7**	46.5	46.4	**46.5**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	51.4	51.1	**102.4**	57.6	58.9	**116.5**	56.6	57.9	**114.6**	62.9	62.9	**125.9**	55.5	58.5	**114.1**
Total containers transported by trucks and rail *('000)*	103.2	98.3	**201.5**	109.3	114.5	**223.8**	110.1	110.7	**220.8**	119.4	117.6	**237.1**	104.1	106.9	**210.9**
Containers by trucks *('000)*	92.8	86.1	**178.9**	95.2	100.1	**195.3**	94.7	93.0	**187.8**	101.9	99.6	**201.5**	88.8	89.5	**178.3**
Containers by VBS/TAS trucks *('000)*	75.6	73.5	**149.1**	82.2	85.7	**167.9**	84.1	85.3	**169.4**	90.7	90.3	**180.9**	82.0	83.4	**165.3**
Containers by bulk runs trucks *('000)*	17.2	12.7	**29.8**	13.0	14.4	**27.4**	10.6	7.7	**18.4**	11.3	9.3	**20.6**	6.8	6.1	**12.9**
Containers by rail *('000)*	10.4	12.2	**22.6**	14.1	14.4	**28.5**	15.3	17.7	**33.0**	17.5	18.1	**35.6**	15.2	17.4	**32.6**
Total TEUs transported by trucks and rail *('000)*	150.3	144.0	**294.3**	164.0	172.3	**336.3**	162.5	164.3	**326.7**	180.4	174.0	**354.3**	153.7	157.5	**311.1**
TEUs by trucks *('000)*	136.3	128.1	**264.4**	144.1	151.8	**295.9**	140.4	139.4	**279.9**	156.3	149.1	**305.4**	133.5	134.9	**268.3**
TEUs by VBS/TAS trucks *('000)*	110.1	108.5	**218.6**	124.1	129.1	**253.2**	122.9	126.7	**249.6**	137.6	134.3	**271.9**	122.1	124.3	**246.4**
TEUs by bulk runs trucks *('000)*	26.2	19.6	**45.8**	20.0	22.7	**42.7**	17.5	12.8	**30.3**	18.7	14.8	**33.5**	11.4	10.6	**22.0**
TEUs by rail *('000)*	14.0	16.0	**30.0**	19.9	20.5	**40.4**	22.0	24.8	**46.9**	24.1	24.8	**48.9**	20.2	22.6	**42.8**
Whole of Port															
Total number of container ship visits	136	136	**272**	119	122	**241**	117	113	**230**	123	126	**249**	121	125	**246**
Total cargo throughput *(million tonnes)*			**13.0**			**12.3**			**15.9**			**15.6**			**16.3**
Non-containerised general cargo throughput *(million tonnes)*			**10.2**			**0.5**			**0.7**			**0.6**			**0.5**
Total containers (lifts) exchanged *('000)*	108.6	107.7	**216.3**	117.3	126.6	**243.9**	122.9	116.9	**239.8**	134.0	130.8	**264.7**	117.9	119.6	**237.5**
Total TEUs exchanged *('000)*			**289.1**			**337.6**			**319.3**			**359.2**			**311.1**
Full import *('000)*			**141.0**			**172.8**			**157.2**			**176.2**			**153.7**
Empty import *('000)*			**8.3**			**6.1**			**8.4**			**7.2**			**6.7**
Full export *('000)*			**79.0**			**78.1**			**82.7**			**86.9**			**87.6**
Empty export *('000)*			**60.8**			**80.6**			**71.1**			**88.9**			**63.0**

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: DP World (2013), Patrick (2013), Fremantle Port Authority (2013) and BITRE estimates (2013).

Table 1.6 Container terminal throughput: Five ports

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
UCC ship handled, as reported by stevedores	959	963	**1 922**	1 027	1 032	**2 059**	974	983	**1 957**	980	1 022	**2 002**	936	951	**1 887**
Total containers handled *('000)*	961.4	998.3	**1 959.7**	1 094.9	1 121.1	**2 215.9**	1 001.4	1 029.6	**2 031.0**	1 103.8	1 149.9	**2 253.6**	988.2	1 020.4	**2 008.6**
Total TEUs handled *('000)*	1 408.3	1 467.1	**2 875.4**	1 627.9	1 670.0	**3 298.0**	1 476.8	1 524.7	**3 001.6**	1 654.6	1 734.0	**3 388.6**	1 476.6	1 516.3	**2 992.9**
40-foot container as per cent of all containers handled *(%)*	46.5	47.0	**46.7**	48.7	49.0	**48.8**	47.5	48.1	**47.8**	49.9	50.8	**50.4**	49.4	48.6	**49.0**
Landside															
Number of trucks used in VBS/TAS operations *('000)*	444.4	455.5	**899.9**	513.1	512.9	**1 026.1**	471.6	483.8	**955.5**	518.7	538.9	**1 057.6**	470.0	493.4	**963.4**
Total containers transported by trucks and rail *('000)*	902.6	958.8	**1 861.5**	1 039.3	1 054.8	**2 094.1**	950.7	971.0	**1 921.7**	1 019.7	1 075.9	**2 095.6**	919.4	954.3	**1 873.7**
Containers by trucks *('000)*	826.6	869.4	**1 696.0**	946.0	962.5	**1 908.5**	873.2	878.3	**1 751.5**	924.4	962.5	**1 886.9**	847.2	876.2	**1 723.4**
Containers by VBS/TAS trucks *('000)*	676.0	719.7	**1 395.7**	804.8	813.6	**1 618.4**	751.0	769.6	**1 520.6**	794.1	827.1	**1 621.2**	718.9	762.8	**1 481.7**
Containers by bulk runs trucks *('000)*	150.6	149.7	**300.3**	141.2	148.9	**290.1**	122.3	108.7	**230.9**	130.2	135.5	**265.7**	128.4	113.3	**241.7**
Containers by rail *('000)*	76.1	89.4	**165.5**	93.3	92.3	**185.6**	77.4	92.8	**170.2**	95.3	113.4	**208.7**	72.2	78.1	**150.3**
Total TEUs transported by trucks and rail *('000)*	1 362.9	1 430.5	**2 793.4**	1 548.8	1 573.3	**3 122.0**	1 402.2	1 435.8	**2 838.0**	1 465.7	1 519.2	**2 984.9**	1 364.3	1 415.4	**2 779.7**
TEUs by trucks *('000)*	1 259.3	1 305.3	**2 564.6**	1 418.1	1 437.7	**2 855.8**	1 293.3	1 304.2	**2 597.5**	1 389.2	1 443.3	**2 832.6**	1 266.3	1 307.8	**2 574.1**
TEUs by VBS/TAS trucks *('000)*	980.8	1 049.8	**2 030.6**	1 195.6	1 200.4	**2 395.9**	1 093.2	1 126.9	**2 220.1**	1 181.5	1 221.8	**2 403.4**	1 059.5	1 126.2	**2 185.6**
TEUs by bulk runs trucks *('000)*	278.5	255.5	**534.0**	222.5	237.3	**459.8**	200.1	177.3	**377.4**	207.7	221.5	**429.2**	206.8	181.6	**388.5**
TEUs by rail *('000)*	103.6	125.2	**228.8**	130.7	135.6	**266.3**	108.9	131.5	**240.4**	76.5	75.9	**152.3**	98.0	107.7	**205.6**
Whole of Port															
Total number of container ship visits	975	959	**1 934**	971	997	**1 968**	981	987	**1 968**	1 016	1 040	**2 056**	964	970	**1 934**
Total cargo throughput *(million tonnes)*			**70.5**			**71.8**			**75.9**			**76.3**			**73.4**
Non-containerised general cargo throughput *(million tonnes)*			**12.0**			**2.4**			**2.7**			**2.9**			**2.3**
Total containers (lifts) exchanged *('000)*	1 061.6	1 089.5	**2 151.1**	1 195.3	1 248.6	**2 443.9**	1 119.8	1 127.6	**2 247.4**	1 225.3	1 260.3	**2 485.6**	1 088.6	1 111.8	**2 200.4**
Total TEUs exchanged *('000)*			**3 022.0**			**3 460.7**			**3 149.3**			**3 541.4**			**3 177.1**
Full import *('000)*			**1 400.4**			**1 634.4**			**1 456.4**			**1 667.8**			**1 467.6**
Empty import *('000)*			**128.9**			**125.6**			**129.0**			**127.8**			**134.3**
Full export *('000)*			**913.1**			**1 006.1**			**956.0**			**1 013.6**			**944.7**
Empty export *('000)*			**579.7**			**694.7**			**618.8**			**732.1**			**630.5**

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: As for Tables 1.1 to 1.5.

CHAPTER 2
Measures of container terminal productivity

Overview

Starting with this issue, Chapter 2 of Waterline presents in a consolidated format all container terminal productivity measures which were previously located in different chapters. As for Chapter 1, the indicators are in three groups—wharf-side, landside and whole of container terminal.

Seven quarterly wharf-side productivity indicators are covered:

2.1 Crane rate – containers per hour

2.2 Elapsed labour rate – containers per hour

2.3 Ship rate – containers per hour

2.4 Crane rate – TEUs per hour

2.5 Elapsed labour rate – TEUs per hour

2.6 Ship rate – TEUs per hour

2.7 Throughput pbm (containers per berth metre).

The following four quarterly landside productivity indicators are reported for trucks involved in VBS/TAS operations. Bulk runs trucks are not included in calculating these indicators:

2.8 Containers per truck

2.9 TEUs per truck

2.10 Average truck turnaround time

2.11 Average container turnaround time.

Twelve indicators are reported for whole of container terminal productivity. Indicators 2.14 to 2.17, Indicator 2.21 and Indicator 2.22 are new indicators included in this report:

2.12 Median of ship turnaround time

2.13 95th percentile of ship turnaround time

2.14 Number of ships waited in anchorage for more than 2 hours

2.15 Per cent of ships waited in anchorage for more than 2 hour

2.16 Average waiting time in anchorage

2.17 Median of waiting time in anchorage

2.18 Total time ships spent in berth

2.19 Average TEUs per hour ship spent in berth

2.20 Average lifts per hour ship spent in berth

2.21 Total time ships available to stevedore

2.22 Average lifts per hour of stevedoring operation

2.23 Average lifts per ship visit.

The chapter presents these indicators for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Five ports, where Five ports are aggregations of data for the five capital city container terminals.

Wharf-side productivity measures

Measures of productivity on the wharf-side of a container terminal relate only to containers moved by stevedoring companies from/to UCC ships at that container terminal.

Indicator 2.1 Crane rate – containers per hour

This is computed as the total number of containers handled divided by the total elapsed crane time (see details in Box 1). This indicator is interpreted as a proxy measure for the productivity of capital at a container terminal.

Box 1: Elapsed Crane Time

This is the crane time allocated by the stevedore to work on a container ship, assuming the container ship is ready for loading or unloading. It is computed as the total allocated crane hours, less operational and non-operational delays such as:

- No labour allocated
- Closed-port holiday
- Port-wide industrial stoppage
- Total crane time spent handling break-bulk cargo and containers that require manual intervention, e.g. use of wires, chains, non-rigid spreaders or other handling gear
- Award or enterprise agreement breaks as applicable
- Adverse weather
- Delays caused by the ship or its agent
- All breakdowns, including spreader changes
- Other equipment breakdowns which stop crane operations
- Booming up for passing ships
- Handling hatch covers
- Cage work and lashing/unlashing where crane operations are affected
- Crane long-travelling between hatches and crossing accommodation
- Labour withdrawn without operator's agreement including enterprise agreement related industrial stoppages
- Over-dimensional containers requiring additional (rigid) spreader
- Spreader changes
- Waiting for export cargo
- Defective ship's gear (e.g. jammed twist-locks, broken cell guides, ballast pumps unable to maintain list/trim).

Indicator 2.2 Elapsed labour rate – containers per hour

This indicator measures labour productivity at a container terminal and is computed as the number of containers handled divided by the total elapsed labour time (see details in Box 2). Sometimes this measure is reported as the "ship working rate".

Indicator 2.3 Ship rate – containers per hour

This is the average number of containers moved on or off a ship in an hour. Generally, this indicator measures the combined stevedoring productivity of capital and labour.

Indicator 2.4 Crane rate – TEUs per hour

This is similar to Indicator 2.1 after converting containers to TEUs.

Indicator 2.5 Elapsed labour rate – TEUs per hour

This is similar to Indicator 2.2 after converting containers to TEUs.

Indicator 2.6 Ship rate – TEUs per hour

This is similar to Indicator 2.3 after converting containers to TEUs.

Indicator 2.7 Throughput pbm (containers per berth metre)

This is the number of containers through a container terminals divided by the length (in metres) of berths. At a container terminal it measures the intensity of use of the terminal container handling facility.

Box 2: Elapsed Labour Time

This is the time elapsed between labour first boarding a container ship and labour last leaving the ship, less any time when the labour has not worked for whatever reasons including non-operational delays such as:

- No labour allocated to ship
- Closed-port holiday
- Port-wide industrial stoppage
- Break bulk and containers that require manual interventions, e.g. use of wires, chains, non-rigid spreaders or other handling gear.

Landside productivity measures

These indicators relate to the performance in processing containers through the 1-stop Vehicle Booking System (VBS) by Patrick and DP World, or through the Truck Appointment System (TAS) by Hutchison Ports Australia. They do not include the performance of bulk runs trucks.

Indicator 2.8 Containers per truck

Count of containers processed through the VBS/TAS systems divided by the total number of VBS/TAS trucks used.

Indicator 2.9 TEUs per truck

Count of TEUs through the VBS/TAS systems divided by the total number of VBS/TAS trucks used. In contrast to Indicator 2.8, this indicator measures the truck efficiency in a standard unit, a TEU, and thus takes into account the different sizes of containers.

Indicator 2.10 Average truck turnaround time

The indicator measures the time lapsed from when the truck enters the gate of a container terminal to the time when the truck exits the gate. This measure does not include the time the truck waits outside the gate of a container terminal. It also excludes time for Australian Quarantine and Inspection Service inspections. This is a measure of stevedoring efficiency and shows how fast (expressed in minutes) a stevedoring company processes a truck at a container terminal.

Indicator 2.11 Average container turnaround time

This is as the "average truck turnaround time" (Indicator 2.10) divided by "average containers per truck" (Indicator 2.8). It is a measure of the stevedoring efficiency in handling containers at a container terminal.

Container turnaround time improves (that is, it goes down) if either the truck utilisation rates improve, implying that the number of containers per truck increases, or the container terminal is faster in processing each truck.

Whole of container terminal measures

Indicator 2.12 Median of ship turnaround time

This is the median of the time (in hours) a container ship is in a port. It is the time that lapses from the time a ship enters a port to the time a ship leaves the port.

Indicator 2.13 95th percentile of ship turnaround time

The 95th percentile indicates that for 95 per cent of the ships, the turnaround time is below the value of the indicator. Conversely, for 5 per cent of the ships, the turnaround time is above the value of the indicator.

Indicator 2.14 Number of ships waited in anchorage for more than 2 hours

This indicator provides the number of container ships, as reported by port authorities that, at the ships' first time entry, waited for longer than 2 hours for port entry clearance. Delay before entering a port usually results from the geography-specific situation of a port and may also be caused by operational reasons, both at the terminal or ship or both.

Indicator 2.15 Per cent of ships waited in anchorage for more than 2 hours

This is the number of container ships in Indicator 2.14 as a per cent of the total number of container ships that visited the container terminal in the period.

Indicator 2.16 Average waiting time in anchorage

This is the average time (hours) ships have waited in anchorage. Only ships that waited for port entry clearance for two hours or more are included in the calculation. The indicator shows gross delay. Breaking the data down so as to differentiate between port and non-port factors causing delays may breach commercial confidentiality.

Indicator 2.17 Median of waiting time in anchorage

This is the median of time (hours) ships have waited in anchorage. Only ships that waited for port entry clearance for two hours or more are included in the calculation.

Indicator 2.18 Total time ships spent in berth

This is the total hours spent in berth by all dedicated container ships that exchanged containers at that port. The time a ship spends in berth is the elapsed time between the time a ship arrives at berth and the time of its departure from berth. Port authorities report the berth time as a "gross value" including all times spent by a ship at berth such as time for loading/unloading containers, for maintenance and supply operations, or waiting for labour or suitable weather.

Indicator 2.19 Average TEUs per hour ship spent in berth

This is the total TEUs lifted on/off dedicated container ships (UCC) divided by the total time ship spent in berth (Indicator 2.18). The indicator is strongly influenced by changes in average number of TEUs exchanged per visiting ships and by the mix of ship sizes during the period. The average number of TEUs exchanged also varies seasonally and cyclically.

Indicator 2.20 Average lifts per hour ship spent in berth

This indicator is similar to Indicator 2.19 whereas the total crane lifts (containers handled) is used in calculating the indicator rather than the number of TEUs.

Indicator 2.21 Total time ships available to stevedores

This is the total time (in hours) when ships can be loaded or unloaded.

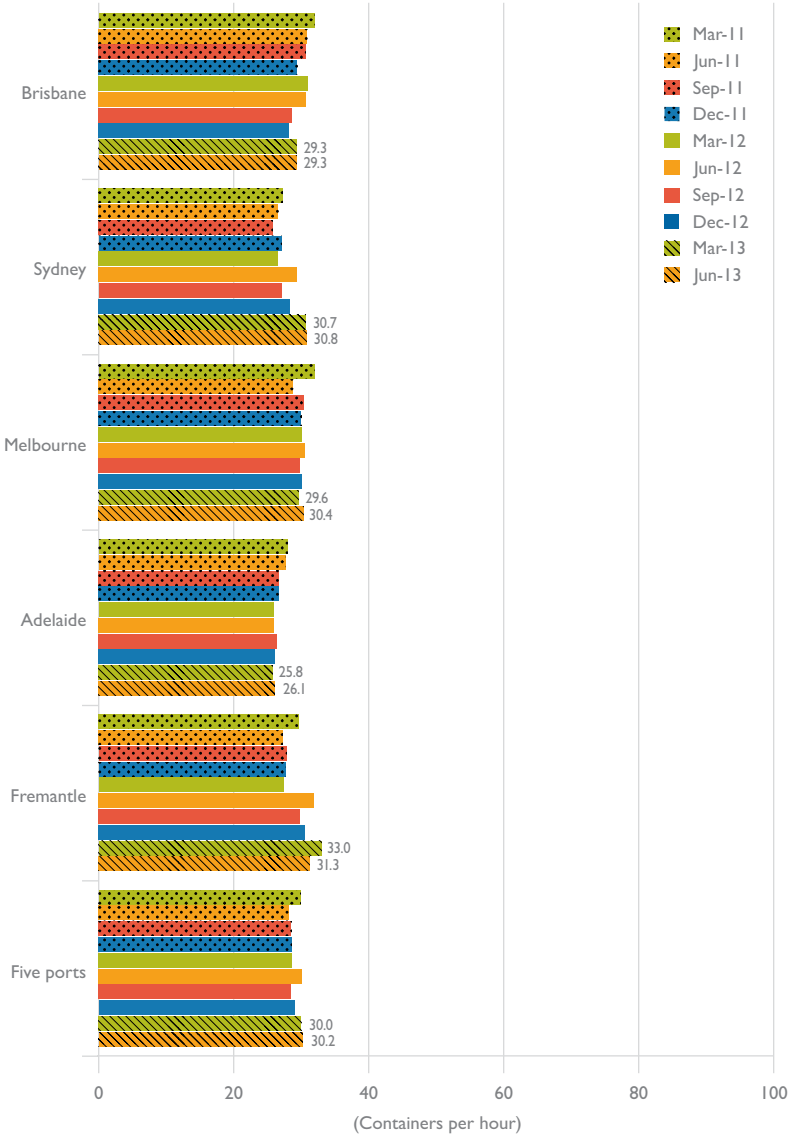
Indicator 2.22 Average lifts per hour of stevedoring operation

This is the total number of crane lifts (containers handled) divided by the total time actually spent by stevedores in loading and unloading containers.

Indicator 2.23 Average lifts per ship visit

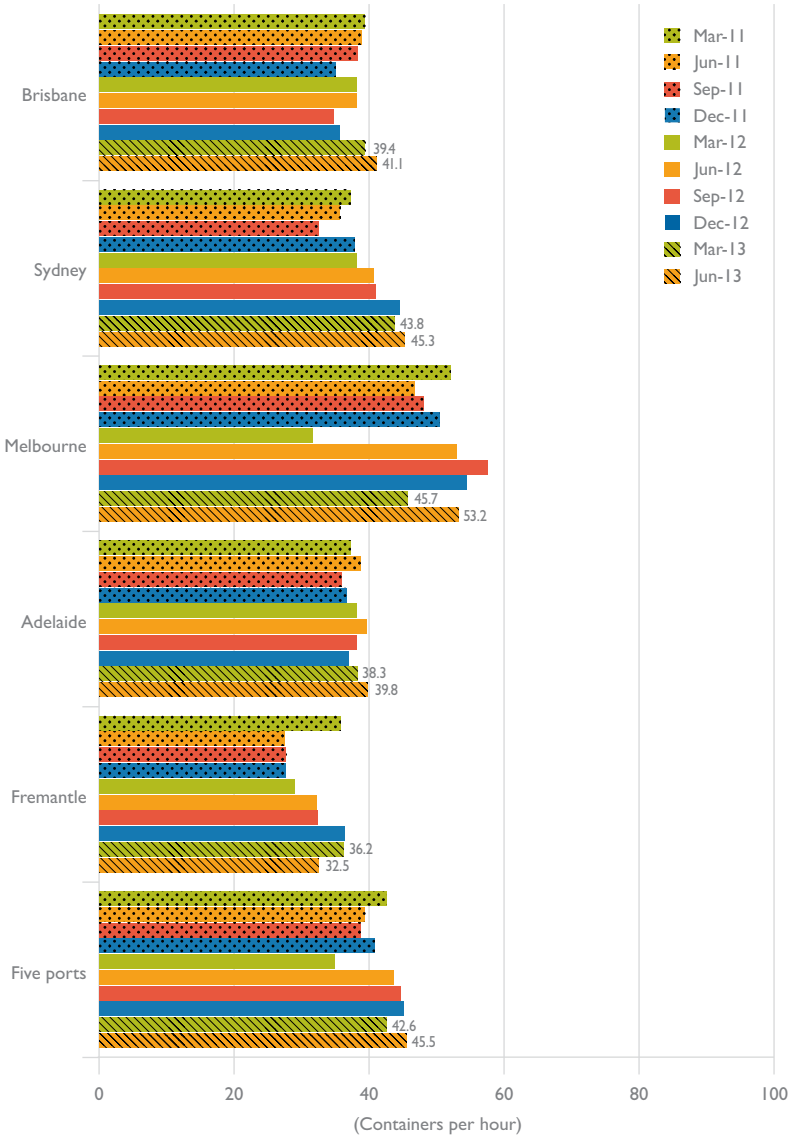
This is the number of crane lifts (containers handled) divided by the number of visits of dedicated container ships (UCC).

Figure 2.1 Wharf-side crane rate



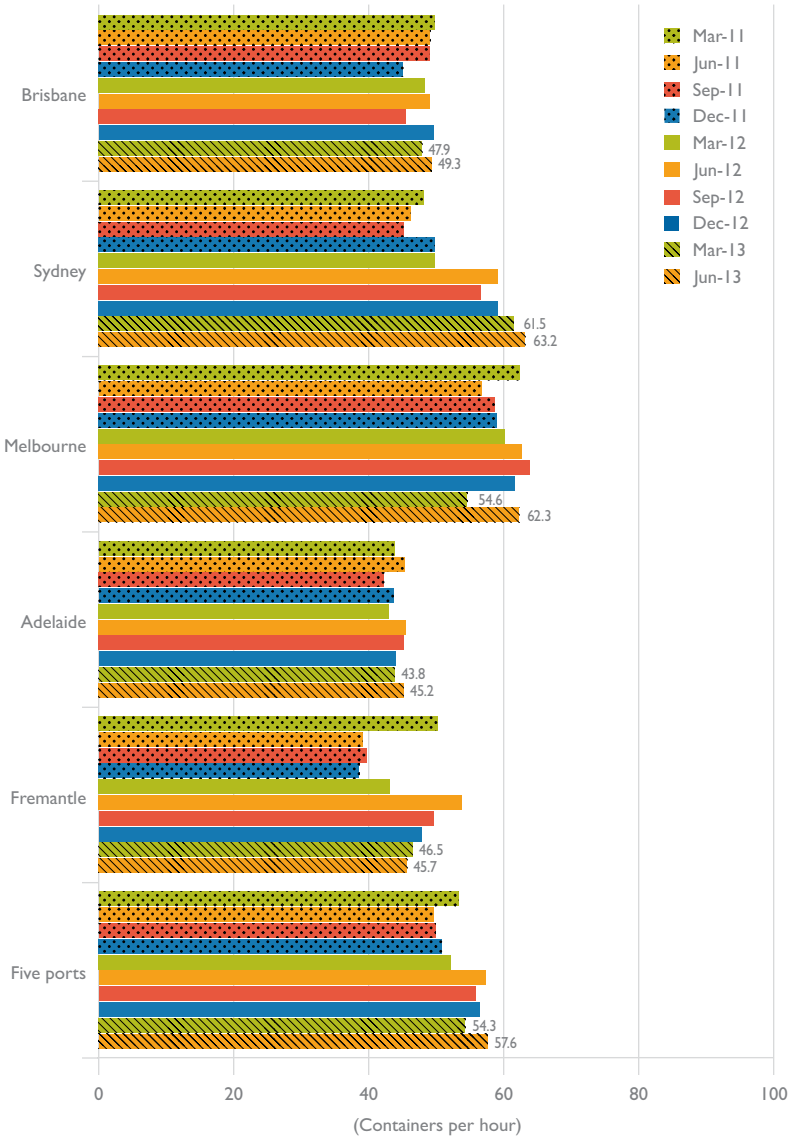
Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

Figure 2.2 Wharf-side elapsed labour rate



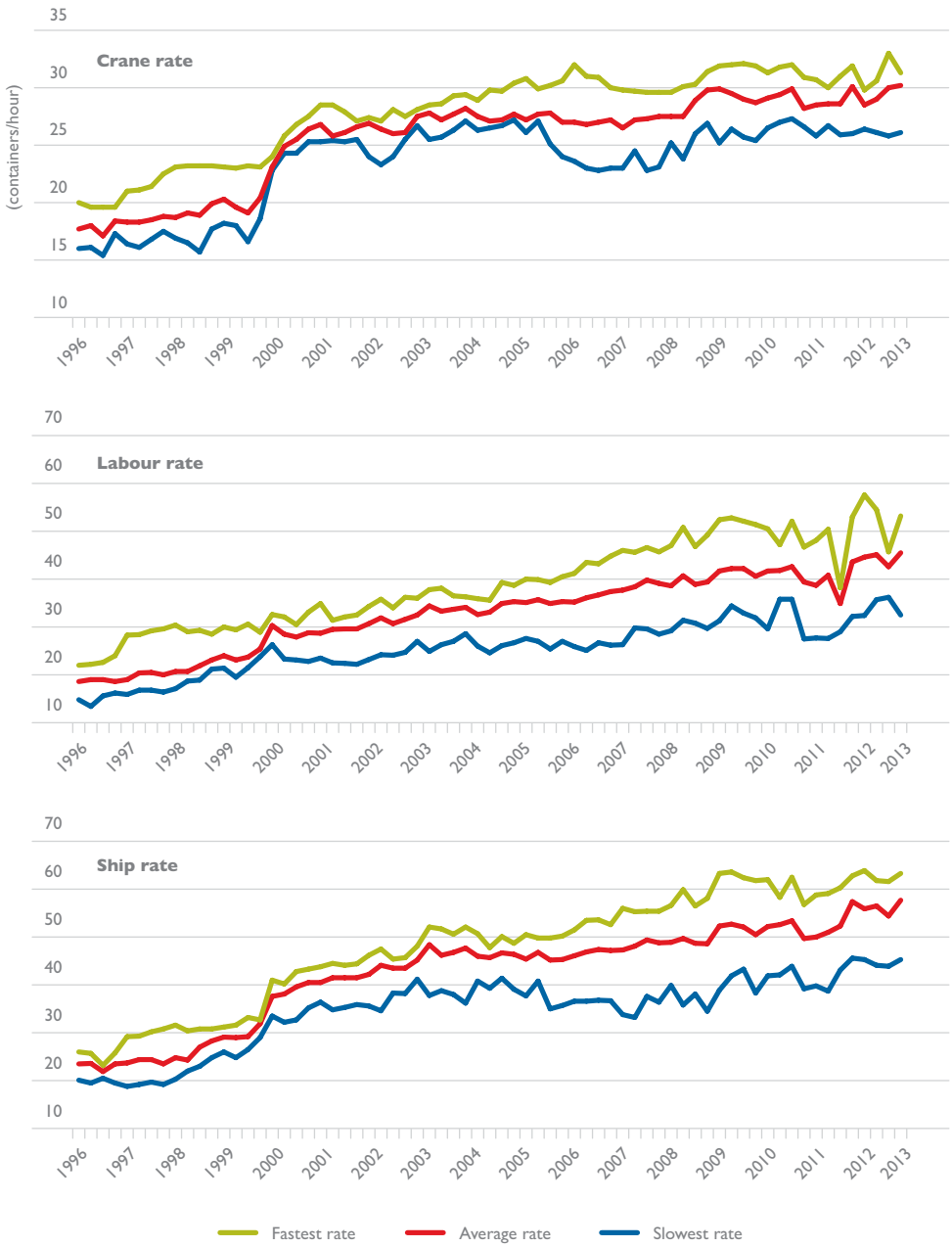
Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

Figure 2.3 Wharf-side ship rate



Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

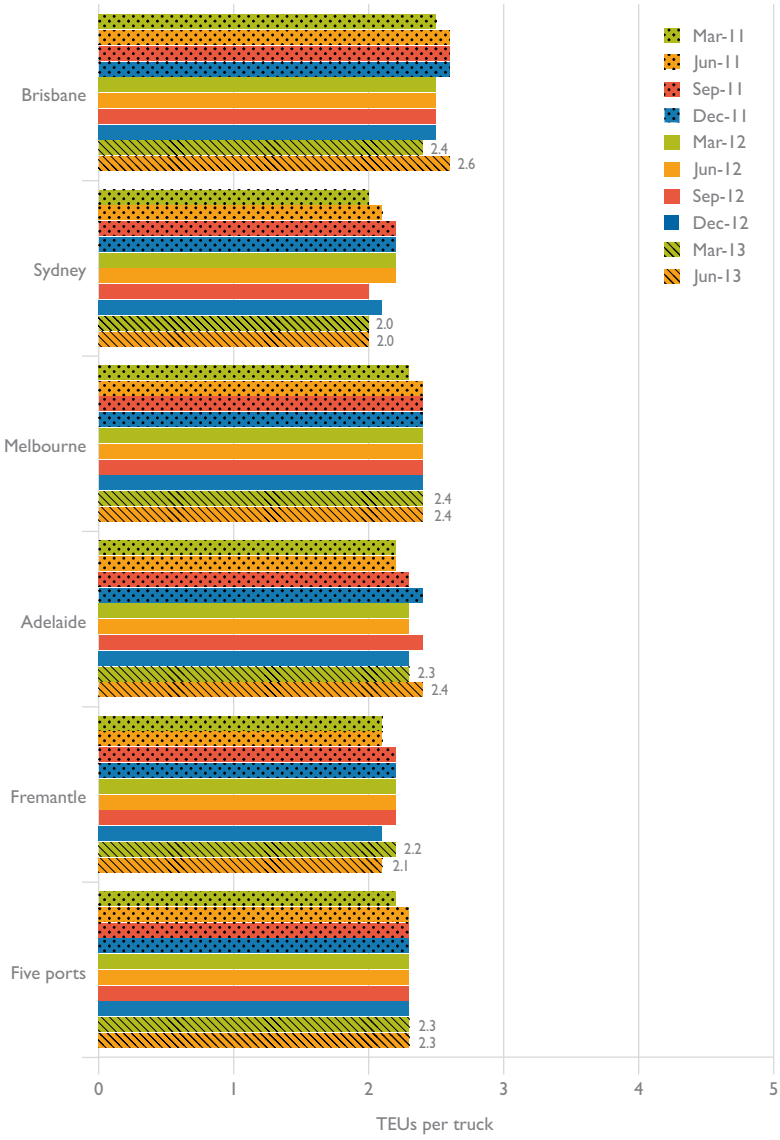
Figure 2.4 Productivity in five ports: Comparison of wharf-side rates



Notes: The wharf-side crane rate, labour rate and ship rate are compared among all five ports and the fastest, average and slowest rates are illustrated. The fastest and slowest rate may correspond to different ports in different periods.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

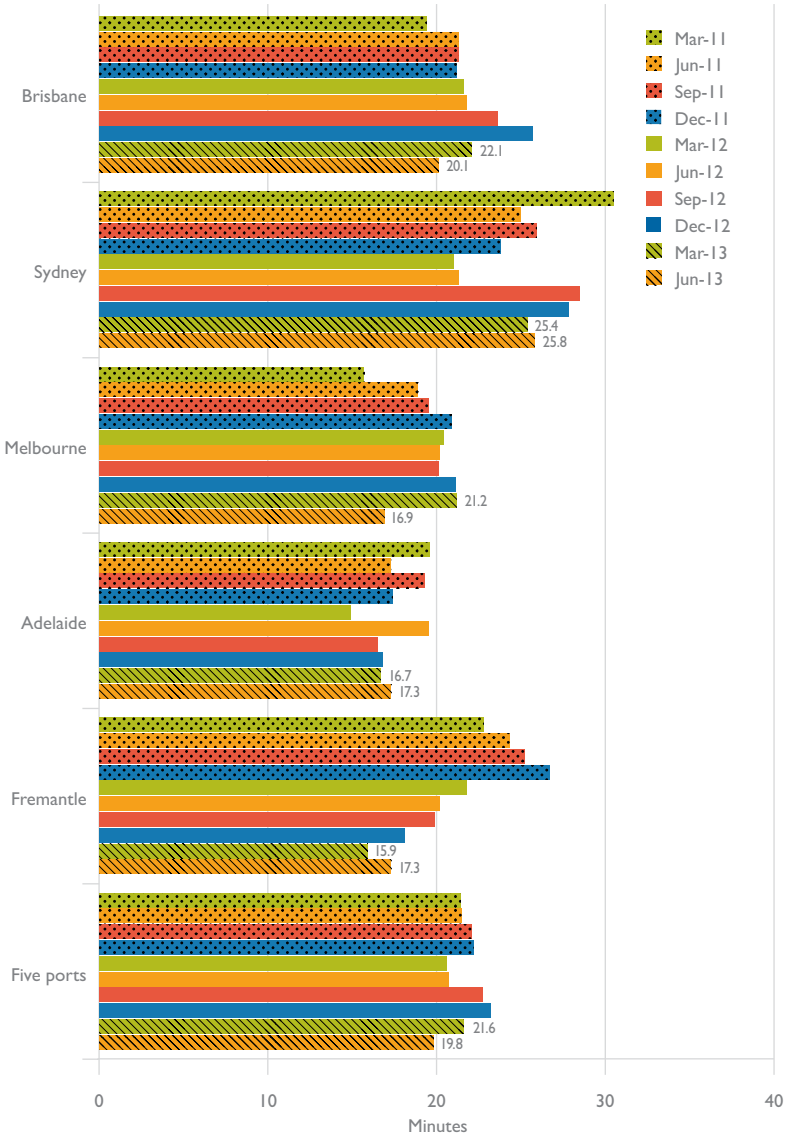
Figure 2.5 Average TEUs per truck on landside of container terminals



Notes: This indicator is based on only the trucks that are processed through the VBS/TAS system.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

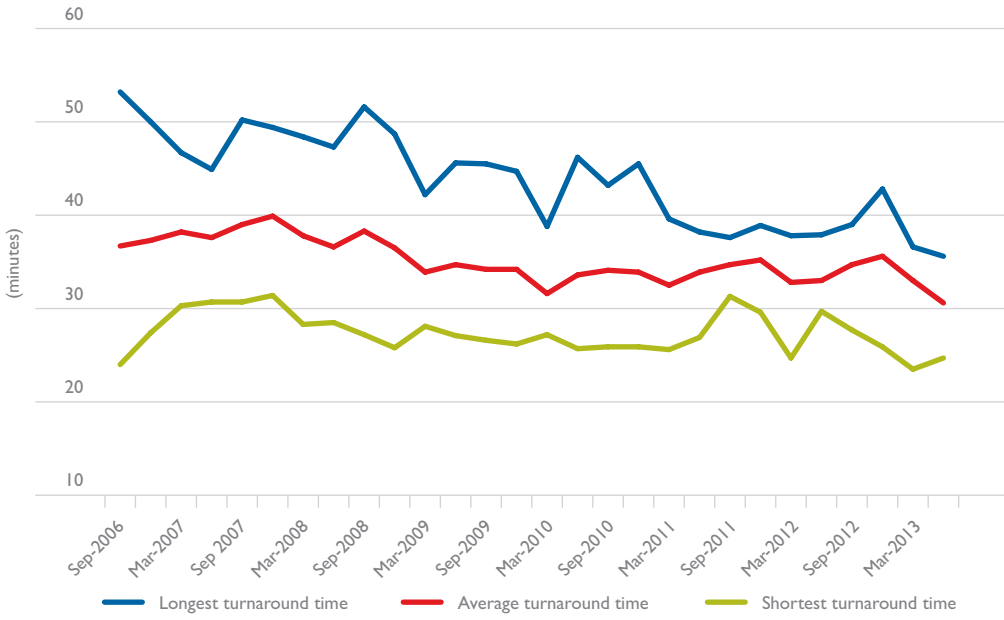
Figure 2.6 Average container turnaround time on landside of container terminals



Notes: This indicator is based on only the containers that are processed through the VBS/TAS system.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

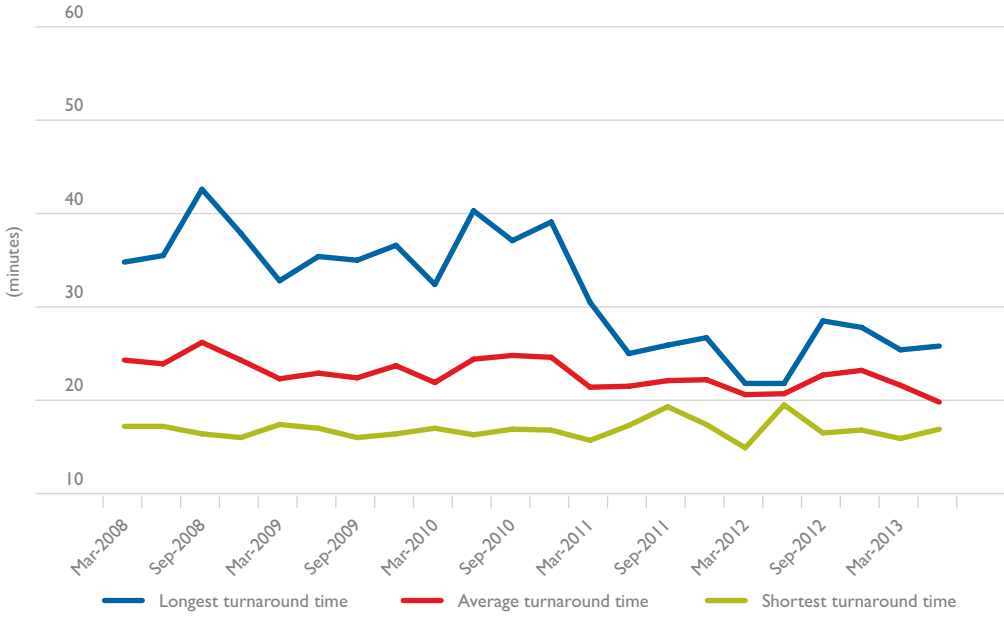
Figure 2.7 Longest and shortest truck turnaround time in five ports



Notes: The truck turnaround time is compared among all five ports in each quarter. The longest and shortest truck turnaround time may correspond to different ports in different periods.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

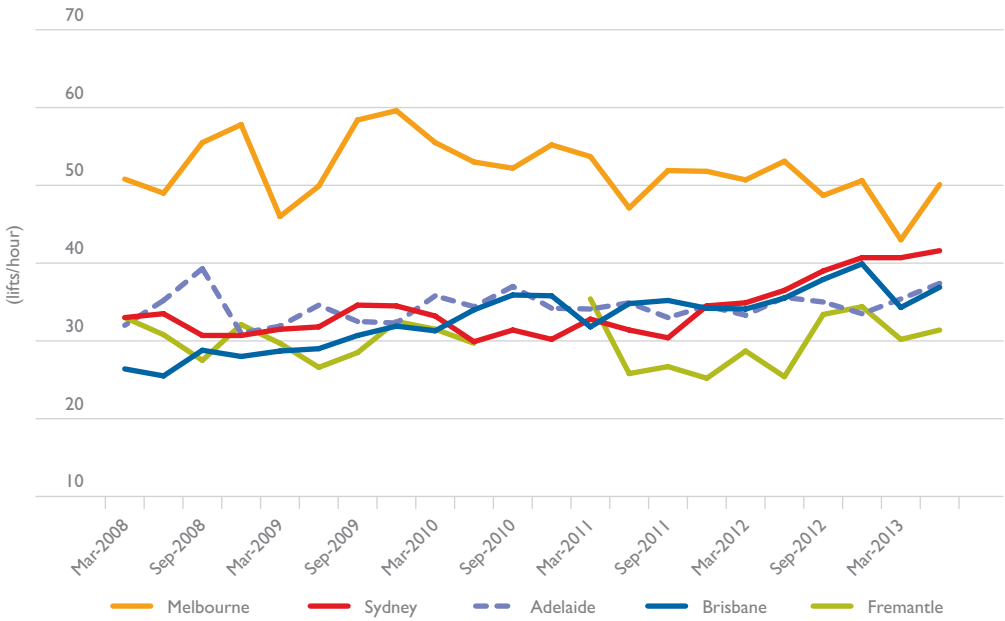
Figure 2.8 Longest and shortest container turnaround time in five ports



Notes: The container turnaround time is compared among all five ports in each quarter. The longest and shortest container turnaround time may correspond to different ports in different periods.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

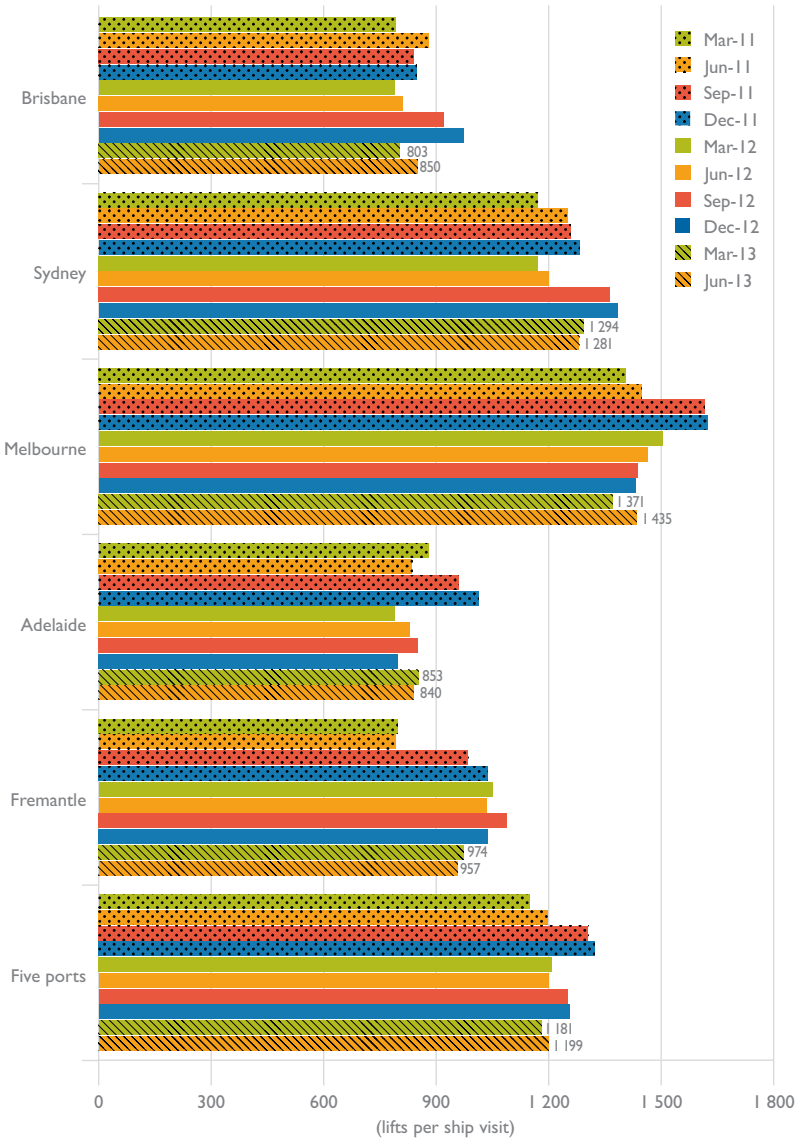
Figure 2.9 Average number of lifts per hour a ship spent at berth



Note: In September and December quarters of 2010 only part of ship movement statistics for Fremantle was available for analysis. These data points are not plotted.

Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2013), Sydney Port Authority (2013), Port of Melbourne Corporation (2013), Port of Adelaide (2013) and Fremantle Port Authority (2013).

Figure 2.10 Average number of lifts per ship visit



Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2013), Sydney Port Authority (2013), Port of Melbourne Corporation (2013), Port of Adelaide (2013) and Fremantle Port Authority (2013).

Table 2.1 Container terminal productivity: Brisbane

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
Containers per hour															
Crane rate	32.0	30.9	**31.5**	30.7	29.4	**30.1**	31.0	30.7	**30.9**	28.6	28.2	**28.4**	29.3	29.3	**29.3**
Elapsed labour rate	39.4	38.9	**39.2**	38.3	35.1	**36.7**	38.2	38.1	**38.2**	34.7	35.7	**35.2**	39.4	41.1	**40.3**
Ship rate	49.8	49.1	**49.5**	49.0	45.1	**47.1**	48.3	49.0	**48.7**	45.5	49.6	**47.6**	47.9	49.3	**48.6**
TEUs per hour															
Crane rate	47.2	45.4	**46.3**	45.8	43.9	**44.9**	46.0	45.9	**46.0**	42.9	42.5	**42.7**	44.1	43.5	**43.8**
Elapsed labour rate	58.0	57.3	**57.7**	57.0	52.5	**54.8**	56.5	57.0	**56.8**	52.0	54.0	**53.0**	59.4	61.1	**60.3**
Ship rate	73.4	72.3	**72.9**	73.0	67.4	**70.2**	71.6	73.3	**72.5**	68.2	74.9	**71.6**	72.3	73.3	**72.8**
Throughput pbm	91.1	102.2	**96.6**	110.9	112.0	**111.4**	98.5	105.7	**102.1**	113.3	120.5	**116.9**	99.3	108.9	**104.1**
Landside															
Containers per truck	1.8	1.8	**1.8**	1.8	1.8	**1.8**	1.7	1.7	**1.7**	1.6	1.7	**1.6**	1.7	1.8	**1.7**
TEUs per truck	2.5	2.6	**2.6**	2.6	2.6	**2.6**	2.5	2.5	**2.5**	2.5	2.5	**2.5**	2.4	2.6	**2.5**
Truck turnaround time *(mins)*	34.4	38.2	**36.4**	37.6	37.7	**37.6**	37.8	37.9	**37.8**	38.3	42.8	**40.6**	36.6	35.6	**36.1**
Average container turnaround time *(mins)*	19.4	21.3	**20.5**	21.3	21.2	**21.3**	21.6	21.8	**21.7**	23.6	25.7	**24.7**	22.1	20.1	**21.1**
Whole of Port															
Ship turnaround time															
Median *(hours)*	30.9	31.9	**31.5**	31.1	32.1	**31.7**	29.8	30.1	**30.0**	31.2	31.6	**31.4**	30.2	30.8	**30.7**
95th percentile *(hours)*	83.8	57.4	**61.7**	54.0	60.5	**58.4**	51.5	53.4	**52.4**	52.5	67.2	**58.2**	97.0	52.8	**70.4**
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours													33	35	**68**
Per cent of ships waited in anchorage for more than 2 hours *(%)*													15.0	15.8	**15.4**
Average waiting time in anchorage *(hours)*													30.6	13.8	**22.2**
Median of waiting time in anchorage *(hours)*													21.3	10.2	**15.8**
Total time ships spent in berth *('000 hours)*	5.2	5.2	**10.4**	4.7	5.2	**9.9**	5.1	5.1	**10.2**	5.8	5.9	**11.8**	5.2	5.1	**10.3**
Average TEUs per hour ship spent in berth *(TEUs per hour)*	41.7	45.5	**43.6**	46.6	45.4	**46.0**	45.0	47.1	**46.1**	50.6	53.4	**52.0**	46.0	48.6	**47.3**
Average lifts per hour ship spent in berth *(lifts per hour)*	31.8	34.8	**33.3**	35.2	34.2	**34.7**	34.1	35.5	**34.8**	37.9	39.9	**38.9**	34.3	36.9	**35.6**
Total time ships are available to stevedores *('000 hours)*													4.1	4.3	**4.2**
Average lifts per stevedores' hour *(lifts per hour)*													43.4	43.8	**43.6**
Average lifts per ship visit *(lifts)*	791.5	878.8	**835.2**	841.5	847.5	**844.5**	789.3	811.9	**800.6**	919.6	972.7	**946.2**	802.5	849.8	**826.2**

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: DP World (2013), Hutchison Ports Australia (2013), Patrick (2013), Port of Brisbane Pty Ltd (2013) and BITRE estimates (2013).

Table 2.2 Container terminal productivity: Sydney

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
Containers per hour															
Crane rate	27.3	26.6	**27.0**	25.8	27.1	**26.5**	26.6	29.4	**28.0**	27.1	28.3	**27.7**	30.7	30.8	**30.8**
Elapsed labour rate	37.2	35.7	**36.5**	32.5	37.8	**35.2**	38.2	40.6	**39.4**	40.9	44.5	**42.7**	43.8	45.3	**44.6**
Ship rate	48.1	46.2	**47.2**	45.2	49.8	**47.5**	49.8	59.2	**54.5**	56.6	59.2	**57.9**	61.5	63.2	**62.4**
TEUs per hour															
Crane rate	40.3	39.4	**39.9**	38.6	40.9	**39.8**	39.8	44.0	**41.9**	41.0	43.2	**42.1**	46.4	46.1	**46.3**
Elapsed labour rate	55.0	53.1	**54.1**	51.1	57.0	**54.1**	57.3	61.0	**59.2**	62.0	67.8	**64.9**	66.3	68.1	**67.2**
Ship rate	71.0	68.6	**69.8**	67.7	75.0	**71.4**	74.7	88.9	**81.8**	85.8	90.6	**88.2**	93.4	95.2	**94.3**
Throughput pbm	169.4	171.7	**170.6**	182.5	180.9	**181.7**	165.2	161.8	**163.5**	182.9	199.6	**191.3**	167.7	175.5	**171.6**
Landside															
Containers per truck	1.3	1.4	**1.4**	1.4	1.4	**1.4**	1.5	1.5	**1.5**	1.4	1.4	**1.4**	1.4	1.4	**1.4**
TEUs per truck	2.0	2.1	**2.0**	2.2	2.2	**2.2**	2.2	2.2	**2.2**	2.0	2.1	**2.0**	2.0	2.0	**2.0**
Truck turnaround time *(mins)*	39.6	35.4	**37.5**	36.4	34.0	**35.2**	30.7	30.8	**30.8**	39.0	38.1	**38.5**	34.7	34.9	**34.8**
Average container turnaround time *(mins)*	30.5	25.0	**27.6**	25.9	23.8	**24.8**	21.0	21.3	**21.1**	28.5	27.8	**28.1**	25.4	25.8	**25.6**
Whole of Port															
Ship turnaround time															
Median *(hours)*	36.3	38.2	**36.9**	39.6	37.3	**38.2**	34.8	33.4	**33.8**	34.2	35.1	**34.5**	31.7	31.3	**31.3**
95th percentile *(hours)*	56.4	70.9	**65.0**	74.8	63.8	**72.7**	54.3	57.8	**57.4**	55.0	55.1	**55.2**	54.6	51.8	**52.8**
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours													59	68	**127**
Per cent of ships waited in anchorage for more than 2 hours *(%)*													22.7	25.0	**23.9**
Average waiting time in anchorage *(hours)*													17.3	14.3	**15.8**
Median of waiting time in anchorage *(hours)*													12.1	9.9	**11.0**
Total time ships spent in berth *('000 hours)*	9.6	10.2	**19.8**	11.5	10.6	**22.0**	9.2	9.0	**18.2**	9.4	9.8	**19.2**	8.3	8.3	**16.7**
Average TEUs per hour ship spent in berth *(TEUs per hour)*	43.2	41.5	**42.3**	40.5	46.2	**43.4**	46.7	48.7	**47.7**	52.6	55.3	**54.0**	54.9	55.5	**55.2**
Average lifts per hour ship spent in berth *(lifts per hour)*	32.8	31.4	**32.1**	30.4	34.5	**32.4**	34.9	36.5	**35.7**	39.0	40.7	**39.8**	40.7	41.6	**41.2**
Total time ships are available to stevedores *('000 hours)*													7.5	7.5	**7.5**
Average lifts per stevedores' hour *(lifts per hour)*													45.5	46.2	**45.9**
Average lifts per ship visit *(lifts)*	1 171.7	1 250.6	**1 211.1**	1 258.7	1 282.1	**1 270.4**	1 171.5	1 200.8	**1 186.1**	1 363.5	1 384.0	**1 373.7**	1 294.4	1 281.2	**1 287.8**

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: DP World (2013), Patrick (2013), Sydney Port Authority (2013) and BITRE estimates (2013).

Table 2.3 Container terminal productivity: Melbourne

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
Containers per hour															
Crane rate	32.0	28.8	**30.4**	30.4	30.0	**30.2**	30.1	30.6	**30.4**	29.8	30.1	**30.0**	29.6	30.4	**30.0**
Elapsed labour rate	52.1	46.7	**49.4**	48.1	50.4	**49.3**	31.7	53.0	**42.4**	57.6	54.5	**56.1**	45.7	53.2	**49.5**
Ship rate	62.4	56.7	**59.6**	58.7	59.0	**58.9**	60.2	62.7	**61.5**	63.8	61.7	**62.8**	54.6	62.3	**58.5**
TEUs per hour															
Crane rate	46.9	42.3	**44.6**	45.0	44.4	**44.7**	44.3	45.1	**44.7**	44.6	45.3	**45.0**	44.1	45.6	**44.9**
Elapsed labour rate	60.6	68.8	**64.7**	71.7	73.2	**72.5**	74.2	78.6	**76.4**	86.3	82.1	**84.2**	68.3	66.9	**67.6**
Ship rate	91.6	83.5	**87.6**	87.3	87.5	**87.4**	88.8	92.8	**90.8**	95.6	93.1	**94.4**	81.7	93.6	**87.7**
Throughput pbm	182.0	190.1	**186.1**	214.1	218.9	**216.5**	198.0	204.6	**201.3**	209.3	212.0	**210.7**	186.2	184.7	**185.5**
Landside															
Containers per truck	1.6	1.7	**1.7**	1.7	1.7	**1.7**	1.7	1.7	**1.7**	1.6	1.6	**1.6**	1.6	1.6	**1.6**
TEUs per truck	2.3	2.4	**2.4**	2.4	2.4	**2.4**	2.4	2.4	**2.4**	2.4	2.4	**2.4**	2.4	2.4	**2.4**
Truck turnaround time *(mins)*	25.6	31.9	**28.8**	32.5	34.8	**33.6**	33.9	33.8	**33.8**	32.8	34.6	**33.7**	34.1	27.3	**30.6**
Average container turnaround time *(mins)*	15.7	18.9	**17.4**	19.5	20.9	**20.2**	20.4	20.2	**20.3**	20.1	21.1	**20.6**	21.2	16.9	**19.0**
Whole of Port															
Ship turnaround time															
Median *(hours)*	33.3	80.9	**34.9**	39.6	40.0	**39.9**	37.7	35.9	**36.6**	35.4	36.7	**36.0**	38.1	35.6	**36.6**
95th percentile *(hours)*	57.8	80.9	**72.3**	83.5	74.5	**77.9**	65.3	61.5	**63.5**	70.0	68.2	**69.9**	65.0	62.4	**64.9**
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours													20	11	**31**
Per cent of ships waited in anchorage for more than 2 hours *(%)*													7.1	4.1	**5.6**
Average waiting time in anchorage *(hours)*													21.4	28.5	**25.0**
Median of waiting time in anchorage *(hours)*													17.7	23.4	**20.6**
Total time ships spent in berth *('000 hours)*	7.7	9.0	**16.7**	9.5	10.0	**19.5**	8.7	8.2	**16.9**	8.9	8.4	**17.4**	9.0	7.7	**16.8**
Average TEUs per hour ship spent in berth *(TEUs per hour)*	70.0	61.5	**65.7**	68.5	68.1	**68.3**	66.4	69.7	**68.1**	64.8	67.7	**66.3**	57.2	66.7	**62.0**
Average lifts per hour ship spent in berth *(lifts per hour)*	53.7	47.1	**50.4**	51.9	51.8	**51.8**	50.7	53.1	**51.9**	48.7	50.6	**49.6**	43.0	50.1	**46.6**
Total time ships are available to stevedores *('000 hours)*													7.4	6.3	**6.9**
Average lifts per stevedores' hour *(lifts per hour)*													52.4	61.1	**56.7**
Average lifts per ship visit *(lifts)*	1 406.2	1 448.4	**1 427.3**	1 616.3	1 623.0	**1 619.7**	1 502.8	1 463.4	**1 483.1**	1 436.7	1 431.6	**1 434.1**	1 371.2	1 434.8	**1 403.0**

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: DP World (2013), Patrick (2013), Port of Melbourne Corporation (2013) and BITRE estimates (2013).

Table 2.4 Container terminal productivity: Adelaide

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
Containers per hour															
Crane rate	28.0	27.7	**27.9**	26.7	26.7	**26.7**	25.9	26.0	**26.0**	26.4	26.1	**26.3**	25.8	26.1	**26.0**
Elapsed labour rate	37.3	38.8	**38.1**	35.9	36.7	**36.3**	38.1	39.7	**38.9**	38.1	37.0	**37.6**	38.3	39.8	**39.1**
Ship rate	43.8	45.3	**44.6**	42.3	43.7	**43.0**	43.0	45.5	**44.3**	45.2	44.0	**44.6**	43.8	45.2	**44.5**
TEUs per hour															
Crane rate	38.0	38.3	**38.2**	37.1	37.2	**37.2**	36.0	35.8	**35.9**	36.9	36.8	**36.9**	35.9	36.0	**36.0**
Elapsed labour rate	50.6	53.7	**52.2**	49.8	51.2	**50.5**	52.8	54.7	**53.8**	53.2	52.2	**52.7**	53.4	54.9	**54.2**
Ship rate	59.6	62.7	**61.2**	58.8	61.0	**59.9**	59.6	62.6	**61.1**	63.1	62.0	**62.6**	61.0	62.5	**61.8**
Throughput pbm	**118.7**	**115.8**	117.2	**131.9**	**115.8**	**123.8**	**113.7**	**132.8**	**123.3**	**134.1**	**132.7**	**133.4**	**124.5**	**130.0**	**127.3**
Landside															
Containers per truck	1.6	1.6	**1.6**	1.6	1.7	**1.7**	1.7	1.6	**1.7**	1.7	1.6	**1.6**	1.6	1.7	**1.7**
TEUs per truck	2.2	2.2	**2.2**	2.3	2.4	**2.3**	2.3	2.3	**2.3**	2.4	2.3	**2.3**	2.3	2.4	**2.4**
Truck turnaround time *(mins)*	31.8	26.9	**29.2**	31.3	29.6	**30.5**	24.7	32.0	**28.5**	27.7	27.1	**27.4**	27.3	29.7	**28.5**
Average container turnaround time *(mins)*	19.6	17.3	**18.4**	19.3	17.4	**18.3**	14.9	19.5	**17.3**	16.5	16.8	**16.6**	16.7	17.3	**17.0**
Whole of Port															
Ship turnaround time															
Median *(hours)*	24.5	24.3	**24.3**	25.4	28.0	**26.5**	22.2	21.9	**22.0**	22.7	21.2	**21.8**	23.3	21.7	**22.2**
95th percentile *(hours)*	39.0	34.7	**37.9**	56.7	51.8	**53.4**	40.1	38.8	**39.1**	42.6	38.8	**41.5**	39.8	36.2	**37.7**
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours													9	10	**19**
Per cent of ships waited in anchorage for more than 2 hours *(%)*													11.7	12.2	**11.9**
Average waiting time in anchorage *(hours)*													19.3	13.7	**16.5**
Median of waiting time in anchorage *(hours)*													17.5	11.5	**14.5**
Total time ships spent in berth *('000 hours)*	1.8	1.7	**3.4**	2.1	1.8	**3.9**	1.8	1.9	**3.6**	2.0	2.0	**4.0**	1.8	1.8	**3.7**
Average TEUs per hour ship spent in berth *(TEUs per hour)*	41.3	43.1	**42.2**	41.0	42.4	**41.7**	41.2	43.5	**42.3**	43.5	43.5	**43.5**	44.5	45.5	**45.0**
Average lifts per hour ship spent in berth *(lifts per hour)*	34.1	34.9	**34.5**	33.0	34.5	**33.8**	33.3	35.6	**34.4**	35.0	33.5	**34.3**	35.4	37.4	**36.4**
Total time ships are available to stevedores *('000 hours)*													1.5	1.5	**1.5**
Average lifts per stevedores' hour *(lifts per hour)*													42.4	44.9	**43.7**
Average lifts per ship visit *(lifts)*	878.7	835.8	**857.2**	959.6	1 012.6	**986.1**	789.5	829.9	**809.7**	852.3	797.6	**824.9**	853.1	840.2	**846.7**

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: DP World (2013), Port of Adelaide (2013) and BITRE estimates (2013).

Table 2.5 Container terminal productivity: Fremantle

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
Containers per hour															
Crane rate	29.7	27.3	**28.5**	27.8	27.7	**27.8**	27.4	31.9	**29.7**	29.8	30.6	**30.2**	33.0	31.3	**32.2**
Elapsed labour rate	35.8	27.5	**31.7**	27.7	27.6	**27.7**	29.0	32.2	**30.6**	32.4	36.3	**34.4**	36.2	32.5	**34.4**
Ship rate	50.3	39.1	**44.7**	39.7	38.6	**39.2**	43.2	53.8	**48.5**	49.6	47.8	**48.7**	46.5	45.7	**46.1**
TEUs per hour															
Crane rate	43.3	39.9	**41.6**	41.8	41.9	**41.9**	39.5	47.0	**43.3**	44.7	46.0	**45.4**	48.5	46.0	**47.3**
Elapsed labour rate	52.3	40.3	**46.3**	41.4	41.5	**41.5**	41.7	47.5	**44.6**	48.6	54.5	**51.6**	53.3	47.7	**50.5**
Ship rate	73.5	57.2	**65.4**	59.5	58.1	**58.8**	61.8	79.1	**70.5**	73.7	71.0	**72.4**	67.9	66.4	**67.2**
Throughput pbm	75.8	76.7	**76.2**	84.6	89.0	**86.8**	83.2	84.7	**83.9**	93.8	92.2	**93.0**	80.9	82.2	**81.6**
Landside															
Containers per truck	1.5	1.4	**1.5**	1.4	1.5	**1.4**	1.5	1.5	**1.5**	1.4	1.4	**1.4**	1.5	1.4	**1.4**
TEUs per truck	2.1	2.1	**2.1**	2.2	2.2	**2.2**	2.2	2.2	**2.2**	2.2	2.1	**2.2**	2.2	2.1	**2.2**
Truck turnaround time *(mins)*	33.5	35.0	**34.3**	35.9	38.9	**37.4**	32.4	29.7	**31.0**	28.6	25.9	**27.3**	23.5	24.7	**24.1**
Average container turnaround time *(mins)*	22.8	24.3	**23.6**	25.2	26.7	**26.0**	21.8	20.2	**21.0**	19.9	18.1	**19.0**	15.9	17.3	**16.6**
Whole of Port															
Ship turnaround time															
Median *(hours)*	29.4	36.8	**32.2**	41.3	42.1	**41.9**	38.3	35.4	**37.3**	36.7	34.0	**35.5**	36.5	34.6	**35.5**
95th percentile *(hours)*	59.8	66.4	**64.7**	88.1	104.7	**101.6**	84.1	75.0	**81.8**	66.2	59.9	**63.6**	64.5	59.9	**62.0**
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours													7	7	**14**
Per cent of ships waited in anchorage for more than 2 hours *(%)*													5.7	5.6	**5.7**
Average waiting time in anchorage *(hours)*													14.5	16.5	**15.5**
Median of waiting time in anchorage *(hours)*													13.6	10.7	**12.2**
Total time ships spent in berth *('000 hours)*	3.1	4.2	**7.2**	4.4	5.0	**9.4**	4.3	4.6	**8.9**	4.0	3.8	**7.8**	3.9	3.8	**7.7**
Average TEUs per hour ship spent in berth *(TEUs per hour)*	46.0	33.6	**39.8**	35.7	33.8	**34.8**	36.4	33.3	**34.8**	44.5	45.8	**45.1**	39.4	40.9	**40.1**
Average lifts per hour ship spent in berth *(lifts per hour)*	35.4	25.8	**30.6**	26.7	25.2	**26.0**	28.7	25.4	**27.1**	33.4	34.4	**33.9**	30.2	31.4	**30.8**
Total time ships are available to stevedores *('000 hours)*													2.9	3.3	**3.1**
Average lifts per stevedores' hour *(lifts per hour)*													40.3	36.5	**38.4**
Average lifts per ship visit *(lifts)*	798.4	792.0	**795.2**	985.3	1 038.0	**1 011.6**	1 050.5	1 034.5	**1 042.5**	1 089.1	1 038.0	**1 063.5**	974.1	957.1	**965.6**

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: DP World (2013), Patrick (2013), Fremantle Port Authority (2013) and BITRE estimates (2013).

Table 2.6 Container terminal productivity: Five ports

	2011						2012						2013		
	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun	Sep Qtr	Dec Qtr	Jul–Dec	Mar Qtr	Jun Qtr	Jan–Jun
Wharfside															
Containers per hour															
Crane rate	29.9	28.2	**29.1**	28.5	28.6	**28.6**	28.6	30.1	**29.4**	28.5	29.0	**28.8**	30.0	30.2	**30.1**
Elapsed labour rate	42.6	39.4	**41.0**	38.7	40.8	**39.8**	34.9	43.6	**39.3**	44.6	45.1	**44.9**	42.6	45.5	**44.1**
Ship rate	53.3	49.6	**51.5**	49.9	50.9	**50.4**	52.2	57.3	**54.8**	55.8	56.4	**56.1**	54.3	57.6	**56.0**
TEUs per hour															
Crane rate	43.8	41.4	**42.6**	42.3	42.5	**42.4**	42.2	44.5	**43.4**	42.8	43.8	**43.3**	44.9	44.9	**44.9**
Elapsed labour rate	56.9	58.0	**57.5**	58.4	60.2	**59.3**	61.3	64.7	**63.0**	66.8	68.1	**67.5**	63.8	63.7	**63.8**
Ship rate	78.1	73.0	**75.6**	74.3	75.8	**75.1**	77.1	85.1	**81.1**	83.8	85.3	**84.6**	81.5	86.1	**83.8**
Throughput pbm	134.7	139.9	**137.3**	153.4	154.2	**153.8**	140.3	144.3	**142.3**	154.7	161.1	**157.9**	138.5	142.9	**140.7**
Landside															
Containers per truck	1.5	1.6	**1.6**	1.6	1.6	**1.6**	1.6	1.6	**1.6**	1.5	1.5	**1.5**	1.5	1.5	**1.5**
TEUs per truck	2.2	2.3	**2.3**	2.3	2.3	**2.3**	2.3	2.3	**2.3**	2.3	2.3	**2.3**	2.3	2.3	**2.3**
Truck turnaround time *(mins)*	32.5	33.9	**33.2**	34.7	35.2	**34.9**	32.8	33.0	**32.9**	34.7	35.6	**35.1**	33.0	30.6	**31.8**
Average container turnaround time *(mins)*	21.4	21.5	**21.4**	22.1	22.2	**22.1**	20.6	20.7	**20.7**	22.7	23.2	**22.9**	21.6	19.8	**20.7**
Whole of Port															
Ship turnaround time															
Median *(hours)*	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**
95th percentile *(hours)*	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**	n.a.	n.a.	**n.a.**
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours													128	131	**259**
Per cent of ships waited in anchorage for more than 2 hours *(%)*													13.3	13.5	**13.4**
Average waiting time in anchorage *(hours)*													21.4	18.4	**19.9**
Median of waiting time in anchorage *(hours)*													16.5	14.0	**15.2**
Total time ships spent in berth *('000 hours)*	27.3	30.2	**57.5**	32.2	32.6	**64.8**	29.1	28.8	**57.8**	30.1	30.0	**60.1**	28.3	26.8	**55.1**
Average TEUs per hour ship spent in berth *(TEUs per hour)*	53.6	49.2	**51.4**	52.5	53.7	**53.1**	52.7	54.6	**53.7**	55.2	57.5	**56.3**	52.0	56.1	**54.0**
Average lifts per hour ship spent in berth *(lifts per hour)*	41.1	37.7	**39.4**	39.7	40.6	**40.2**	40.3	41.5	**40.9**	41.4	42.8	**42.1**	39.1	42.4	**40.7**
Total time ships are available to stevedores *('000 hours)*													23.4	23.0	**23.2**
Average lifts per stevedores' hour *(lifts per hour)*													46.9	49.8	**48.4**
Average lifts per ship visit *(lifts)*	1 149.4	1 198.3	**1 173.6**	1 304.7	1 322.5	**1 313.6**	1 209.5	1 200.2	**1 204.6**	1 250.4	1 255.5	**1 252.6**	1 180.8	1 199.3	**1 190.1**

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: As for Tables 2.1 to 2.5.

CHAPTER 3
Timeslots for trucks at container terminals

Overview

This chapter reports on two main indicators:

1. The number of truck booking or appointments timeslots available at a container terminal
2. The number of truck booking or appointments timeslots used at a container terminal

The data is derived from the Vehicle Booking System (VBS) used by Patrick and DP World and Hutchinson Ports Australia's Truck Appointments System (TAS). An important use of these statistics is to monitor the time of day and week when trucks access the container terminals to pick up or deliver containers. For this reason the count of slots available and used are provided for the following windows:

Monday to Friday Day: 6:01 AM to 6:00 PM

Monday to Friday Evening: 6:01 PM to 12:00 Midnight

Monday to Friday Night: 12:01 Midnight to 6:00 AM

Saturday Day: 6:01 AM to 6:00 PM

Saturday Evening: 6:01 PM to 12:00 Midnight

Saturday Night: 12:01 Midnight to 6:00 AM

Sunday Day: 6:01 AM to 6:00 PM

Sunday Evening: 6:01 PM to 12:00 Midnight

Sunday Night: 12:01 Midnight to 6:00 AM

The stevedores at the five container terminals do not have identical day, evening and night shifts. Thus data has been adjusted to fit into these standardised work shifts for comparative purposes.

Indicator 3.1 Number of truck timeslots available

Stevedoring companies make available a number of truck timeslots at various times in each day, based on the deployment of container handling equipment. The main factors affecting the availability of truck timeslots are the volume of containers to be processed, and terminal resources available to process containers. When shipping schedules and container volumes demand extra resources, additional labour and extra equipment can be deployed to the landside of a container terminal and extra available timeslots are advertised normally one or two days in advance.

Indicator 3.2 Number of timeslots actually used

This is the count of timeslots actually used by trucks

Indicator 3.3 Timeslots used by trucks in all off-peak periods as per cent of total timeslots used at container terminals

This indicator, derived from Indicator 3.2, gives the count of timeslots used by trucks during the off-peak period as a per cent of all timeslots used. The off-peak period is defined as all time periods except Monday to Friday 6:01 AM to 6:00 PM.

Results for this indicator are presented in Figure 3.1. The indicator is further divided up into Monday to Friday off-peak usage (Indicator 3.4) and week-end usage (Indicator 3.5).

Indicator 3.4 Timeslots used by trucks in Monday to Friday off-peak periods as per cent of total timeslots used

This indicator, is derived from Indicator 3.2, gives a count of timeslots used by trucks during the Monday to Friday off-peak period as a per cent of all timeslots used. Results for this indicator are presented in Figure 3.2.

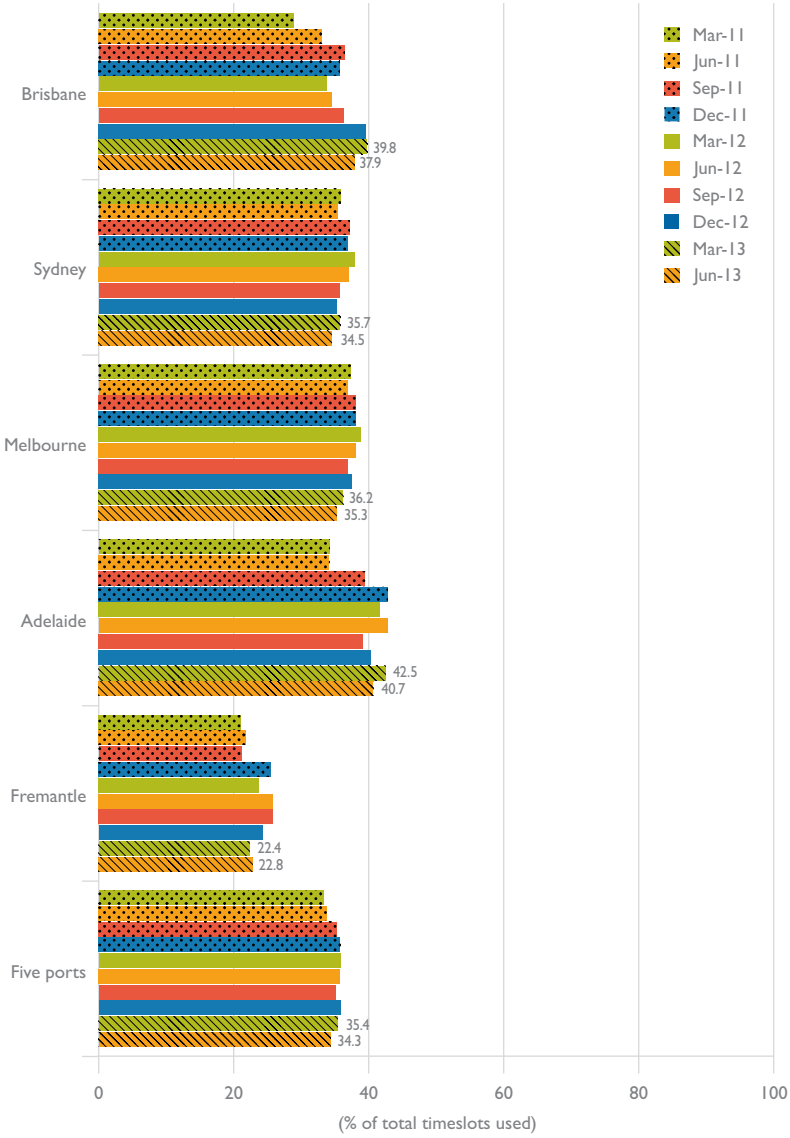
Indicator 3.5 Timeslots used by trucks on Saturday and Sunday as per cent of total timeslots used

This indicator, is derived from indicator 3.2, gives a count of timeslots used by trucks during the Weekend (Saturday to Sunday) as a per cent of all timeslots used. Results for this indicator are presented in Figure 3.3.

Indicator 3.6 Average TEUs handled per VBS/TAS truck timeslot

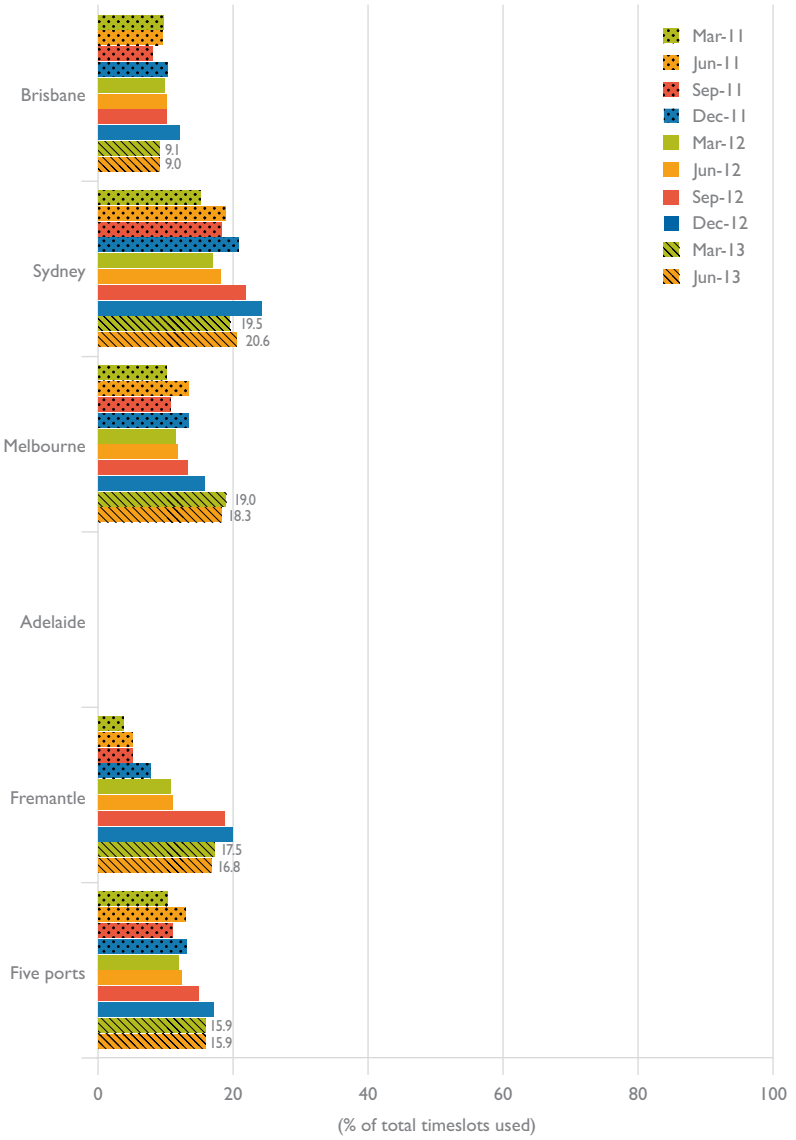
This indicator is a measure of the intensity of usage of timeslots. It is an estimate of the number of TEUs handled per truck timeslot used. The indicator increases as opportunities for triangulation and twin jobs increase at a container terminal. Results for this indicator are presented in Figure 3.4.

Figure 3.1 Timeslots used by trucks in off-peak periods Monday to Friday



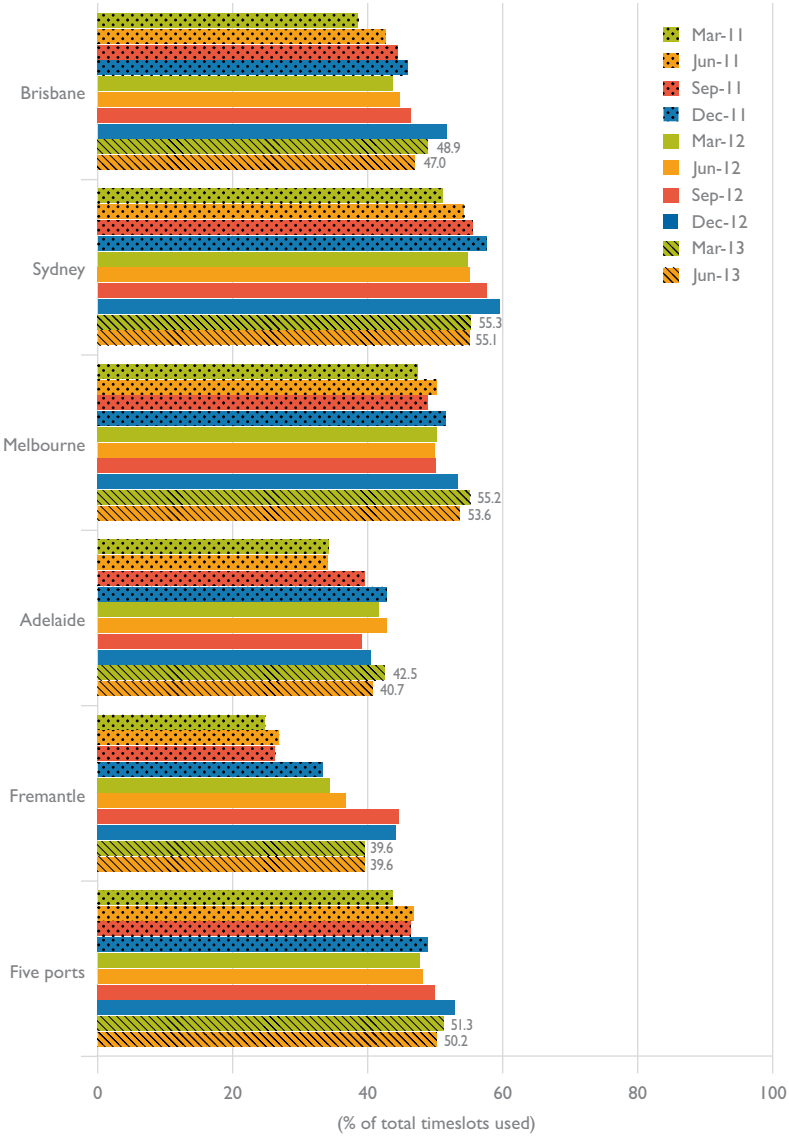
Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

Figure 3.2 Timeslots used by trucks on Saturday and Sunday



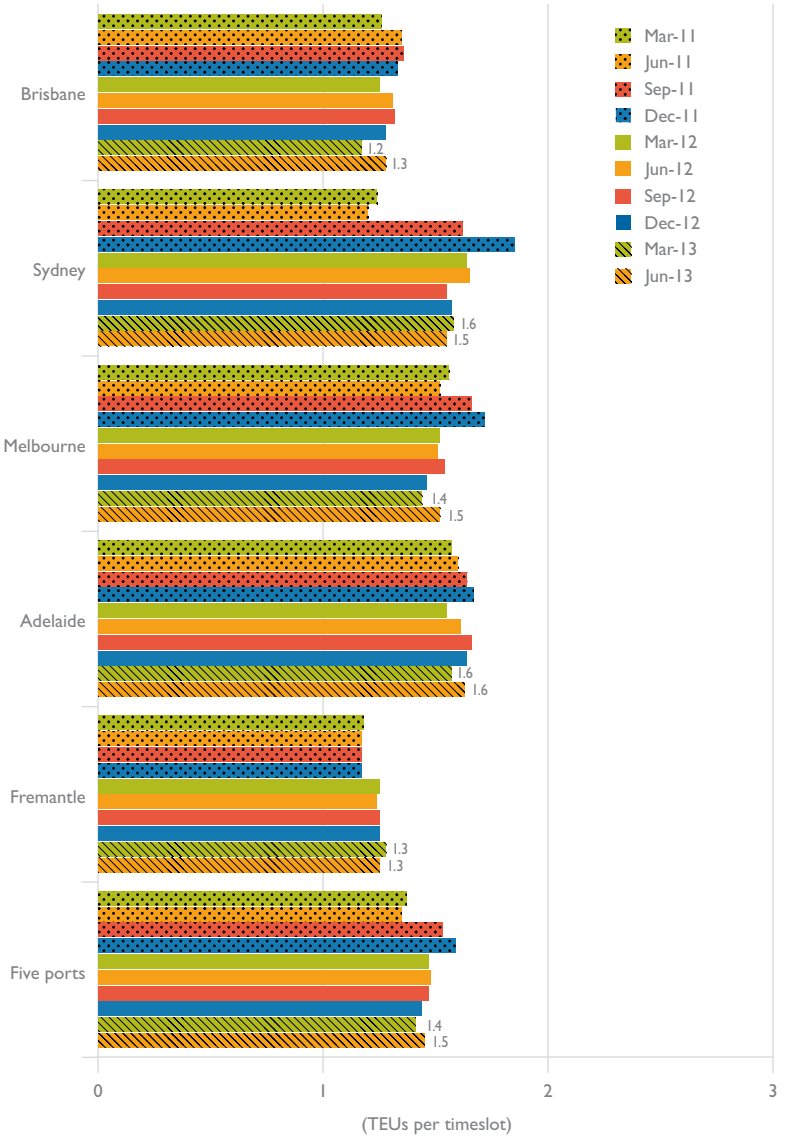
Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

Figure 3.3 Timeslots used by trucks in all off-peak periods



Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013)

Figure 3.4 TEUs processed per timeslot used by trucks at container terminals



Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013)

Table 3.1 Timeslots available and actually used by trucks: Brisbane

			2011				2012				2013	
	Weekday	Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
Available timeslots	Monday – Friday	Day	68.4	72.0	80.7	79.8	77.5	80.0	82.2	79.3	75.2	80.6
('000)		Evening	25.8	28.8	36.2	35.7	32.0	33.0	34.1	37.2	32.7	33.0
		Night	6.9	13.0	18.2	18.5	15.0	17.3	22.0	28.4	27.7	26.3
		Sub-total	**101.0**	**113.8**	**135.1**	**134.0**	**124.5**	**130.3**	**138.3**	**145.0**	**135.7**	**139.9**
	Saturday	Day	7.2	8.1	8.4	9.7	10.4	10.7	9.6	10.5	9.2	8.0
		Evening	0.5	0.3	1.1	1.5	0.4	0.2	0.2	0.2	0.0	0.1
		Night	0.1	1.0	0.0	0.0	0.2	1.6	1.6	2.4	0.0	0.5
		Sub-total	**7.9**	**9.5**	**9.6**	**11.2**	**11.1**	**12.4**	**11.5**	**13.0**	**9.2**	**8.7**
	Sunday	Day	1.0	1.6	0.8	1.7	2.1	1.4	3.5	4.3	3.2	5.2
		Evening	1.2	0.5	1.1	1.7	0.6	0.3	0.3	1.0	0.7	0.6
		Night	0.9	0.5	0.8	1.0	0.7	0.8	0.9	2.9	2.3	2.3
		Sub-total	3.1	2.6	2.6	4.5	3.5	2.5	4.8	8.1	6.1	8.1
	Total available timeslots		**112.1**	**125.9**	**147.2**	**149.7**	**139.0**	**145.1**	**154.6**	**166.2**	**151.0**	**156.8**
Used timeslots	Monday – Friday	Day	67.6	71.2	77.8	76.6	76.6	79.0	81.1	78.5	74.0	79.5
('000)		Evening	25.0	28.3	34.7	33.7	31.1	32.3	33.3	36.6	32.1	32.2
		Night	6.8	12.8	16.4	16.9	14.8	17.1	21.5	27.8	25.5	24.6
		Sub-total	**99.3**	**112.2**	**128.8**	**127.2**	**122.5**	**128.4**	**136.0**	**142.9**	**131.6**	**136.3**
	Saturday	Day	7.0	8.0	7.7	8.8	10.0	10.5	9.4	10.3	8.7	7.6
		Evening	0.5	0.3	0.9	1.3	0.3	0.1	0.2	0.2	0.0	0.1
		Night	0.1	1.0	0.0	0.0	0.2	1.5	1.6	2.3	0.0	0.5
		Sub-total	**7.6**	**9.3**	**8.7**	**10.1**	**10.5**	**12.2**	**11.2**	**12.8**	**8.7**	**8.2**
	Sunday	Day	1.0	1.6	0.8	1.7	1.8	1.4	3.0	3.8	2.2	3.2
		Evening	1.1	0.5	1.0	1.7	0.4	0.3	0.1	0.7	0.3	0.4
		Night	0.9	0.5	0.8	1.0	0.7	0.7	0.9	2.4	1.9	1.8
		Sub-total	**3.1**	**2.6**	**2.6**	**4.4**	**3.0**	**2.4**	**4.1**	**6.8**	**4.5**	**5.3**
	Total used timeslots		**110.0**	**124.1**	**140.1**	**141.7**	**135.9**	**142.9**	**151.3**	**162.5**	**144.8**	**149.8**

Note: Data are rounded to the nearest 100. Cells with an entry of "0.0" mean that data were reported but are less than 100.

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

Table 3.2 Timeslots available and actually used by trucks: Sydney

			2011				2012				2013	
	Weekday	Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
Available timeslots	Monday – Friday	Day	115.5	119.6	102.9	92.9	91.6	89.0	90.0	93.0	83.8	86.8
('000)		Evening	47.0	51.0	45.2	42.2	41.6	40.6	41.5	42.9	38.0	38.5
		Night	39.0	43.2	42.2	41.9	36.8	36.3	36.0	38.9	30.2	29.6
		Sub-total	**201.4**	**213.7**	**190.3**	**177.0**	**170.0**	**166.0**	**167.5**	**174.8**	**152.0**	**155.0**
	Saturday	Day	16.6	21.7	16.9	17.4	11.1	12.1	11.4	15.2	8.3	8.4
		Evening	3.9	5.7	6.1	6.1	1.7	1.5	3.1	3.7	2.0	2.4
		Night	2.3	3.5	8.4	8.9	4.5	4.6	7.1	7.8	5.6	5.7
		Sub-total	**22.8**	**31.0**	**31.3**	**32.4**	**17.4**	**18.1**	**21.5**	**26.7**	**15.9**	**16.5**
	Sunday	Day	8.2	11.1	15.7	15.0	8.8	10.4	14.6	17.9	11.7	13.5
		Evening	4.9	5.9	7.5	6.7	4.7	5.0	7.7	7.9	6.0	6.3
		Night	4.1	5.9	5.4	5.6	3.9	3.4	3.6	3.8	3.2	3.5
		Sub-total	**17.2**	**22.9**	**28.5**	**27.3**	**17.4**	**18.8**	**25.8**	**29.6**	**20.9**	**23.3**
	Total available timeslots		**241.4**	**267.6**	**250.2**	**236.8**	**204.8**	**202.9**	**214.9**	**231.2**	**188.7**	**194.7**
Used timeslots	Monday – Friday	Day	110.6	115.0	93.9	79.4	86.5	85.0	86.4	89.9	79.9	84.0
('000)		Evening	45.1	49.2	40.6	35.4	38.8	37.6	39.1	41.5	36.1	37.2
		Night	36.1	39.8	38.1	33.7	33.8	32.9	33.5	36.8	27.9	27.4
		Sub-total	**191.8**	**204.1**	**172.6**	**148.4**	**159.1**	**155.5**	**159.0**	**168.2**	**143.9**	**148.6**
	Saturday	Day	14.6	19.8	12.2	13.6	10.5	11.3	10.7	14.6	7.9	8.2
		Evening	2.9	4.7	2.3	2.8	1.6	1.3	2.8	3.5	1.9	2.3
		Night	2.1	3.0	6.0	6.9	4.2	4.3	6.1	7.3	5.1	5.3
		Sub-total	**19.6**	**27.5**	**20.6**	**23.2**	**16.3**	**16.9**	**19.6**	**25.3**	**14.9**	**15.9**
	Sunday	Day	6.8	9.4	11.0	9.9	8.4	9.8	14.1	17.2	11.1	13.3
		Evening	4.5	5.6	5.1	4.2	4.4	4.8	7.4	7.6	5.8	6.0
		Night	3.6	5.0	2.1	1.6	3.3	3.0	3.5	3.7	3.0	3.3
		Sub-total	**14.9**	**20.0**	**18.2**	**15.7**	**16.2**	**17.6**	**25.0**	**28.5**	**20.0**	**22.6**
	Total used timeslots		**226.2**	**251.6**	**211.3**	**187.4**	**191.6**	**189.9**	**203.5**	**222.1**	**178.8**	**187.1**

Sources: DP World (2013) and Patrick (2013).

Table 3.3 Timeslots available and actually used by trucks: Melbourne

			2011				2012				2013	
	Weekday	Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
Available timeslots	Monday – Friday	Day	137.0	139.4	157.1	140.9	152.4	154.7	148.5	149.7	133.9	140.9
('000)		Evening	54.1	57.0	65.0	60.2	66.1	66.0	64.9	72.8	60.1	60.1
		Night	44.6	47.9	52.7	49.9	51.8	51.7	46.3	53.3	49.5	49.4
		Sub-total	**235.7**	**244.3**	**274.8**	**251.0**	**270.3**	**272.4**	**259.6**	**275.8**	**243.5**	**250.4**
	Saturday	Day	14.7	19.0	19.2	20.7	18.1	20.0	19.2	26.0	17.6	16.4
		Evening	3.7	5.3	4.6	3.7	1.3	1.5	4.2	4.3	4.2	4.3
		Night	1.5	2.8	2.9	3.1	8.5	8.5	3.2	3.5	9.6	9.1
		Sub-total	**19.8**	**27.0**	**26.6**	**27.5**	**27.9**	**30.0**	**26.6**	**33.8**	**31.4**	**29.7**
	Sunday	Day	3.9	5.6	4.3	5.5	5.9	5.3	4.3	6.5	12.4	13.2
		Evening	2.7	3.5	3.7	2.9	3.8	4.2	4.2	4.9	6.7	6.8
		Night	4.1	6.0	5.6	4.0	0.5	0.5	5.6	5.4	7.2	7.3
		Sub-total	**10.7**	**15.1**	**13.6**	**12.3**	**10.2**	**10.0**	**14.1**	**16.8**	**26.3**	**27.3**
	Total available timeslots		**266.3**	286.4	315.1	290.8	308.3	312.3	300.3	326.5	301.3	307.4
Used timeslots	Monday – Friday	Day	133.9	136.2	145.3	132.9	140.5	144.5	148.1	148.8	130.7	138.0
('000)		Evening	52.9	56.0	60.7	56.4	62.0	61.9	63.7	67.0	58.5	58.4
		Night	42.2	45.0	47.7	48.4	47.7	47.9	46.0	52.8	47.1	46.6
		Sub-total	**229.0**	**237.1**	**253.7**	**237.7**	**250.2**	**254.3**	**257.8**	**268.7**	**236.3**	**243.0**
	Saturday	Day	12.9	17.3	15.1	19.6	16.1	18.3	19.1	25.9	17.2	16.0
		Evening	2.7	4.3	3.3	3.4	0.4	0.5	3.5	4.5	4.1	4.1
		Night	1.3	2.3	2.3	2.5	7.6	7.7	3.1	3.4	8.7	8.2
		Sub-total	**16.9**	**23.8**	**20.6**	**25.5**	**24.0**	**26.5**	**25.7**	**33.8**	**29.9**	**28.3**
	Sunday	Day	2.8	4.5	2.8	4.8	4.5	3.6	4.2	6.4	12.2	12.9
		Evening	2.6	3.3	3.2	2.9	3.4	3.6	3.7	4.9	6.5	6.6
		Night	3.6	5.1	4.0	3.9	0.3	0.1	5.6	5.4	6.7	6.8
		Sub-total	8.9	12.9	10.1	11.5	8.2	7.4	13.5	16.7	25.3	26.2
	Total used timeslots		**254.8**	**273.9**	**284.4**	**274.8**	**282.4**	**288.1**	**296.9**	**319.2**	**291.5**	**297.6**

Sources: DP World (2013) and Patrick (2013).

Table 3.4 Timeslots available and actually used by trucks: Adelaide

			2011				2012				2013	
	Weekday	Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
Available timeslots	Monday – Friday	Day	23.5	24.9	25.4	24.4	24.6	23.8	26.2	24.9	25.3	26.7
('000)		Evening	16.4	17.2	19.6	19.9	20.0	20.0	19.1	18.3	20.3	20.1
		Night										
		Sub-total	**39.9**	**42.1**	**45.0**	**44.3**	**44.6**	**43.8**	**45.4**	**43.2**	**45.7**	**46.7**
	Saturday	Day										
		Evening										
		Night										
		Sub-total										
	Sunday	Day										
		Evening										
		Night										
		Sub-total										
	Total available timeslots		**39.9**	**42.1**	**45.0**	**44.3**	**44.6**	**43.8**	**45.4**	**43.2**	**45.7**	**46.7**
Used timeslots	Monday – Friday	Day	22.1	23.0	24.1	22.2	21.8	22.4	25.8	23.8	23.6	25.0
('000)		Evening	11.5	11.9	15.7	16.6	15.5	16.7	16.6	16.1	17.4	17.2
		Night										
		Sub-total	**33.5**	**34.9**	**39.9**	**38.8**	**37.3**	**39.1**	**42.3**	**39.9**	**41.0**	**42.2**
	Saturday	Day										
		Evening										
		Night										
		Sub-total										
	Sunday	Day										
		Evening										
		Night										
		Sub-total										
	Total used timeslots		**33.5**	**34.9**	**39.9**	**38.8**	**37.3**	**39.1**	**42.3**	**39.9**	**41.0**	**42.2**

Note: Blank cells mean no data was reported for the categories because the VBS is not operated for trucks in night shift or on weekends at Adelaide.

Source: DP World (2013).

Table 3.5 Timeslots available and actually used by trucks: Fremantle

			2011				2012				2013	
	Weekday	Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
Available timeslots	Monday – Friday	Day	75.1	70.9	81.9	78.0	67.8	66.6	62.6	61.8	59.0	61.4
('000)		Evening	23.2	22.5	25.4	26.3	22.8	21.5	21.5	20.1	17.9	19.1
		Night	1.5	1.6	3.6	8.3	3.8	6.2	7.7	6.8	3.8	4.1
		Sub-total	**99.8**	**95.0**	**110.9**	**112.6**	**94.5**	**94.3**	**91.8**	**88.7**	**80.8**	**84.7**
	Saturday	Day	3.1	4.9	5.3	7.4	7.5	7.4	7.2	7.0	6.2	5.2
		Evening	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
		Night	0.0	0.0	0.0	0.3	0.5	0.9	1.6	1.4	1.5	1.1
		Sub-total	**3.1**	**5.1**	**5.4**	**7.7**	**8.1**	**8.3**	**8.8**	**8.4**	**7.7**	**6.5**
	Sunday	Day	0.6	0.0	0.3	1.8	2.7	3.1	11.3	12.2	8.4	9.5
		Evening	0.1	0.1	0.2	0.2	0.1	0.0	1.3	1.2	0.9	1.1
		Night	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
		Sub-total	**0.8**	**0.1**	**0.6**	**2.0**	**2.8**	**3.1**	**12.7**	**13.4**	**9.2**	**10.6**
	Total available timeslots		**103.7**	**100.2**	**116.9**	**122.2**	**105.4**	**105.8**	**113.3**	**110.5**	**97.7**	**101.7**
Used timeslots	Monday – Friday	Day	70.5	67.8	78.1	73.4	64.4	64.3	60.8	59.8	57.6	59.9
('000)		Evening	18.3	18.7	19.4	21.2	19.6	20.3	20.9	19.4	17.5	18.6
		Night	1.4	1.6	3.1	6.9	3.7	5.9	7.5	6.6	3.8	4.1
		Sub-total	**90.2**	**88.0**	**100.6**	**101.5**	**87.7**	**90.6**	**89.1**	**85.9**	**79.0**	**82.5**
	Saturday	Day	2.7	4.4	4.9	6.4	7.2	7.3	7.0	6.8	6.0	5.1
		Evening	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
		Night	0.0	0.0	0.0	0.3	0.4	0.9	1.5	1.4	1.4	1.1
		Sub-total	**2.7**	**4.6**	**4.9**	**6.7**	**7.8**	**8.2**	**8.5**	**8.2**	**7.5**	**6.3**
	Sunday	Day	0.6	0.0	0.3	1.8	2.7	3.1	10.8	11.9	8.2	9.3
		Evening	0.1	0.1	0.2	0.1	0.1	0.0	1.2	1.2	0.8	1.1
		Night	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
		Sub-total	**0.8**	**0.1**	**0.6**	**1.9**	**2.7**	**3.1**	**12.1**	**13.1**	**9.0**	**10.4**
	Total used timeslots		**93.7**	**92.8**	**106.0**	**110.1**	**98.2**	**101.9**	**109.7**	**107.2**	**95.4**	**99.2**

Note: Data are rounded to the nearest 100. Cells with an entry of "0.0" mean that data were reported but are less than 100.

Sources: DP World (2013) and Patrick (2013).

Table 3.6 Timeslots available and actually used by trucks: Five ports

			2011				2012				2013	
	Weekday	Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
Available timeslots	Monday – Friday	Day	419.5	426.8	448.0	416.1	414.0	414.2	409.6	408.7	377.2	396.4
('000)		Evening	166.4	176.4	191.5	184.2	182.4	181.1	181.1	191.3	169.1	170.8
		Night	91.9	105.7	116.7	118.5	107.5	111.6	112.0	127.5	111.3	109.5
		Sub-total	**677.9**	**708.9**	**756.1**	**718.9**	**703.8**	**706.8**	**702.6**	**727.5**	**657.6**	**676.6**
	Saturday	Day	41.6	53.8	49.8	55.1	47.1	50.1	47.3	58.6	41.3	38.1
		Evening	8.1	11.5	11.8	11.3	3.5	3.1	7.6	8.2	6.2	6.9
		Night	3.9	7.3	11.3	12.4	13.8	15.5	13.6	15.1	16.7	16.5
		Sub-total	**53.6**	**72.6**	**72.9**	**78.8**	**64.4**	**68.8**	**68.4**	**82.0**	**64.2**	**61.4**
	Sunday	Day	13.7	18.2	21.1	24.0	19.6	20.3	33.7	40.8	35.7	41.4
		Evening	8.9	10.0	12.4	11.5	9.1	9.4	13.5	15.1	14.3	14.8
		Night	9.2	12.5	11.9	10.6	5.2	4.6	10.2	12.1	12.6	13.1
		Sub-total	31.8	40.7	45.4	46.1	33.8	34.3	57.3	68.1	62.6	69.2
	Total available timeslots		**763.3**	**822.2**	**874.4**	**843.7**	**802.1**	**809.9**	**828.4**	**877.6**	**784.4**	**807.3**
Used timeslots	Monday – Friday	Day	404.7	413.2	419.3	384.4	389.8	395.2	402.1	400.8	365.9	386.3
('000)		Evening	152.7	164.0	171.1	163.4	167.1	168.9	173.5	180.7	161.6	163.5
		Night	86.5	99.2	105.2	105.8	99.9	103.7	108.5	124.0	104.3	102.7
		Sub-total	**643.9**	**676.4**	**695.5**	**653.7**	**656.8**	**667.8**	**684.2**	**705.5**	**631.8**	**652.6**
	Saturday	Day	37.1	49.4	39.9	48.5	43.8	47.5	46.0	57.5	39.8	36.8
		Evening	6.2	9.5	6.5	7.5	2.4	1.9	6.6	8.2	6.0	6.7
		Night	3.5	6.3	8.3	9.6	12.4	14.3	12.4	14.5	15.3	15.2
		Sub-total	**46.8**	**65.2**	**54.8**	**65.6**	**58.6**	**63.8**	**65.0**	**80.1**	**61.0**	**58.7**
	Sunday	Day	11.2	15.6	14.9	18.3	17.4	17.9	32.2	39.4	33.7	38.7
		Evening	8.3	9.5	9.5	8.8	8.2	8.6	12.4	14.4	13.5	14.0
		Night	8.1	10.6	7.0	6.5	4.4	3.8	10.0	11.5	11.6	11.9
		Sub-total	27.6	35.7	31.4	33.6	30.0	30.4	54.6	65.2	58.8	64.6
	Total used timeslots		**718.3**	**777.3**	**781.7**	**752.8**	**745.5**	**761.9**	**803.8**	**850.9**	**751.6**	**775.8**

Sources: DP World (2013), Hutchison Ports Australia (2013) and Patrick (2013).

CHAPTER 4
Port interface cost index

Overview

The port interface cost index (PICI) provides a measure of shore-based shipping charges which approximate costs of carting containers through Australia's mainland major city ports. The PICI is based on an indicative approach; that is, the index is not an average of all charges, but is based on those typically charged by service providers in most instances.

The PICI is computed as a national average (Table 4.6) taking into account the port fees and charges for imports and exports of containers at the five major container ports (Table 4.1 to 4.5).

Basis of measures

One of the important considerations is ship size, the total internal capacity of a ship often referred to as Gross (Registered) Tonnage. Some ports use "agreed" Gross Tonnage for charging purposes. The "agreed" Gross Tonnage may differ from Gross Registered Tonnage specified in ships' registration documents. The PICI has as its starting point the estimation of parameters for three typical sizes of container ships.

- 9 991 GT ship represents all ships of sizes ranging from 5 000 to 20 000 GT
- 37 394 GT ship represents all ships of sizes ranging from 35 000 to 40 000 GT
- 53 324 GT ship represents all ships of sizes ranging from 50 000 to 55 000 GT

The parameters are summarised in Tables 4.1 to 4.5 in six-monthly periods. For each ship size, the parameters of interest are:

- Average twenty foot equivalent units (TEUs) exchanged (loaded and unloaded);
- Average number of port calls for ships in a particular GT range; and
- Elapsed berth time (hours) — the average time between arrival at, and departure from, their berth of all ships in a particular GT range

Each parameter is estimated as an average for all the ships in the Gross Tonnage range for the six-monthly period.

These parameters enable the PICI charges to be estimated on a per TEU basis. It is then possible to estimate ship-based and cargo-based charges per TEU for these typical ships.

Ship-based charges are the charges ship owners pay for a port visit by the ship. Cargo-based charges are the charges levied on the actual number and sizes of containers.

The port interface costs per TEU are based on a set of typical charges which affect the import and export of containers. They are presented in Tables 4.1 to 4.5 for container terminals at each port.

The total costs are the sum of the ship-based charges, the cargo-based charges, the stevedoring costs, customs brokers' fees and transport charges. The stevedoring costs are taken from the ACCC annual report on the stevedoring industry. Together these costs enable the calculation of the national PICI measured in current and constant (2013) prices in dollars per TEU.

What PICI measures

The PICI is a measure of shore-based shipping costs or charges for containers moved through mainland capital city ports. These are called "shore-based" because they are that part of the charges paid by importers and exporters of containers which are directly related to the activity which occurs in the port and on the wharf. They do not include the total price for importing or exporting goods carried in containers paid by customers to customs brokers and freight forwarders.

The index is a measure of the movements in costs to users of waterfront and related services and, signals whether the cost is increasing or decreasing. The waterfront is defined as the interface between seaports and land transport, hence the term port interface cost index.

Stevedoring and port and related charges are estimated for a standard representative ship transferring an average number of containers.

The PICI provides estimates in the changes in five major cost elements by port for exports and imports. The five cost components covered are: (a) Ship based charges; (b) Cargo based charges; (c) Stevedoring costs; (d) Customs brokers' fees; (e) Road transport costs; etc.

(a) Ship based charges

These charges are levied on container ships once they come into harbour. These include the following items:

- Conservancy charges which are navigation service charges levied by the government of the state in which the port is situated;
- Tonnage charges that are based on the Gross Tonnage of the ship—port service charges levied by the port authority;
- Pilotage charge to cover services for piloting the ship;
- Towage charges levied by the tugboat operator;
- Mooring & unmooring – charge levied either by the port authority, stevedoring company or other service providers; and
- Security charges.

(b) Cargo based charges

These include wharfage charges that are levied on each container by the port authorities, and harbour dues (such as channel infrastructure fees) that are levied on each container by the port authorities.

(c) Stevedoring costs

Stevedoring and port and related charges are estimated for a standard representative ship transferring an average number of containers. Stevedoring charges are the charges levied by stevedoring companies for handling containers. They are estimated for Australia each year by the ACCC which monitors their price.

(d) Customs brokers' fees

These are the fees charged by customs brokers for the administrative costs associated with organising the import and export of containers for a representative consignment.

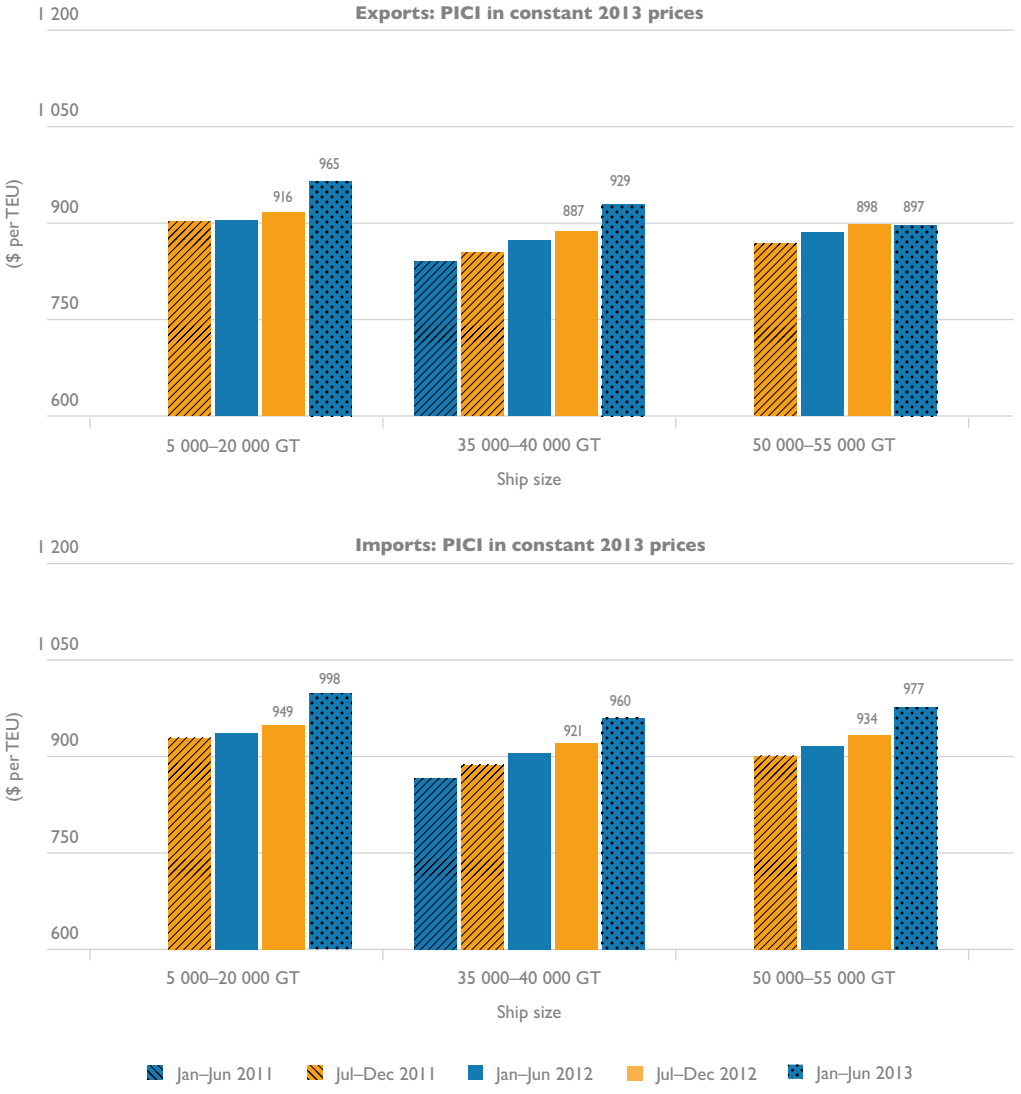
(e) Road transport costs

Transport charges are estimates of what transport companies charge for transporting a container to or from the wharf from/to the metropolitan area of the capital city in which the port is situated. These charges are estimated for a representative transport distance.

Port Interface Cost Index (PICI)

Port interface fees and charges are calculated for each of the five ports for each six month period. They are shown for imports and exports in the Port Interface Cost tables and are representative, typical costs of importing or exporting a container (TEU) when carried on the monitored ship size categories. In addition, a national port interface costs is compiled. The five ports National PICI is the average cost, for each six month period, of importing or exporting a TEU in a container ship in the selected ship size GT category. In estimating the national PICI shown in Table 4.6 for each ship size category monitored, use is made of individual port shares in PICI shown in Tables 4.1 to 4.5 separately for imported and exported TEUs.

Figure 4.1 Port Interface Cost Index for container imports and exports, by ship size



Sources: BITRE estimates based on data in Tables 4.1 to 4.5 and data from ABS (2013).

Table 4.1 Port interface costs by ship type – parameters and estimates: Brisbane

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Parameters used in estimation of the port interface fees and charges [a]															
Average TEUs exchanged per ship visit ALL	361	287	377	615	396	1 220	1 295	1 199	1 503	1 289	2 007	1 452	1 373	1 746	1 471
Loaded	274	272	350	196	304	978	1 063	956	620	999	1 329	972	877	909	1 019
Loaded inwards	164	197	126	98	182	598	670	347	417	652	598	670	347	581	550
Loaded outwards	110	76	223	98	122	381	393	609	203	347	571	451	471	327	469
Empty	87	15	27	419	92	242	232	242	883	290	677	481	497	838	452
Average no of port calls by ships in GT range	5	3	4	4	4	3	3	3	3	3	3	3	3	3	3
Average elapsed berth time for ships in GT range *(hours)*	25	13	17	25	28	25	27	25	26	23	30	24	22	23	24
Charges per ship visit *($)*															
Total ship-based charges	13 914	20 440	20 440	20 445	21 817	37 379	38 994	39 016	39 902	40 956	49 826	46 187	46 225	47 247	48 417
Empty TEUs [b]	1 571	265	265	706	1 710	4 354	4 188	6 269	16 438	5 402	12 202	8 682	8 972	15 587	8 408
Ship-based charges ($/TEU)															
Conservancy	5	7	5	3	5	6	6	6	5	6	5	7	7	6	7
Tonnage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pilotage	11	26	20	12	20	11	11	12	10	12	8	12	12	10	12
Towage	16	30	23	15	24	12	12	13	11	13	11	12	12	10	12
Mooring, unmooring [c]	6	8	6	4	6	2	2	2	2	2	1	2	2	1	2
Total ship-based charges *($/TEU)*	39	71	54	34	55	31	30	33	27	32	25	32	34	27	33
Fees and charges for imports *($/TEU)*															
Ship-based charges	39	71	54	34	55	31	30	33	27	32	25	32	34	27	33
Cargo-based charges															
Wharfage	30	31	31	32	32	30	31	31	32	32	30	31	31	32	32
Harbour dues	50	52	68	62	62	49	52	60	62	62	49	52	60	62	62
Other charges															
Stevedoring	171	173	177	177	177	171	173	173	177	177	171	173	177	177	177
Customs brokers' fees	151	151	146	146	151	151	151	146	146	151	151	151	146	146	151
Road transport charges	395	393	401	401	446	395	393	401	401	446	395	393	401	401	446
Total fees and charges *($/TEU)*	**836**	**871**	**877**	**852**	**922**	**827**	**830**	**844**	**844**	**899**	**821**	**832**	**849**	**845**	**900**
Port's share in national index for ships in GT range [d]	**14%**	**11%**	**7%**	**5%**	**11%**	**18%**	**15%**	**12%**	**13%**	**16%**	**14%**	**12%**	**9%**	**13%**	**14%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Fees and charges for exports *($/TEU)*															
Ship-based charges	39	71	54	34	55	31	30	33	27	32	25	32	34	27	33
Cargo-based charges															
Wharfage	30	31	31	32	32	30	31	31	32	32	30	31	31	32	32
Harbour dues	50	52	68	62	62	49	52	60	62	62	49	52	60	62	62
Other charges															
Stevedoring	171	173	177	177	177	171	173	173	177	177	171	173	177	177	177
Customs brokers' fees	159	159	152	152	159	159	159	152	152	159	159	159	152	152	159
Road transport charges	395	393	401	401	446	395	393	401	401	446	395	393	401	401	446
Total fees and charges *($/TEU)*	**844**	**880**	**883**	**858**	**931**	**835**	**838**	**850**	**850**	**907**	**829**	**840**	**855**	**851**	**909**
Port's share in national index for ships in GT range [e]	**9%**	**6%**	**16%**	**9%**	**10%**	**18%**	**19%**	**29%**	**12%**	**15%**	**20%**	**16%**	**18%**	**13%**	**17%**

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports on ships in the GT range as a per cent of five ports TEU imports on ships in the GT range.

e This is estimated as the TEU exports on ships in the GT range as a per cent of five ports TEU exports on ships in the GT range.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.2 Port interface costs by ship type – parameters and estimates: Sydney

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Parameters used in estimation of the port interface fees and charges [a]															
Average TEUs exchanged per ship visit ALL	269	430	275	344	243	1 931	3 297	1 861	2 023	2 115	2 201	3 670	2 128	2 388	2 097
Loaded	212	324	246	283	228	1350	1 991	1 201	1368	1395	1 525	2 216	1 499	1 652	1 468
Loaded inwards	72	201	121	150	121	990	1641	883	1023	1011	1144	1802	1111	1234	1056
Loaded outwards	141	123	125	133	107	359	350	318	345	384	381	415	388	418	411
Empty	57	106	29	61	15	582	1306	660	655	720	676	1453	629	736	630
Average no of port calls by ships in GT range	6	4	4	3	3	3	3	3	3	2	4	3	3	3	3
Average elapsed berth time for ships in GT range *(hours)*	27	15	16	33	26	45	47	36	35	34	42	44	38	36	34
Charges per ship visit *($)*															
Total ship-based charges	21 870	21 074	18 763	19 464	19 772	41 284	38 972	39 103	40 770	41 954	49 910	48 407	48 543	50 187	50 727
Empty TEUs [b]	684	1296	356	764	192	6 934	15 948	8 055	8 262	9 080	8 062	17 745	7 683	9 284	7 940
Ship-based charges *($/TEU)*															
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	17	11	17	14	20	9	5	10	9	9	11	7	12	11	13
Pilotage	12	4	6	5	7	4	1	2	2	2	4	1	2	2	2
Towage	43	28	36	30	44	6	4	7	7	7	5	4	7	6	7
Mooring, unmooring [c]	9	6	9	7	11	2	1	2	2	2	2	1	2	2	2
Total ship-based charges *($/TEU)*	81	49	68	57	81	21	12	21	20	20	23	13	23	21	24
Fees and charges for imports *($/TEU)*															
Ship-based charges	81	49	68	57	81	21	12	21	20	20	23	13	23	21	24
Cargo-based charges															
Wharfage	108	111	111	114	114	109	111	111	114	114	108	111	111	114	114
Harbour dues															
Other charges															
Stevedoring	171	173	177	177	177	171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	139	139	139	139	148	139	139	139	139	148	139	139	139	139	148
Road transport charges	478	478	485	485	522	478	478	485	485	522	478	478	485	485	522
Total fees and charges *($/TEU)*	**978**	**950**	**980**	**972**	**1042**	**919**	**913**	**933**	**936**	**981**	**919**	**915**	**935**	**937**	**985**
Port's share in national index for ships in GT range [d]	**6%**	**11%**	**7%**	**8%**	**7%**	**30%**	**38%**	**30%**	**31%**	**25%**	**27%**	**34%**	**29%**	**28%**	**26%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Fees and charges for exports *($/TEU)*															
Ship-based charges	81	49	68	57	81	21	12	21	20	20	23	13	23	21	24
Cargo-based charges															
Wharfage	66	68	68	70	70	66	68	68	70	70	66	68	68	70	70
Harbour dues															
Other charges															
Stevedoring	171	173	177	177	177	171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	137	137	137	137	138	137	137	137	137	138	137	137	137	137	138
Road transport charges	478	478	485	485	522	478	478	485	485	522	478	478	485	485	522
Total fees and charges *($/TEU)*	**933**	**905**	**935**	**926**	**989**	**873**	**868**	**888**	**889**	**927**	**875**	**869**	**890**	**890**	**932**
Port's share in national index for ships in GT range [e]	**11%**	**10%**	**9%**	**12%**	**9%**	**17%**	**17%**	**15%**	**20%**	**17%**	**13%**	**15%**	**15%**	**17%**	**15%**

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports on ships in the GT range as a per cent of five ports TEU imports on ships in the GT range.

e This is estimated as the TEU exports on ships in the GT range as a per cent of five ports TEU exports on ships in the GT range.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.3 Port interface costs by ship type – parameters and estimates: Melbourne

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Parameters used in estimation of the port interface fees and charges [a]															
Average TEUs exchanged per ship visit ALL	350	264	347	350	352	1 931	2 021	1 761	1 901	2 026	2 500	2 747	2 515	2 702	2 357
Loaded	278	205	267	302	286	1587	1 623	1 426	1524	1702	2 099	2 139	2 036	2 159	1 990
Loaded inwards	95	113	175	214	187	884	981	833	931	973	1222	1291	1155	1263	1137
Loaded outwards	183	92	93	88	99	703	643	593	593	729	876	848	881	897	854
Empty	73	59	80	48	66	344	398	336	376	324	401	608	479	542	367
Average no of port calls by ships in GT range	6	3	4	3	3	3	3	3	2	1	4	4	2	3	3
Average elapsed berth time for ships in GT range *(hours)*	22	13	24	41	52	32	33	29	28	29	34	37	34	32	29
Charges per ship visit *($)*															
Total ship-based charges	21 870	21 074	18 763	19 464	19 772	37 023	39 416	40 267	47 692	48 038	46 043	46 710	47 598	57 837	58 247
Empty TEUs [b]	767	646	878	805	1 099	3 631	4 381	3 694	6 294	5 421	4 236	6 688	5 272	9 068	6 128
Ship-based charges *($/TEU)*															
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	10	14	10	15	15	6	7	8	11	10	5	7	8	11	12
Pilotage	20	27	21	21	21	6	6	7	6	6	5	5	5	5	6
Towage	26	37	30	31	31	6	6	8	8	7	8	5	6	6	6
Mooring, unmooring [c]	2	3	2	2	2	0	0	1	0	0	0	0	0	0	0
Total ship-based charges *($/TEU)*	58	81	63	69	70	19	19	23	25	24	18	17	19	21	25
Fees and charges for imports *($/TEU)*															
Ship-based charges	58	81	63	69	70	19	19	23	25	24	18	17	19	21	25
Cargo-based charges															
Wharfage	42	44	44	67	67	42	44	44	67	67	42	44	44	67	67
Harbour dues	40	41	42	43	44	40	41	42	43	44	39	40	41	42	43
Other charges															
Stevedoring	171	173	177	177	177	171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	152	152	153	153	153	152	152	153	153	153	152	152	153	153	153
Road transport charges	434	485	485	484	529	434	485	485	484	529	434	485	485	484	529
Total fees and charges *($/TEU)*	**896**	**976**	**964**	**993**	**1040**	**858**	**915**	**923**	**949**	**994**	**856**	**911**	**918**	**944**	**994**
Port's share in national index for ships in GT range [d]	**8%**	**6%**	**10%**	**12%**	**11%**	**27%**	**23%**	**28%**	**28%**	**24%**	**29%**	**24%**	**30%**	**29%**	**28%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Fees and charges for exports *($/TEU)*															
Ship-based charges	58	81	63	69	70	19	19	23	25	24	18	17	19	21	25
Cargo-based charges															
Wharfage	42	44	44	67	67	42	44	44	67	67	42	44	44	67	67
Harbour dues	40	41	42	43	44	40	41	42	43	44	39	40	41	42	43
Other charges															
Stevedoring	171	173	177	177	177	171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	136	131	134	134	142	136	131	134	134	142	136	131	134	134	142
Road transport charges	434	485	485	484	529	434	485	485	484	529	434	485	485	484	529
Total fees and charges *($/TEU)*	**880**	**955**	**945**	**975**	**1029**	**841**	**894**	**905**	**930**	**983**	**839**	**890**	**900**	**926**	**983**
Port's share in national index for ships in GT range [e]	**14%**	**8%**	**7%**	**8%**	**8%**	**33%**	**31%**	**28%**	**35%**	**31%**	**31%**	**31%**	**33%**	**36%**	**32%**

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports on ships in the GT range as a per cent of five ports TEU imports on ships in the GT range.

e This is estimated as the TEU exports on ships in the GT range as a per cent of five ports TEU exports on ships in the GT range.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.4 Port interface costs by ship type – parameters and estimates: Adelaide

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Parameters used in estimation of the port interface fees and charges [a]															
Average TEUs exchanged per ship visit ALL	115	116				1 070	1 232	926	943	1 027	1 425	1 691	1 340	1 275	1 288
Loaded	111	112				883	1 009	726	744	813	1 219	1 407	1 069	981	1 070
Loaded inwards	2	3				429	508	332	363	335	578	724	530	517	520
Loaded outwards	111	112				455	501	394	381	478	640	683	539	464	550
Empty	2	3				187	223	200	199	214	207	285	271	295	218
Average no of port calls by ships in GT range	2	3				2	3	2	3	2	5	4	2	2	2
Average elapsed berth time for ships in GT range *(hours)*	7	8				25	26	21	22	23	30	37	29	26	25
Charges per ship visit *($)*															
Total ship-based charges	23 091	24 334				36 172	39 019	38 873	38 873	39 523	44 125	46 602	45 751	45 751	46 083
Empty TEUs [b]	1 940	3128				1 153	1 424	1 293	1 293	1 387	1 273	1 815	1 911	1 911	1 413
Ship-based charges *($/TEU)*															
Conservancy	2	1				4	4	5	5	5	3	3	5	5	5
Tonnage	4	4				9	8	9	10	9	6	9	10	10	10
Pilotage	5	4				9	8	10	10	9	6	9	10	10	10
Towage	6	4				5	4	6	6	6	4	3	4	4	4
Mooring, unmooring [c]	12	8				16	15	21	21	19	18	12	17	17	17
Total ship-based charges *($/TEU)*	29	21				42	40	50	51	48	37	37	46	46	45
Fees and charges for imports *($/TEU)*															
Ship-based charges	29	21				42	40	50	51	48	37	37	46	46	45
Cargo-based charges															
Wharfage	75	78				75	78	79	79	79	75	78	79	79	79
Harbour dues															
Other charges															
Stevedoring	171	173				171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	153	153				153	153	149	149	148	153	153	149	148	148
Road transport charges	293	308				293	308	308	308	348	293	308	308	312	348
Total fees and charges *($/TEU)*	**721**	**733**				**735**	**751**	**764**	**764**	**801**	**730**	**749**	**759**	**762**	**798**
Port's share in national index for ships in GT range [d]	**0%**	**0%**				**13%**	**12%**	**11%**	**11%**	**8%**	**14%**	**13%**	**14%**	**12%**	**13%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Fees and charges for exports *($/TEU)*															
Ship-based charges	29	21				42	40	50	51	48	37	37	46	46	45
Cargo-based charges															
Wharfage	75	78				75	78	79	79	79	75	78	79	79	79
Harbour dues															
Other charges															
Stevedoring	171	173				171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	103	103				103	103	102	102	111	103	103	102	103	111
Road transport charges	293	308				293	308	308	308	348	293	308	308	312	348
Total fees and charges *($/TEU)*	**671**	**683**				**685**	**701**	**717**	**717**	**764**	**680**	**699**	**712**	**717**	**761**
Port's share in national index for ships in GT range [e]	**9%**	**9%**				**22%**	**24%**	**19%**	**22%**	**21%**	**23%**	**25%**	**20%**	**19%**	**20%**

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports on ships in the GT range as a per cent of five ports TEU imports on ships in the GT range.

e This is estimated as the TEU exports on ships in the GT range as a per cent of five ports TEU exports on ships in the GT range.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents. Blank cells mean the data are not reported.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.5 Port interface costs by ship type – parameters and estimates: Fremantle

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Parameters used in estimation of the port interface fees and charges [a]															
Average TEUs exchanged per ship visit ALL	1871	2520	2 615	2 757	2423	874	1 028	1 002	1 025	2 115	1 280	1 641	1 478	1 646	1 447
Loaded	1530	2022	2 255	2190	2011	638	743	734	773	1395	1 005	1 247	1 087	1 172	1 129
Loaded inwards	809	1233	1276	1366	1152	422	556	537	587	1011	651	885	735	800	727
Loaded outwards	721	789	979	824	860	216	187	197	186	384	354	362	352	372	402
Empty	341	499	360	566	412	236	285	267	252	720	275	394	391	474	317
Average no of port calls by ships in GT range	14	13	12	8	7	3	3	3	3	2	6	4	3	7	3
Average elapsed berth time for ships in GT range *(hours)*	41	54	43	46	34	26	39	38	27	34	27	41	40	31	31
Charges per ship visit *($)*															
Total ship-based charges	10 035	10106	10106	12 105	12 105	28 243	28 166	28 166	31 702	31 702	33 685	33 522	33 522	37 579	37 579
Empty TEUs [b]	3 236	4880	3525	5 822	4 234	2 241	2 785	2 616	2 591	2 528	2 613	2 693	3 825	4 877	3 263
Ship-based charges *($/TEU)*															
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	1	1	1	1	1	8	7	7	8	8	8	8	7	7	8
Pilotage	2	1	1	2	2	4	3	3	4	5	2	2	2	3	3
Towage	2	2	1	2	2	19	16	17	17	18	15	15	13	12	14
Mooring, unmooring [c]	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
Total ship-based charges *($/TEU)*	5	4	4	4	5	32	27	28	31	33	26	26	23	23	26
Fees and charges for imports *($/TEU)*															
Ship-based charges	5	4	4	4	5	32	27	28	31	33	26	26	23	23	26
Cargo-based charges															
Wharfage	63	65	65	68	68	63	65	65	68	68	63	65	65	68	68
Harbour dues	19	19	19	20	20	19	19	19	20	20	19	19	19	20	20
Other charges															
Stevedoring	171	173	177	177	177	171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	157	156	156	156	163	157	156	156	156	163	157	156	156	156	163
Road transport charges	394	397	397	409	455	394	397	397	397	455	394	397	397	409	455
Total fees and charges *($/TEU)*	**809**	**815**	**819**	**835**	**889**	**836**	**838**	**843**	**850**	**916**	**830**	**837**	**838**	**854**	**910**
Port's share in national index for ships in GT range [d]	**71%**	**71%**	**75%**	**75%**	**70%**	**13%**	**13%**	**18%**	**18%**	**25%**	**16%**	**16%**	**19%**	**18%**	**18%**

	5 000 to 20 000 GT ships					35 000 to 40 000 GT ships						50 000 to 55 000 GT ships			
	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013	Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
Fees and charges for exports *($/TEU)*															
Ship-based charges	5	4	4	4	5	32	27	28	31	33	26	26	23	23	26
Cargo-based charges															
Wharfage	63	65	65	68	68	63	65	65	68	68	63	65	65	68	68
Harbour dues	19	19	19	20	20	19	19	19	20	20	19	19	19	20	20
Other charges															
Stevedoring	171	173	177	177	177	171	173	177	177	177	171	173	177	177	177
Customs brokers' fees	90	84	84	84	97	90	84	84	84	97	90	84	84	84	97
Road transport charges	394	397	397	409	455	394	397	397	397	455	394	397	397	409	455
Total fees and charges *($/TEU)*	**742**	**743**	**747**	**764**	**823**	**769**	**767**	**771**	**778**	**851**	**763**	**766**	**766**	**782**	**844**
Port's share in national index for ships in GT range [e]	**57%**	**66%**	**69%**	**72%**	**72%**	**10%**	**9%**	**9%**	**11%**	**17%**	**13%**	**13%**	**13%**	**15%**	**15%**

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports on ships in the GT range as a per cent of five ports TEU imports on ships in the GT range.

e This is estimated as the TEU exports on ships in the GT range as a per cent of five ports TEU exports on ships in the GT range.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents. Blank cells mean the data are not reported.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.6 The national port interface cost indices, by size of ship

		Jan–Jun 2011	Jul–Dec 2011	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2013
	ABS GDP deflator (100.0 for 2013)	99.6	100.4	99.7	99.3	100.0
				($ per TEU)		
5 000 – 20 000 GT ships	Import costs: in nominal price		933	933	943	998
	Import costs: constant 2013 price		929	936	949	998
	Export costs: nominal price		906	901	909	965
	Export costs: in constant 2013 price		902	904	916	965
35 000 – 40 000 GT ships	Import costs: in nominal price	862	890	902	914	960
	Import costs: constant 2013 price	866	887	905	921	960
	Export costs: nominal price	836	857	870	880	929
	Export costs: in constant 2013 price	840	854	873	887	929
50 000 – 55 000 GT ships	Import costs: in nominal price		905	914	927	977
	Import costs: constant 2013 price		901	917	934	977
	Export costs: nominal price		871	882	892	897
	Export costs: in constant 2013 price		868	885	898	897

Notes: Blank cells mean the data are not reported.
Values in constant 2013 prices are derived from the nominal costs using the ABS deflator with 2013 as the base year.

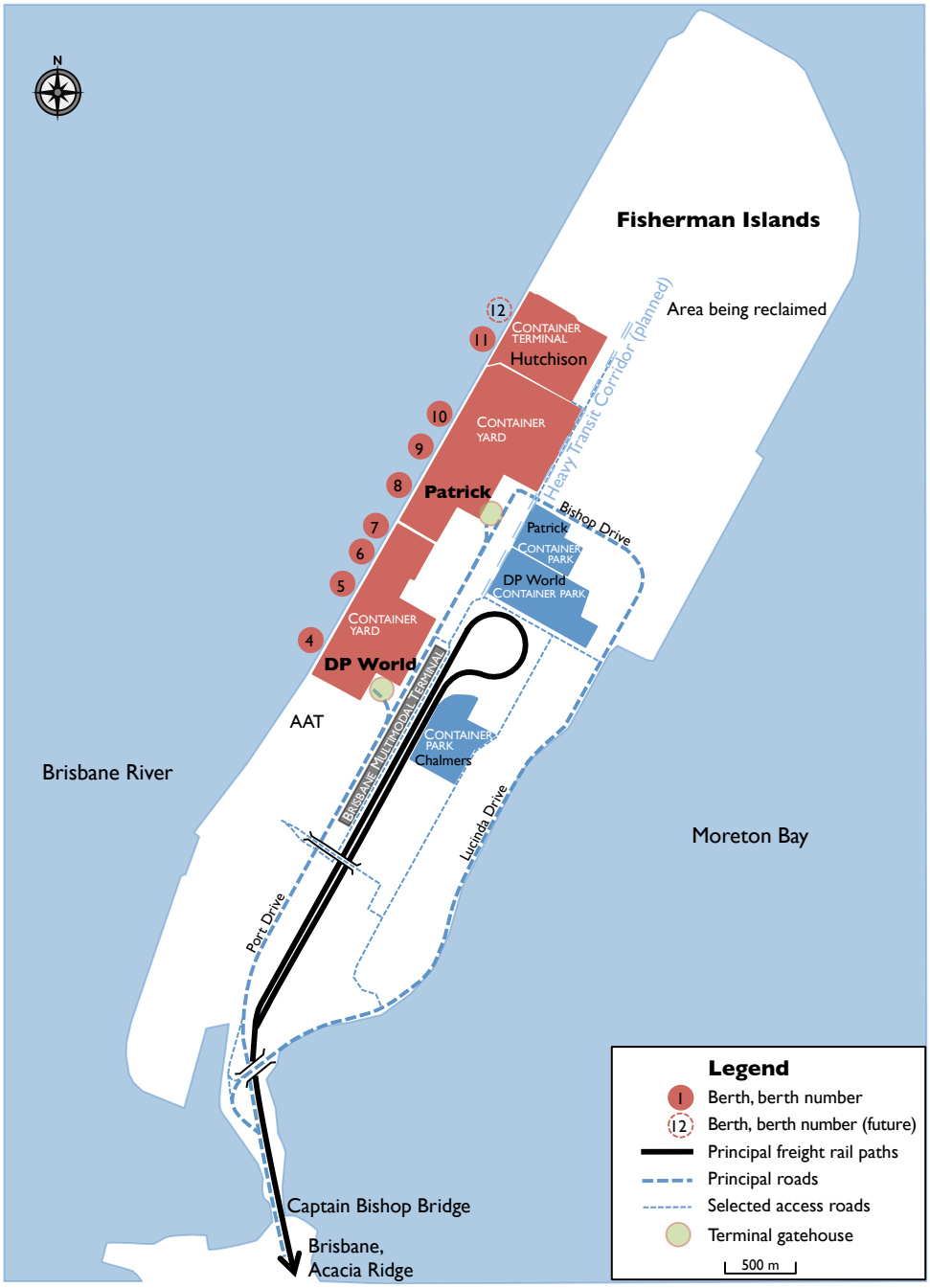
Sources: BITRE estimates based on data in Tables 4.1 to 4.5 and data from ABS (2013).

APPENDIX A

Maps of five major Australian container ports

This appendix presents maps and supplementary information such as facilities and services at the five major Australian container ports.

Brisbane (Fisherman Islands terminals)



(Last updated: February 2013)

Brisbane (Fisherman Islands Terminals)

Dockside

- **Stevedores.** The map shows the existing (DP World and Patrick) container terminals as well as the newly constructed Hutchison Ports Australia (HPA) terminals. Some containers are also handled by Australian Amalgamated Terminals (AAT), who provides a multi-purpose, multi-user facility that is based at Berths 1–3, to the west of the DP World container yard.
- **Berths.** DP World operates from container berths 4–7. The Patrick container berths are 8–10. The HPA berths are Berth 11 and Berth 12.
- **Equipment.** DP World has 6 cranes, including 2 post-Panamax cranes and 2 Super post-Panamax cranes. Patrick has 5 cranes, consisting of 3 Panamax cranes and 2 post-Panamax cranes; in addition, Patrick has 27 automated straddle carriers.

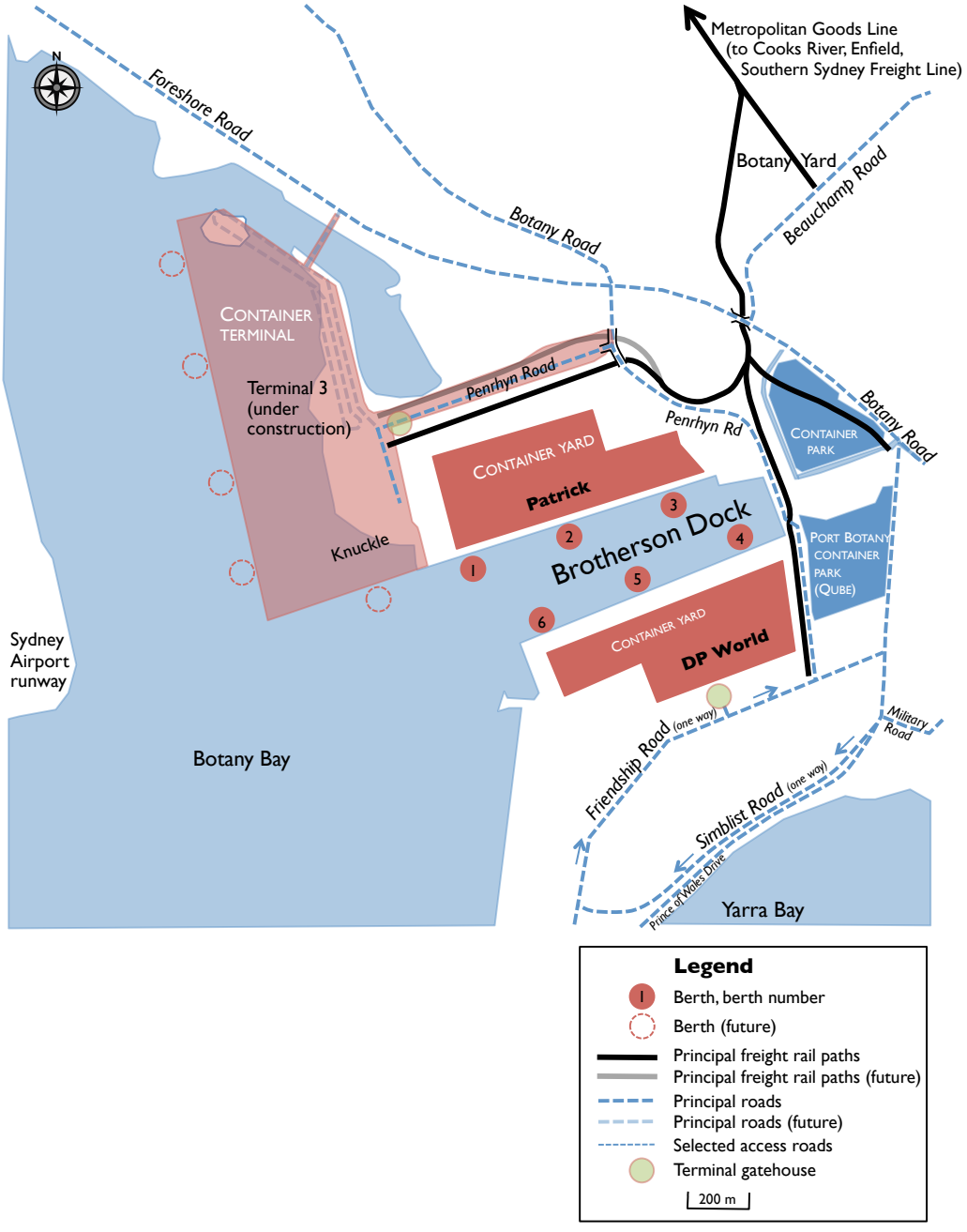
Road

- Road access is via the bridge to Fisherman Islands, over the Captain Bishop Bridge. Access to the terminals is via Port Drive.

Rail

- **Operations.** A near-dock intermodal facility is provided on Fisherman Islands, the Brisbane Multimodal Terminal. Train lengths of up to 850 metres are permitted. Containers are shifted by road between that terminal and the container terminals. In that context, rail access is classed as having "near-dock" facilities.
- **Services.** Rail services to Fisherman Islands include:
  - coal trains from West Moreton (narrow gauge);
  - grain trains (narrow gauge);
  - on a seasonal basis, containers are brought by (narrow-gauge) trains from Goondiwindi and Dalby (carrying cotton), for export;
  - reefer containers containing meat from northern abattoirs are brought by (narrow-gauge) trains;
  - some containers are taken from Fisherman Islands—the presumption is that they are mainly empty containers;
  - there are no scheduled standard-gauge container trains to the Brisbane Multi Modal Terminal.
- **National rail connections.** Dual narrow and (national) standard gauge tracks are installed between Fisherman Islands and the interstate/intrastate intermodal terminal at Acacia Ridge.

Sydney (Brotherson Dock Terminals at Port Botany)



(Last updated: February 2013)

Sydney (Brotherson Dock Terminals at Port Botany)

Dockside

- **Stevedores.** The two existing container terminals at Port Botany are served by Patrick and DP World stevedores. The terminals face into Brotherson Dock.
- **Berths.** Patrick and DP World each has three berths.
- Terminal 3 is currently under construction, with five berths to be provided. Four of the berths at the terminal will by operated by a third stevedore, Hutchison.
- **Equipment.** DP World equipment includes 3 twin-lift quay cranes and 4 single-lift quay cranes. Patrick equipment includes 5 twin-lift quay cranes and 3 single-lift quay cranes.

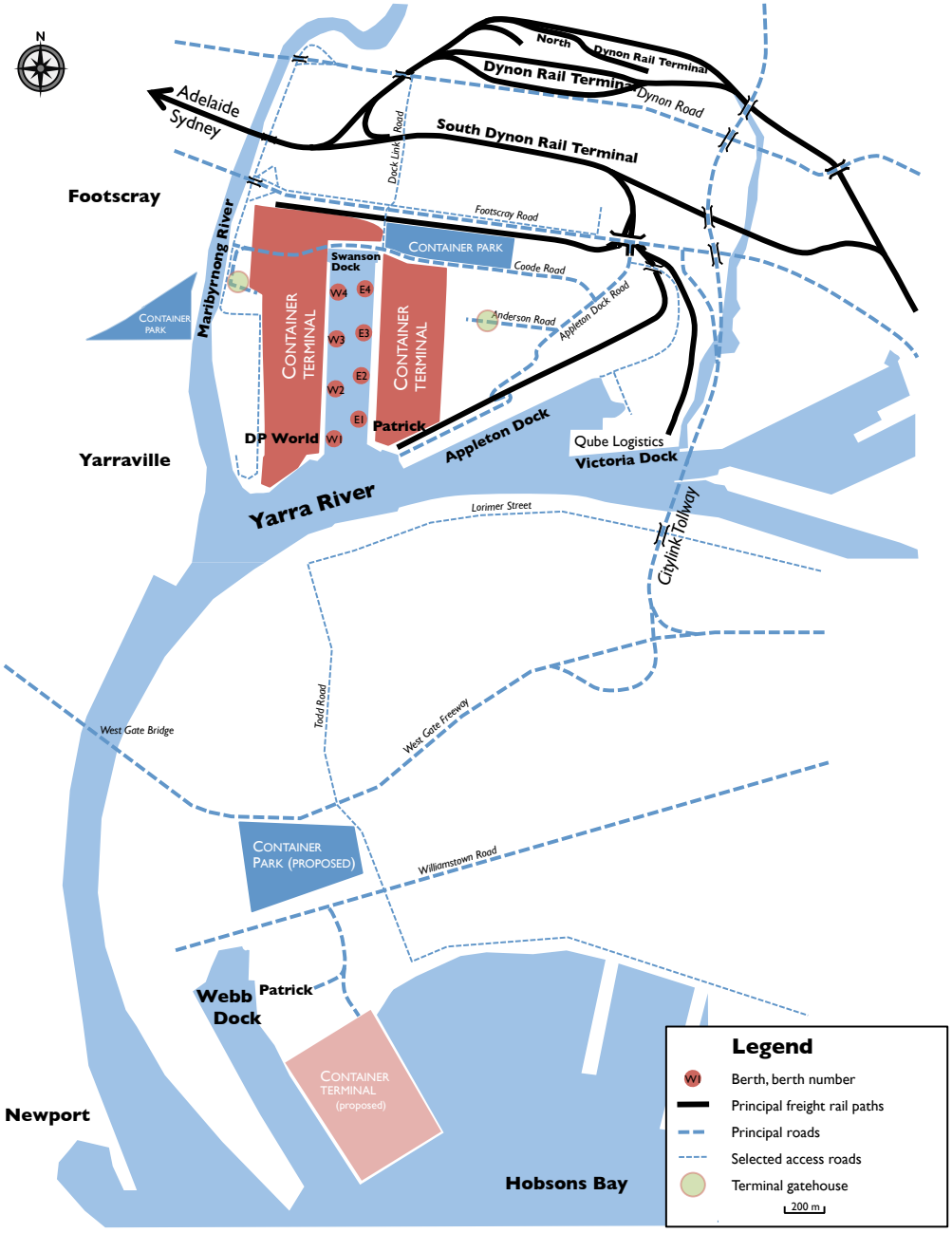
Road

- Access to DP World terminal is via Friendship Road (one-way). The Patrick terminal is accessed from Penrhyn Road.
- The map shows the road configuration being completed during 2012. Road connections to Terminal 3 are shown, notably the access via Penrhyn Road and access over a bridge from Foreshore Road.

Rail

- **Operations.** Stevedores have rail tracks to their terminals, as will the Hutchison terminal.
- DP World has 3 tracks of 600 metre length (as of March 2012). Patrick has 2 sidings of 650 metre length. (*The Sydney Ports Corporation Handbook* does not mention run-around track for the locomotive.)
- A new siding (grade-separated at Penrhyn Road) will link to Terminal 3, paralleling Penrhyn Road and the existing Patrick sidings. There is provision for additional rail access (not shown) to Terminal 3; this would access the terminal via a track paralleling Foreshore Road (approaching from the west) and entering the container yard via a new bridge across the sea inlet.
- **Services.** Rail container services between Botany and the hinterland include:
- Sydney destinations: Yennora terminal (Qube); Cooks River (Qube); Minto or Macarthur Intermodal Shipping Terminal/MIST (Qube); Clyde (Qube); and
- non-urban terminals at Blayney (Qube), Narrabri (Qube; Freightliner) and Broadmeadow/Bullock Island (Qube).
- Grain handled at Port Botany moves in containers, including by (unscheduled) rail services.
- **Rail access.** Railway sidings at Botany Yard are used to regulate train access to the port (as a holding point), to split trains for onwards movements to the port and marshal trains from port-originating wagons, for movements to Enfield/Chullora and beyond.
- **National rail connections.** The port is linked to the interstate rail network, including the Southern Sydney Freight Line, via the Metropolitan Goods Line/Port Botany Line.

Melbourne (Swanson Dock Terminals)



(Last updated: February 2013)

Melbourne (Swanson Dock Terminals at the confluence of the Yarra and Maribyrnong Rivers)

Dockside

- **Stevedores.** DP World's container terminal is at Swanson Dock West, with four berths. Patrick has a container terminal is across the dock at Swanson Dock East, also with four berths. Patrick also handles some containers along with general freight at its Webb Dock East site, with 3 berths in total.
- **Equipment.** The Patrick terminal has 8 cranes, including 3 post-Panamax; the DP World terminal has 8 cranes, including 3 post-Panamax. Patrick has 42 straddle carriers while DP World has 48 straddle carriers. (http://www.portofmelbourne.com/publications/~/media/Global/ Docs/Customer-Handbook.ashx)
- **Berths.** There are 4 container berths at Swanson Dock East (Patrick)—berths E_1–E_4. There are 4 berths at Swanson Dock West (DP World)—berths W_1–W_4. There is one general cargo berth at Victoria Dock (berth 24), which handles containers.

Road

- Access to the Patrick terminal are made via Appleton Dock Road. Access to the DP World terminal is via Coode Road. The Dynon Port Link project included the grade-separation of Footscray Road over the rail tracks to the port.

Rail

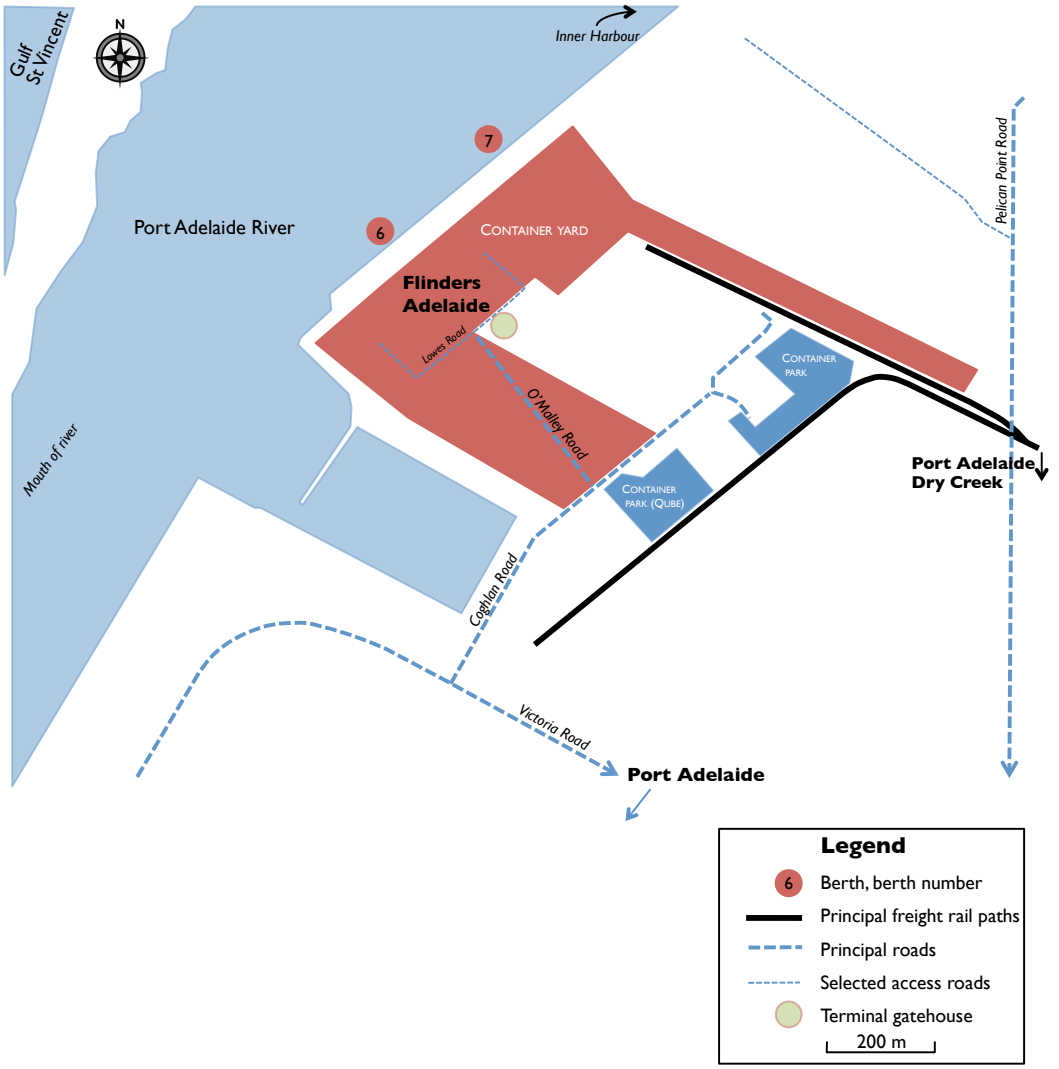
- **Operations.** Import and export containers are rail-served to near the dockside, with Swanson siding, Appleton Dock yard and Westport Sidings (not labelled on the map). There is no longer a rail link to Webb Dock.
- **Services.** The Patrick terminal at Swanson Dock East is served by the "Appleton Dock" multiple sidings (or "yard"), with two dual-gauge sidings of 640 metres and a locomotive run-around track. The sidings have both broad and standard gauge track and scheduled trains (operated by Asciano) run directly from the sidings to:
- Adelaide, Griffith/Junee, Horsham (grain), Dimboola and Portland (containerised mineral sands) (standard gauge);
- Echuca/Deniliquin (containerised rice), Tocumwal (grain), Mildura/Merbein (grain); and Warrnambool (broad gauge).
- Other trains using Appleton Dock (with dedicated sidings) include trains serving Emerald Grain's dry bulk terminal. Common-user sidings are also provided in the yard.
- The DP World terminal at Swanson Dock West is served by a single dual-gauge siding of 510 metres, running just to the south of Footscray Road; there is also a locomotive run-around track.

- Victoria Dock is shown, with Qube Logistics' Westgate Port Sidings. There are two dual-gauge sidings, with 630 metre lengths, plus a locomotive run-around track. Qube operates at the dock, which handles containers coming by rail from Maryvale Paper Mill. That traffic does not appear in *Waterline* data.
- Containers are also railed to the port, terminating at South Dynon Rail Terminal (Asciano) and North Dynon Rail Terminal (Dynon Road Intermodal Terminal, used by Aurizon), from where the containers may then be conveyed to/from the dockside by road shuttles. A container-movements survey (reporting in 2009) found that 30 per cent of containers railed through the Port of Melbourne were using the Dynon terminals rather than the on-dock rail terminals (70 per cent).
- **Rail linkages.** The dock area consists of rail facilities near the docks and the nearby intermodal container terminals at South Dynon, Dynon and North Dynon. Although there is an eastern link from the Dynon terminals towards the east (Southern Cross and Flinders Street), the container movements are to and from the west via the Tottenham–Dynon line.
- Of the five container ports represented here, the Port of Melbourne is in the proximity of intermodal terminals near to the docks as well as the on/near-dock facilities.
- **National rail connections.** Principal freight rail paths are shown; most tracks (including dockside tracks) are dual gauge — broad- and (national) standard-gauge tracks. Access to the interstate network is via the dual-gauge track to the west, via Tottenham.

Port of Melbourne, showing Swanson Dock in the foreground

Source: Port of Melbourne Corporation.

Adelaide (Adelaide Container Terminal at Outer Harbor/ Pelican Point)



(Last updated: February 2013)

Adelaide (Adelaide Container Terminal at Outer Harbor/Pelican Point)

Dockside

- **Stevedores.** Port Adelaide's outer harbour container terminal is operated by DP World, using two berths.
- **Berths.** The map shows the container terminal, located in the outer harbour (at Outer Harbor) of Port Adelaide; the Inner Harbour at Port Adelaide is not shown. The two container facilities are berths 6 and 7.
- **Equipment.** The terminal has four travelling container-handling cranes (Panamax-standard).

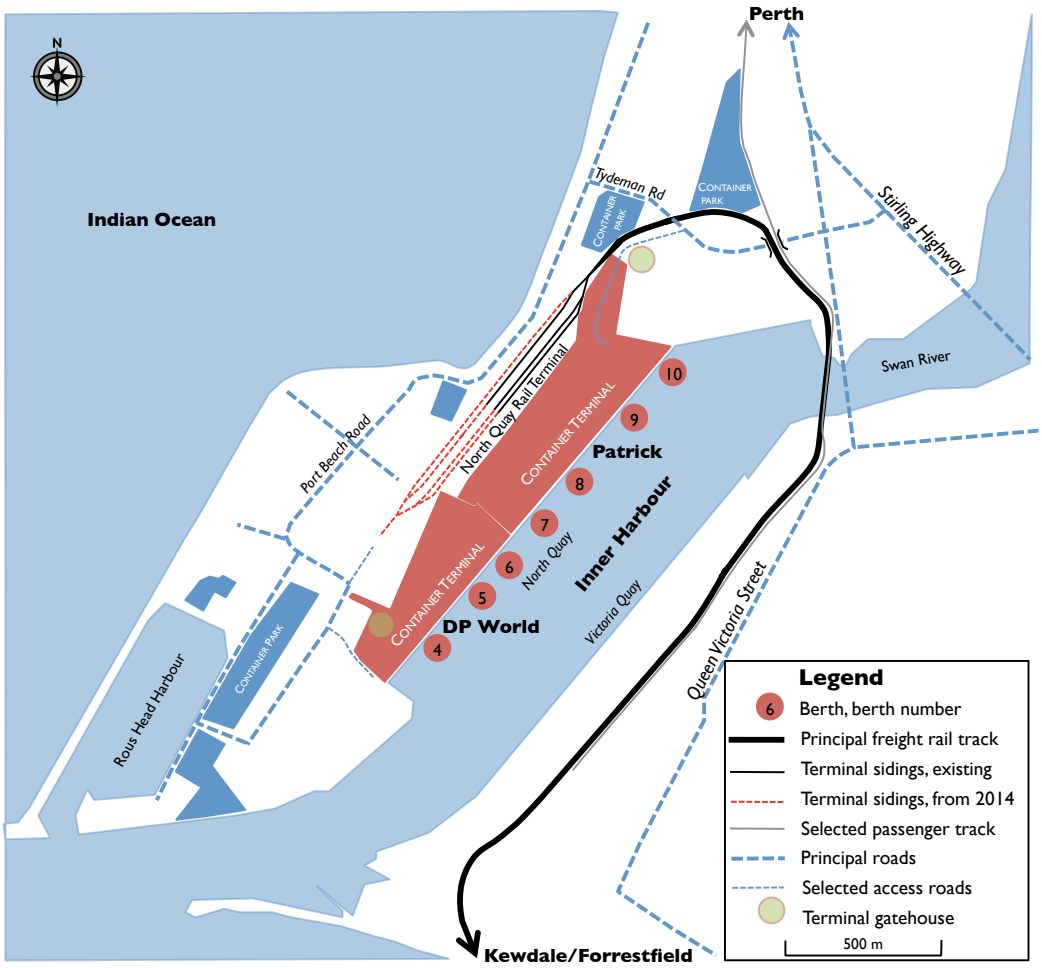
Road

- Adelaide Container Terminal is accessed in O'Malley Road, leading from Coghlan Road.

Rail

- **Operations.** The Outer Harbor terminal has two sets of rail sidings. Two sidings, each of 640 metre length, serve the DP World container terminal (dual standard and broad gauge track). The other set of sidings serve the Mackenzie (now Qube) logistics terminal and container park (with broad gauge).
- **Services.** Railed movements to the dockside (all by standard rather than broad gauge) include:
- containers railed from Rankin Dam siding, moving iron ore that is mined at Cairn Hill. The ore is but emptied from the containers directly into the hold of the vessels.
- A regular train from Port Pirie and Bowmans operates to the DP World terminal via Port Flat terminal. Containers for the landbridge service to Melbourne are removed at Port Flat. Containers on the train include lead (from Port Pirie) and agricultural produce (from the Balco joint venture at Bowmans).
- Grain is brought to Port Adelaide by rail in hopper wagons; some is then loaded into containers at Viterra's (ABB) container grain loader (inverter) and then exported.
- **Rail linkages.** The Outer Harbor facility is at the extremity of a freight-only railway between Outer Harbor, Port Adelaide and Dry Creek. The line is dual standard- and broad-gauge, with some sections of double-track.
- **National rail connections.** The Outer Harbor–Dry Creek line connects with the interstate network at Dry Creek. Nearby intermodal terminals include the Asciano terminal at Islington and the SCT Logistics terminal at Direk.

Fremantle (North Quay Terminals in the Inner Harbour)



(Last updated: December 2013)

Fremantle (North Quay Terminals in the Inner Harbour)

Dockside

- **Stevedores.** Container stevedoring is undertaken at North Quay in the Inner Harbour by Patrick and DP World. Patrick have four berths and DP World has three berths.
- **Berths.** Patrick's berth 10 is a multi-purpose container, ro-ro and general cargo facility. The stevedores' other berths (six) are dedicated container ship berths.

Road

- The principal roads on this peninsula are Tyderman Road (from the Stirling Highway) and Port Beach Road/Rudderham Drive. The DP World terminal is accessed via Rudderham Drive while the Patrick terminal is accessed via Tyderman Road.

Rail

- **Operations.** North Quay Rail Terminal, to the west of the Patrick terminal, serves both Patrick and DP World container terminals. The sidings at that location are around 450 metres in length; there are plans to lengthen them so as to accommodate blocks of 600 metre-length trains. The Rail Terminal is dual-gauge.
- **Services.** Rail services to the port include the following (standard-gauge) trains:
- Aurizon (formerly QRN) run trains under contract for Intermodal Link Services between Forrestfield and the port. They also run trains for their own clients, servicing the Goldfields and Kwinana.
- ARG (Aurizon) operates a weekday container service between Kalgoorlie and Fremantle; the contents of the containers is nickel matte, for the WMC Resources (part of BHP Billiton).
- Lead (from Magellan Metals) is railed to the port in containers from Kalgoorlie via Forrestfield Container Terminal.
- **Rail linkages.** Trains access the Rail Terminal on a dual narrow- and standard-gauge freight-only track from Midland. Freight and passenger trains share a track on the bridge over the Swan River.
- **National rail connections.** The rail link to Midland, on the interstate network, includes spur tracks to interstate intermodal terminals at Kewdale and Forrestfield.

References

Australian Bureau of Statistics (ABS), 2012. *Estimates of industry multifactor productivity, Australia: Detailed productivity estimates (ABS Cat. No. 5260.0.55.002), December 2012*.

Australian Bureau of Statistics (ABS), 2013. *Australian National Accounts: National Income, Expenditure and Product, Selected Analytical Series, 5206.0, June 2013*.

Australian Competition and Consumer Commission (ACCC) 2012. *Container Stevedoring Monitoring, Report no.14, October 2012*.

DP World 2013. *(unpublished data)*.

Fremantle Port Authority 2013. *(unpublished data)*.

Hutchison Ports Australia 2013. *(unpublished data)*.

Mongelluzzo B 2013. *Port productivity research: Bigger ships and tighter supply chains shine a new light on port productivity and its importance to shippers*. The Journal of Commerce (viewed at www.joc.com), 22 July, 2013.

Patrick 2013, Patrick Stevedores. *(unpublished data)*.

Port of Adelaide 2013. *(unpublished data)*.

Port of Brisbane Pty Ltd, 2013. *(unpublished data)*.

Port of Melboune Corporation 2013. *(unpublished data)*.

Ports Australia 2013. *(unpublished data)*.

Sydney Ports Corporation 2013. *(unpublished data)*.

bitre

www.bitre.gov.au