



issue no. 42—July 2007

Feature Article

This issue of *Waterline* includes an article on the Maritime Crew visa which started on 1 July 2007.

Explanatory Notes

Each issue contains explanatory notes about the terms and concepts that are used in *Waterline* (page 22–29).

In brief

Landside of port terminal

- The five port total of containers moved (excluding bulk runs) increased from 633 922 in the September quarter 2006 to 661 441 in the December quarter 2006, an increase of 4.3 per cent (page 5).
- The five port average container turnaround time was 25.0 minutes in the September quarter 2006 and 25.5 minutes in the December quarter 2006 (page 5).
- The five port total of truck bookings increased from 425 706 in the September quarter 2006 to 441 668 in the December quarter 2006, an increase of 3.7 per cent (page 5).
- The five port average truck turnaround time was 37.3 minutes in the September quarter 2006 and 38.2 minutes in the December quarter 2006 (page 5).

Wharfside of port terminal

- In July–December 2006, total cargo throughput was 61.2 million tonnes and total container traffic was 2.687 million teus (page 20).
- The five port average crane rate decreased from 27.0 containers per hour in the

September quarter 2006 to 26.8 containers per hour in the December quarter 2006 (page 10).

- The five port average vessel working rate has increased from 35.2 containers per hour in the September quarter 2006 to 36.1 in the December quarter 2006 (page 10).
- The five port total of container moves increased from 864 475 in the September quarter 2006 to 923 755 in the December quarter 2006 (page 10).
- The national port interface cost index for exporting a container was \$611/teu in 2001 constant prices for July–December 2006. This is the same price level as for January–June 2006 (page 17).
- The tonnage of cargo estimated to be moved under coastal permits has increased from 14.973 million tonnes in the calendar year 2005 to 14.989 million tonnes for the calendar year 2006 (page 21).
- Total ship visits increased by 11 per cent to 4 304 in the year ended 31 December 2006 (page 18).

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Maritime crew visa

Changes to the shipping industry are just around the corner as the Australian Department of Immigration and Citizenship has introduced legislation that requires foreign sea crew to obtain a maritime crew visa (MCV) to come to Australia from 1 July 2007.

The introduction of the MCV will mean the 130 000 foreign sea crew who typically travel to Australia annually on commercial ships, such as cargo and cruise ships, and other non-military ships, will need to hold a MCV before they arrive.

The MCV has been introduced to strengthen Australia's border security while continuing to enable the entry of genuine foreign seafarers. The MCV replaces the current Special Purpose visa that is granted to foreign sea crew on arrival, provided they meet entry requirements.

There will be a six-month transitional period from 1 July to 31 December 2007, to allow the maritime industry to adapt to the requirements and to apply for MCVs. From 1 January 2008, the MCV will be mandatory. Crew not holding an MCV are likely to be restricted on board and have fines imposed.

Industry seminars

Industry seminars were conducted in late 2006 and early this year in all capital cities and major ports. The seminars outlined the key features of the MCV as well as relevant border processing arrangements. An industry information paper distributed at the seminars is now available on the following website <www.immi.gov.au/sea>.

Information products

In the months prior to the start date of the MCV, immigration and customs officers boarded ships and distributed leaflets and posters to educate the wider maritime industry about the MCV. The products raise awareness of the MCV and include information translated into other languages to ensure non-English speaking masters and seafarers are informed. Further information specific to shipping agents, shipping operators and crew manning agents is also available on the website listed above.

Key features of the MCV

The MCV will:

- be required by all foreign sea crew (except New Zealanders and Australian permanent resident visa holders);
- require a formal visa application to be made outside of Australia;
- need to be granted before arrival;

- be free of charge;
- be valid for three years;
- allow multiple entries to Australia; and
- be valid for travel to Australia by sea (not by air).

Applying for an MCV

Individual seafarers, along with authorised third parties, such as shipping agents or crew manning agents, may apply for the MCV. Third parties will be able to receive all communications on behalf of crew, for instance, when a MCV is approved, they will be notified by letter or email. It will be possible to check on the internet, at any time, to confirm if a crew member holds a MCV.

From 1 July 2007, MCV applications can be lodged in two ways: over the internet or by completing a paper application form. Internet applications will be finalised within days, whereas paper applications may take some weeks to finalise. Only one application may be lodged at a time and it should only take a few minutes to submit an application for each crew member, provided the required information is available.

Applications cannot be lodged at an Australian embassy, consulate or high commission. They may only be lodged over the internet or by completing a paper application and posting it to an Australian visa processing centre.

It is important details provided on the MCV application form match details in the passport, as the MCV is linked to the passport.

More information

To find out more about the MCV see the website: <www.immi.gov.au/sea>—from here you can also subscribe to the MCV email list to keep up to date with the latest MCV news.



Landside performance indicators

Introduction

Waterline 41, published in December 2006, included a feature article which introduced a suite of possible performance indicators for the landside of port terminals. The estimates published in *Waterline 41* were experimental, based on incomplete data, and not suitable for any use other than for illustration purposes. Subsequent comments on the proposed indicators from the readership of *Waterline*, industry and government are gratefully acknowledged. These comments have been instrumental in fine-tuning the indicator list and in developing an approach for reporting a new set of indicators.

This issue of *Waterline* starts publishing data on eight of the landside of port terminal indicators for which data are available. The first four are indicators of the size of task performed while the last four are indicators of performance at the landside of port terminals.

The indicators covered were selected because each met the following criteria for a good indicator. Each one of the indicators:

- is relevant to the landside port terminal interface;
- shows unambiguously 'good' or 'bad' direction of movement;
- is supported by timely data of good quality;
- will eventually be available as a time series;
- is capable of disaggregation by geography;
- is intelligible and easily interpreted.

At this stage, data (see Table 1) is reported for a seven day week (Monday to Sunday), which is the most detailed level of reporting possible for some data providers. When less aggregated data becomes available in the future, the indicators will show data for Monday–Friday separately from data for the weekend period. The indicators are:

1. *Total number of trucks processed in a quarter.* This indicator shows the total truck-related task performed at a port terminal in a quarter in a seven day week.
2. *Number of containers processed in a quarter.* This indicator of task size measures containers processed on the landside of port terminals in a seven day week. It is intended that the landside indicators should exclude bulk runs and Australian Customs Service containers which are removed and returned to the port terminal after x-ray screening. Bulk runs of containers occur when a transport company arranges to move a number of containers outside of the Vehicle Booking System (VBS) time slots. It usually occurs at night or on weekends. However, at this time it has not

been possible to exclude all bulk runs from the data.

3. *Number of twenty-foot equivalent units (teus) processed in a quarter.* This task size indicator measures the number of standardised twenty foot equivalent units (teus) of containers processed on the landside of port terminals in a seven day week. It is intended that the count of teus excludes bulk runs, and Australian Customs Service containers which are removed and returned to the port terminal after x-ray screening. At this time it has not been possible to exclude all bulk runs from the data.
4. *Number of containers loaded on or unloaded from rail in a quarter.* This indicator estimates the total rail-related task performed at a port terminal in a quarter.
5. *Average number of containers per truck.*
6. *Average teus per truck.*
7. *Container turnaround time*, as defined in the explanatory notes.
8. *Average truck turnaround time*, as defined in the explanatory notes.

Interpretation of the indicators

Indicators of size of task

A good indicator is closely related to, but may not necessarily be a comprehensive measure of, the phenomenon. For example, the number of containers processed at the port terminal is used as an indicator of size of task, but is not comprehensive because at this stage it excludes some containers processed as bulk runs. Nonetheless it is a good indicator because when it increases or decreases the other counts of containers (eg bulk runs) are likely to change in the same direction. The counts of teus and containers on the landside are less than the counts of containers in Annex 1 because the counts of teus and containers on the landside of port terminal exclude some bulk runs.

Containers/teus per truck

Changes in this indicator provide an indirect measure of the impact of changes in the volume of the landside of port terminal task on the road network.

For example, an increase in the number of containers carried per truck, keeping other things constant, implies a decrease in the total number of trucks on the road network. Similarly, a decrease in the number of containers carried per truck, keeping other things constant, implies an increase in the total number of trucks on the road network.

Average number of containers/teus per truck should not be interpreted as a measure of truck utilisation because the measure does not take into account the mass capacity of the truck.

Turnaround times

Container turnaround time is a measure of the efficiency of stevedoring companies. Truck turnaround time measures the efficiency of stevedoring companies in the handling of an average individual truck at a port terminal in a seven day period.

Comparisons across port terminals

Each one of the port terminals within the scope of the performance reports in *Waterline* is unique. The appendix at the end of the explanatory notes contains a set of diagrams giving schematic representations of each of the five port terminals discussed in *Waterline* and shows differences between port terminals with respect to geography, access by road and rail, and proximity to inter-modal facilities. Comparisons between ports are difficult and are of very limited utility due to these differences. The most useful comparisons of the landside of port terminal indicators involve within port terminal comparisons, over time.

Results: five ports

Table 1 presents the September quarter 2006 and December quarter 2006 landside of port terminal performance indicators at the five major Australian container ports. Figure 1 presents the landside task indicators for the September and December quarters of 2006.

In summary:

- the five port average container turnaround time was 25.0 minutes in the September

quarter 2006 and 25.5 minutes in the December quarter 2006;

- the five port average truck turnaround time was 37.3 minutes in the September quarter 2006 and 38.2 minutes in the December quarter 2006;
- the five port average of containers per truck was 1.5 in the September quarter 2006 and 1.5 in the December quarter 2006;
- the five port total of truck bookings increased from 425 706 in the September quarter 2006 to 441 668 in the December quarter 2006, an increase of 3.7 per cent;
- the five port total of containers moved (excluding some bulk runs) increased from 633 922 in the September quarter 2006 to 661 441 in the December quarter 2006, an increase of 4.3 per cent;
- the five port total of teus moved (excluding bulk runs) increased from 898 483 in the September quarter 2006 to 942 784 in the December quarter 2006, an increase of 4.9 per cent;
- the three port total of containers moved by rail, not including Adelaide and Fremantle, increased from 92 851 in the September quarter 2006 to 99 213 in the December quarter 2006, an increase of 6.9 per cent. This total also does not include containers which may have been moved from some near-port terminals.

Australian sea freight, Information Papers

Australian sea freight, Information Papers are a series of BTRE papers that provide information on Australian sea freight movements. The papers cover all sea freight activities around Australia during a financial year. This annual publication makes available key Australian maritime freight and shipping statistics.

The papers cover international sea freight into and out of Australia, interstate and intrastate cargo loaded and unloaded at Australian ports. They include single and continuing voyage permits and provide information about ship and cargo movements through Australian ports, as well as details of the Australian trading fleet.

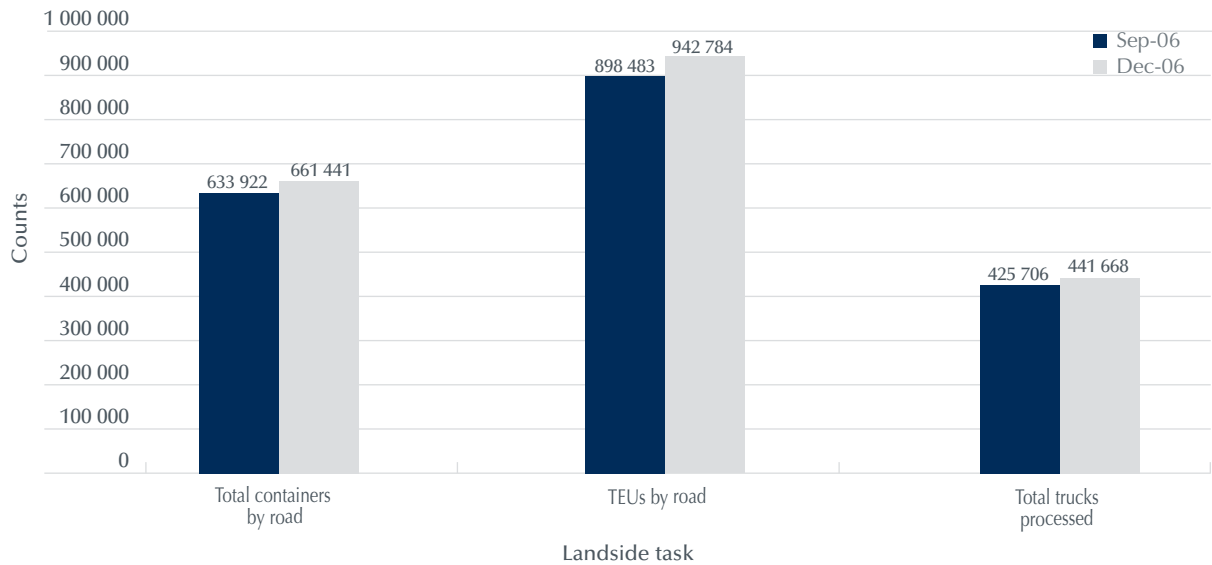
The papers contain tabulated data, plots and figures compiled from various original statistical sources and provide simple essential commentary prepared in the Maritime and Rail Transport Statistics Section of the BTRE.

This publication is available in PDF format from the Bureau of Transport and Regional Economics website at www.btre.gov.au. If you require hard copy, part or all of this publication in a different format, please contact BTRE. Quarterly updates of selected tables are also available at <http://www.btre.gov.au>.

Previous papers in the series are:

BTRE 2001, Australian Sea Freight, 1999–2000, BTRE Information Paper 47, BTRE, Canberra
BTRE 2003a, Australian Sea Freight, 2000–2001, BTRE Information Paper 48, BTRE, Canberra
BTRE 2003b, Australian Sea Freight, 2001–2002, BTRE Information Paper 50, BTRE, Canberra
BTRE 2005a, Australian Sea Freight, 2002–2003, BTRE Information Paper 53, BTRE, Canberra
BTRE 2005b, Australian Sea Freight, 2003–2004, BTRE Information Paper 56, BTRE, Canberra
BTRE 2007, Australian Sea Freight, 2004–05, BTRE Information Paper 58, BTRE, Canberra

Figure 1 Five major ports: Landslide of container terminal size of task indicators, September quarter and December quarter, 2006



Sources Patrick and DP World

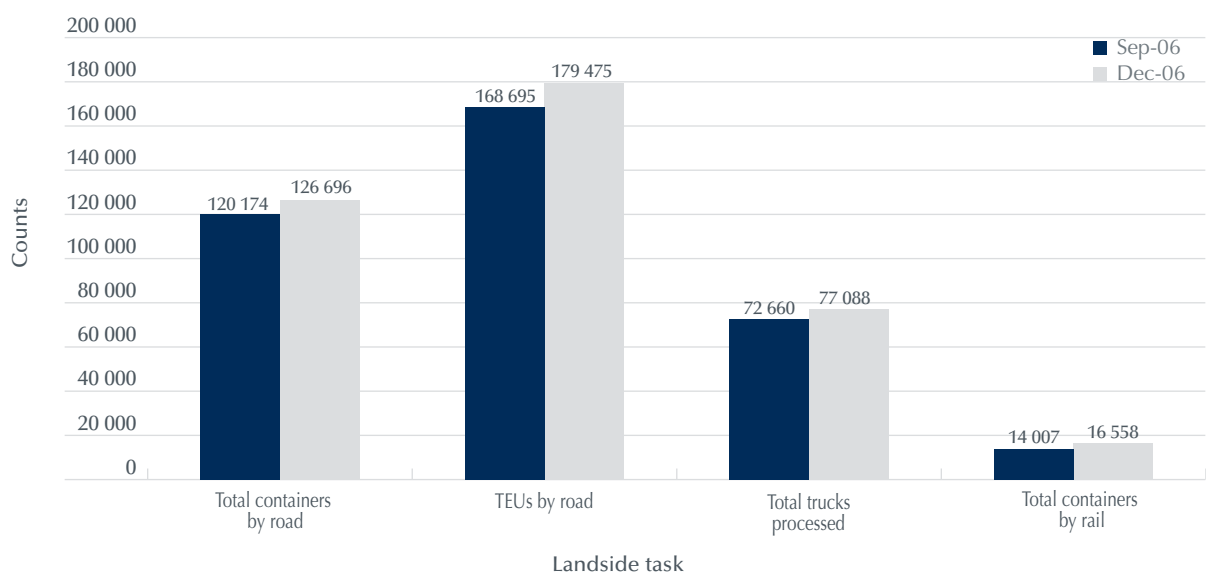
Individual ports

Figures 2 to 6 present the landside task indicators for Brisbane, Sydney, Melbourne, Adelaide and Fremantle respectively. This section discusses performance indicators for individual ports. The landside of port terminal infrastructure arrangements for each of these ports are unique to each port. This means that any comparison of performance indicators between ports would be misleading. The data for Brisbane, Sydney, Melbourne and Fremantle use, where appropriate, weighted averages for the container terminals operated by DP World and

Patrick. The Adelaide data are for the DP World container terminal.

The *Brisbane* (DP World, Patrick) average container turnaround time decreased from 32.4 minutes in the September quarter 2006 to 32.1 minutes in the December quarter 2006. The truck turnaround time decreased from 53.5 minutes in the September quarter 2006 to 52.6 minutes in the December quarter 2006. The total number of trucks increased by 6.4 per cent in December 2006 and the total teus increased by 6.4 per cent. Total containers moved increased by 5.4 per cent.

Figure 2 Brisbane: Landside of container terminal size of task indicators, September quarter and December quarter, 2006

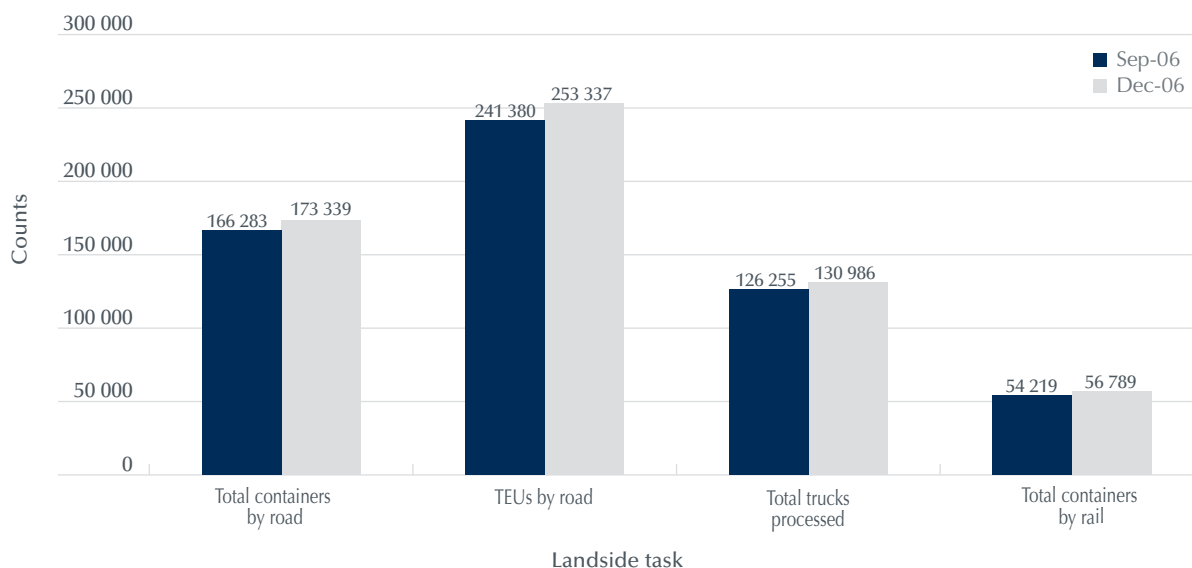


Sources Patrick and DP World

The *Sydney* (DP World, Patrick) average container turnaround time increased from 30.9 minutes in the September quarter 2006 to 32.9 minutes in the December quarter 2006. The truck turnaround time increased from 40.5 minutes the September

quarter 2006 to 42.8 minutes in the December quarter 2006. The total number of trucks increased by 3.7 per cent in December 2006 and the total teus increased by 5.0 per cent. Total containers moved increased by 4.2 per cent.

Figure 3 Sydney: Landside of container terminal size of task indicators, September quarter and December quarter, 2006

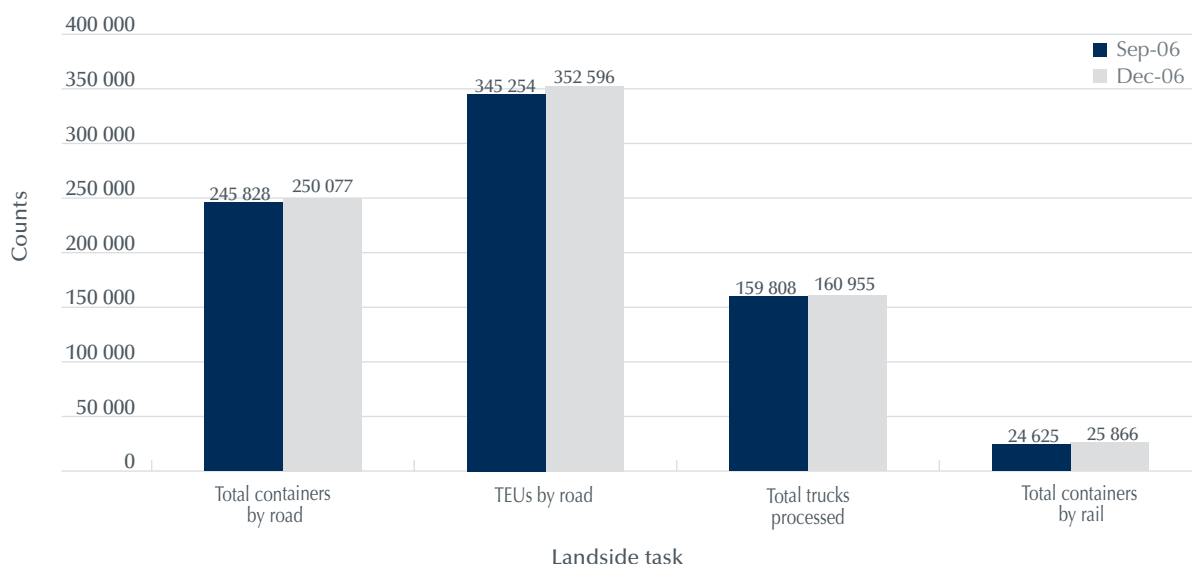


Sources Patrick and DP World

The *Melbourne* (DP World, Patrick) average container turnaround time decreased from 20.7 minutes in the September quarter 2006 to 19.0 minutes in the December quarter 2006. The truck turnaround time decreased from 31.8 minutes

the September quarter 2006 to 29.5 minutes in the December quarter 2006. The total number of trucks increased by 0.7 per cent in December 2006 and the total teus increased by 2.1 per cent. Total containers moved increased by 1.7 per cent.

Figure 4 Melbourne: Landside of container terminal size of task indicators, September quarter and December quarter, 2006

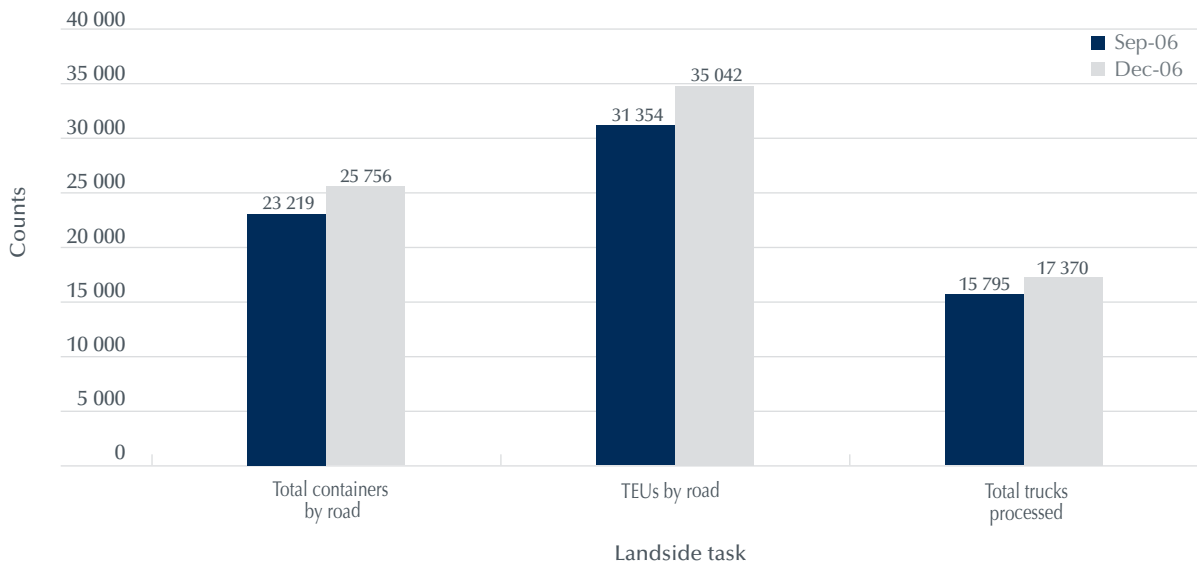


Sources Patrick and DP World

The *Adelaide* (DP World) average container turnaround time increased from 21.4 minutes in the September quarter 2006 to 23.0 minutes in the December quarter 2006. The truck turnaround time increased from 31.5 minutes in the September quarter 2006 to 34.1 minutes in

the December quarter 2006. The total number of trucks increased by 10.0 per cent in December 2006 and the total teus increased by 11.8 per cent. Total containers moved increased by 10.9 per cent.

Figure 5 Adelaide: Landside of container terminal size of task indicators, September quarter and December quarter, 2006

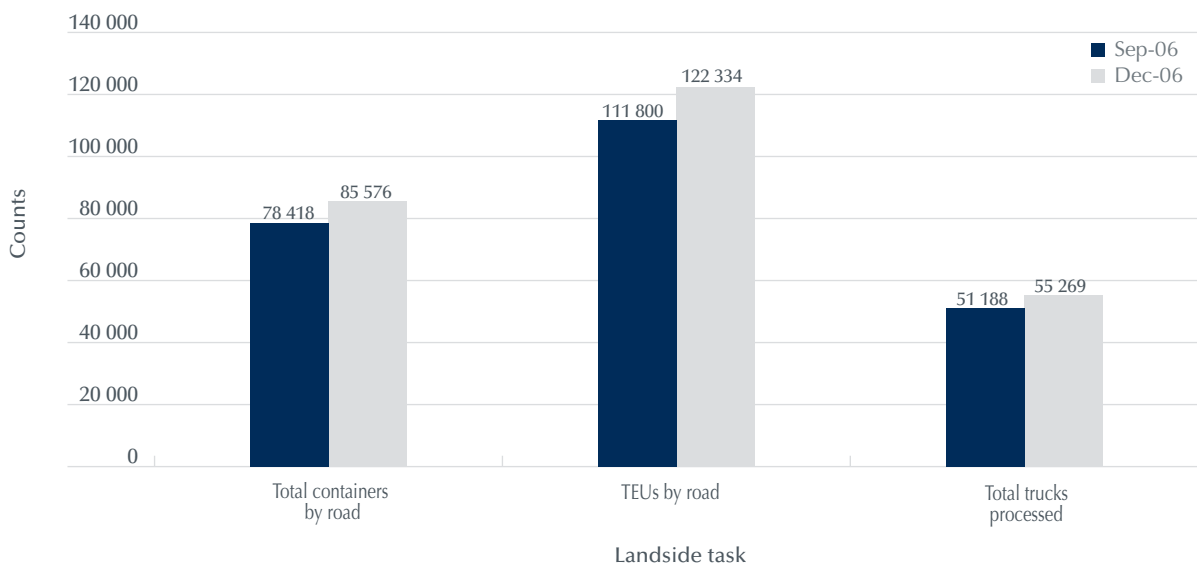


Sources Patrick and DP World

The *Fremantle* (DP World, Patrick) average container turnaround time increased from 16.0 minutes in the September quarter 2006 to 17.8 minutes in the December quarter 2006. The truck turnaround time increased from 24.4 minutes in the September quarter 2006 to 27.6 minutes in

the December quarter 2006. The total number of trucks increased by 8.0 per cent in December 2006 and the total teus increased by 9.4 per cent. Total containers moved increased by 9.1 per cent.

Figure 6 Fremantle: Landside of container terminal size of task indicators, September quarter and December quarter, 2006



Sources Patrick and DP World

Table 1 Container terminal landside performance indicators

Port/Indicator	Sep-06	Dec-06
FIVE PORTS		
Road		
Total trucks	425 706	441 668
Containers per truck	1.5	1.5
Average container turnaround time – mins.	25.0	25.5
Total Containers (including bulk runs) ^a	633 922	661 441
Teus	898 483	942 784
Truck turnaround time – mins.	37.3	38.2
Teus per truck	2.1	2.1
BRISBANE		
Road		
Total trucks	72 660	77 088
Containers per truck	1.7	1.6
Average container turnaround time–mins.	32.4	32.1
Total Containers (including bulk runs) ^a	120 174	126 693
Teus	168 695	179 475
Truck turnaround time – mins.	53.5	52.6
Teus per truck	2.3	2.3
Rail		
Total containers	14 007	16 558
SYDNEY		
Road		
Total trucks	126 255	130 986
Containers per truck	1.3	1.3
Average container turnaround time – mins.	30.9	32.5
Total Containers (including bulk runs) ^a	166 283	173 339
Teus	241 380	253 337
Truck turnaround time – mins.	40.5	42.8
Teus per truck	1.9	1.9
Rail		
Total containers	54 219	56 789
MELBOURNE		
Road		
Total trucks	159 808	160 955
Containers per truck	1.5	1.6
Average container turnaround time – mins.	20.7	19.0
Total Containers (including bulk runs) ^a	245 828	250 077
Teus	345 254	352 596
Truck turnaround time – mins.	31.8	29.5
Teus per truck	2.2	2.2
Rail		
Total containers	24 625	25 866
ADELAIDE		
Road		
Total trucks	15 795	17 370
Containers per truck	1.5	1.5
Average container turnaround time – mins.	21.4	23.0
Total Containers (including bulk runs) ^a	23 219	25 756
Teus	31 354	35 042
Truck turnaround time – mins.	31.5	34.1
Teus per truck	2.0	2.0
Rail		
Total containers	na	na
FREMANTLE		
Road		
Total trucks	51 188	55 269
Containers per truck	1.5	1.5
Average container turnaround time – mins.	16.0	17.8
Total Containers (including bulk runs) ^a	78 418	85 576
Teus	111 800	122 334
Truck turnaround time – mins.	24.4	27.6
Teus per truck	2.2	2.2
Rail		
Total containers	na	na

^a It has not been possible at this stage to exclude all of bulk runs from this data.

Sources Patrick and DP World.

Stevedoring productivity

National crane rate productivity, as measured by the five port average, increased to 27.0 containers per hour in the September quarter 2006 (0.5 per cent lower than the September quarter 2005 rate of 27.2). In the December quarter 2006, the crane rate fell by 0.9 per cent to 26.8 containers per hour (3.2 per cent lower than the December quarter 2005 rate of 27.7).

Table 2 presents the December quarter 2004 to December quarter 2006 indicators of *stevedoring productivity* at the five major Australian container ports, expressed in container moves per hour. Figures 7 to 12 present these data over the June quarter 1996 to December quarter 2006 period. The data for Brisbane, Sydney, Melbourne and Fremantle are weighted averages for the container terminals operated by DP World and Patrick. The Adelaide data are for the DP World container terminal.

In summary:

- the five port average *crane rate* (average productivity *per crane* while the ship is worked) was 27.8 in the March quarter 2006, 27.0 in the June quarter 2006, 27.0 in the September quarter 2006, and 26.8 containers per hour for the December quarter 2006;
- the five port total of container moves increased from 864 475 in the September quarter 2006 to a new record of 923 755 moves in the December quarter 2006, an increase of 6.9 per cent;
- the five port average *vessel working rate* (productivity *per ship* based on the time labour is aboard the ship) was 34.9 in the March quarter 2006, 35.3 in the June quarter 2006, 35.2 in the September quarter 2006, and 36.1 containers per hour in the December quarter 2006, which was 1.1 per cent higher than the rate of 35.7 achieved in the December quarter 2005.

The *Brisbane* (DP World, Patrick) average crane rate decreased from 24.0 in the June quarter 2006 to 23.6 in the September quarter 2006, and to 23.0 containers per hour in the December quarter 2006. The vessel working rate also decreased from 27.0 containers per hour in the June quarter 2006 to 25.9 in the September quarter 2006, and to 25.1 in the December quarter 2006.

The *Sydney* (DP World, Patrick) average crane rate decreased from 26.7 in the June quarter 2006 to 26.5 in the September quarter 2006, and to 26.4 containers per hour in the December quarter 2006. The vessel working rate increased from 33.9 containers per hour in the June quarter 2006 to 34.2 in the September quarter 2006, and to 34.6 in the December quarter 2006.

The *Melbourne* (DP World, Patrick) average crane rate increased from 28.2 in the June quarter 2006 to 28.3 in the September quarter 2006, and decreased to 28.1 containers per hour in the December quarter 2006. The vessel working rate increased from 40.5 containers per hour in the June quarter 2006 to 41.2 in the September quarter 2006, and to 43.5 in the December quarter 2006.

The *Adelaide* (DP World) average crane rate increased from 30.6 in the June quarter 2006 to 32.0 in the September quarter 2006, and then decreased to 31.0 containers per hour in the December quarter 2006. The vessel working rate increased from 35.9 containers per hour in the June quarter 2006 to 37.4 in the September quarter 2006, and then decreased to 36.0 in the December quarter 2006.

The *Fremantle* (DP World, Patrick) average crane rate increased from 27.3 in the June quarter 2006 to 27.6 in the September quarter 2006, and to 27.8 containers per hour in the December quarter 2006. The vessel working rate decreased from 33.1 containers per hour in the June quarter 2006 to 31.7 in the September quarter 2006, and then increased to 33.5 in the December quarter 2006.

Overall, stevedoring (or crane-rate) variability was reasonably stable over the June 2006 to December 2006 quarters.

Teus per hour

Annex 1 on page 30 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purpose of long-term historical comparison. They are not directly comparable with the data in Table 2 because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

Table 2 Container terminal performance indicators—productivity in containers per hour

Port / Indicator	Dec-04	Mar-05	Jun-05	Sep-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06
FIVE PORTS									
Ships handled	936	890	993	1027	1043	1026	1075	1117	1094
Total containers	819 744	744 032	743 597	790 348	837 459	741 960	795 252	864 475	923 755
Crane rate	27.1	27.2	27.7	27.2	27.7	27.8	27.0	27.0	26.8
Vessel working rate	33.1	34.9	35.3	35.1	35.7	34.9	35.3	35.2	36.1
Crane time not worked (per cent)	28	25	24	22	24	23	22	23	23
40-foot containers (per cent)	42	40	39	40	43	41	41	42	44
Ship rate	45.6	46.6	46.3	45.3	46.7	45.1	45.2	46.0	46.8
Throughput pbm	115	104	104	111	117	104	111	121	129
BRISBANE									
Ships handled	227	205	222	244	261	262	257	280	271
Total containers	134 274	116 561	115 730	130 156	142 728	124 908	129 537	149 996	157 725
Crane rate	26.5	27.2	27.2	26.9	27.7	25.1	24.0	23.6	23.0
Vessel working rate	24.6	26.1	26.7	27.6	27.0	25.4	27.0	25.9	25.1
Crane time not worked (per cent)	40	37	33	0	26	27	24	29	31
40-foot containers (per cent)	43	42	37	33	43	42	42	39	43
Stevedoring variability (per cent)	56	54	47	40	44	43	50	59	52
Ship rate	41.3	41.3	40.1	37.6	40.7	34.9	35.6	36.5	36.5
Throughput pbm	84	73	72	81	89	78	81	93	98
SYDNEY									
Ships handled	262	258	283	294	297	293	307	318	322
Total containers	256 898	230 741	231 959	252 971	265 762	231 970	249 580	274 042	299 864
Crane rate	26.7	26.7	27.7	26.1	27.4	28.0	26.7	26.5	26.4
Vessel working rate	34.9	34.9	36.9	34.9	36.0	34.8	33.9	34.2	34.6
Crane time not worked (per cent)	26	25	24	23	35	25	25	26	24
40-foot containers (per cent)	45	43	43	44	45	44	44	46	47
Stevedoring variability (per cent)	53	46	50	44	50	47	54	50	55
Ship rate	47.0	46.6	48.2	45.3	47.6	46.3	45.0	46.3	45.7
Throughput pbm	132	119	119	130	137	119	129	141	154
MELBOURNE									
Ships handled	272	260	299	293	300	293	318	321	314
Total containers	301 997	281 637	278 030	287 655	302 693	273 641	297 877	314 900	330 896
Crane rate	27.5	27.5	27.6	27.9	27.8	28.4	28.2	28.3	28.1
Vessel working rate	35.6	39.3	38.7	40.0	39.9	39.3	40.5	41.2	43.5
Crane time not worked (per cent)	25	21	20	21	39	21	19	20	19
40-foot containers (per cent)	41	39	39	41	42	41	40	42	42
Stevedoring variability (per cent)	65	69	68	61	68	58	57	59	59
Ship rate	47.7	50.0	48.6	50.4	49.7	49.7	50.1	51.4	53.4
Throughput pbm	165	154	152	158	166	150	163	172	181
ADELAIDE									
Ships handled	56	53	68	66	66	66	67	68	65
Total containers	34 654	34 551	37 587	40 467	36 426	34 260	37 581	39 208	40 949
Crane rate	29.8	29.7	30.4	30.8	29.9	30.2	30.6	32.0	31.0
Vessel working rate	35.3	37.1	33.6	36.6	35.8	36.0	35.9	37.4	36.0
Crane time not worked (per cent)	10	15	14	15	37	13	13	13	16
40-foot containers (per cent)	27	26	27	30	33	33	31	32	35
Stevedoring variability (per cent)	na	na	na	na	na	na	na	na	na
Ship rate	39.2	43.5	39.0	43.3	41.3	41.5	41.2	43.2	42.8
Throughput pbm	74	74	80	86	78	73	80	83	87
FREMANTLE									
Ships handled	119	114	121	130	119	112	126	130	122
Total containers	91 921	80 542	80 291	79 099	89 850	77 181	80 677	86 329	94 321
Crane rate	27.2	26.7	27.8	26.5	27.1	28.6	27.3	27.6	27.8
Vessel working rate	31.3	31.4	32.2	30.0	34.5	34.1	33.1	31.7	33.5
Crane time not worked (per cent)	28	28	29	26	31	20	26	27	27
40-foot containers (per cent)	41	37	39	40	43	38	39	43	44
Stevedoring variability (per cent)	41	45	44	38	45	46	47	47	53
Ship rate	43.4	43.6	45.4	40.6	46.0	42.8	44.9	43.5	46.1
Throughput pbm	71	62	62	61	70	60	62	67	73

r revised

pbm per berth metre

Notes 1. The definitions used in compiling the stevedoring productivity data are detailed in explanatory notes at the end of the journal.

2. The data in this table are expressed in container moves per hour and therefore are not directly comparable with the teus per hour data in Annex 1.

3. Crane time not worked is the difference between the ship and the vessel working rates as a percentage of the vessel working rate.

Sources Patrick, DP World.

Figure 7 Five major ports

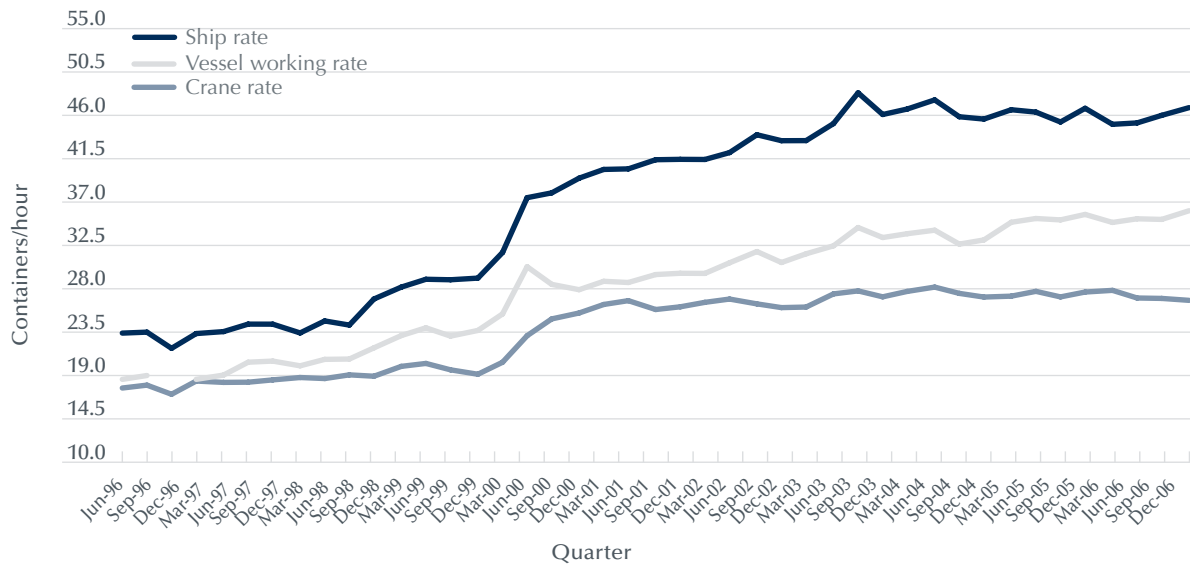


Figure 8 Brisbane

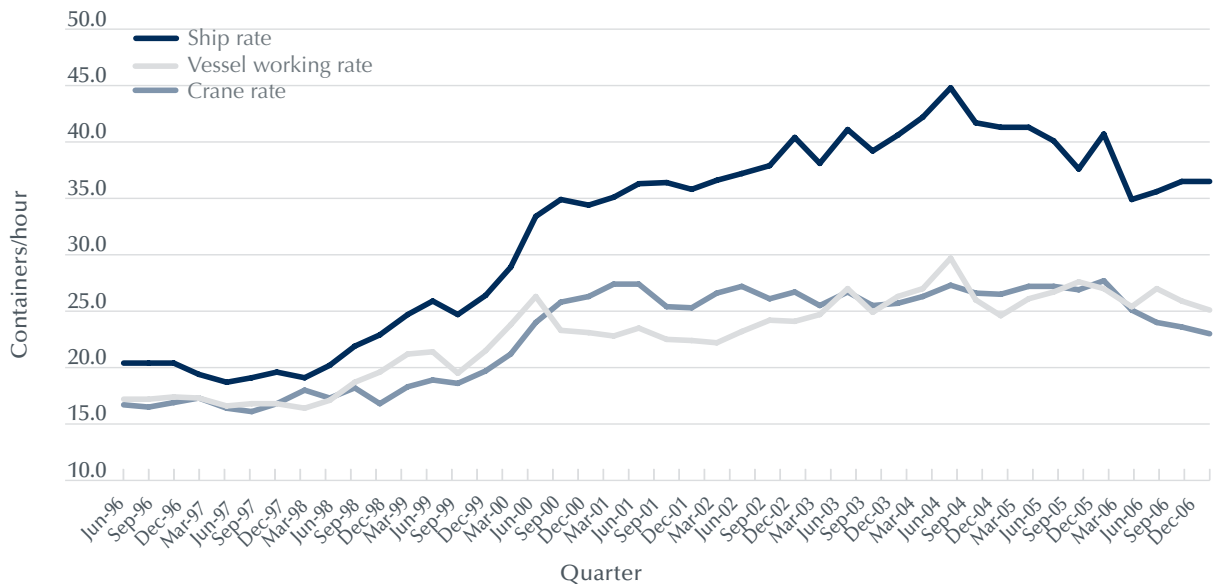
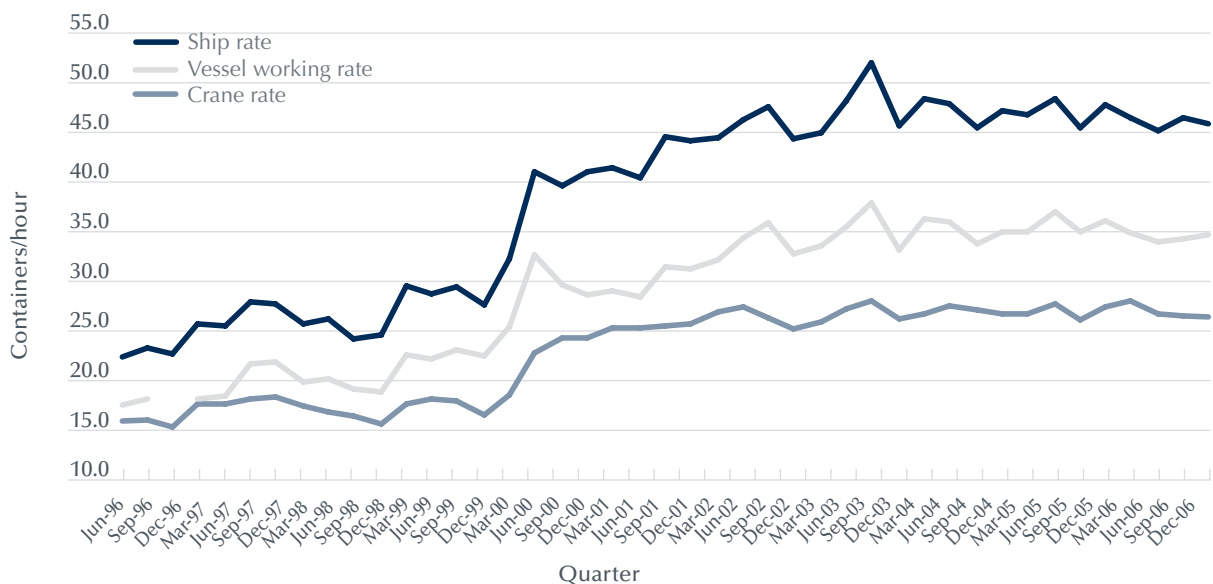


Figure 9 Sydney



Note These figures are based on data contained in Table 2. Readers should refer to the notes in that table.
Sources Patrick and DP World.

Figure 10 Melbourne

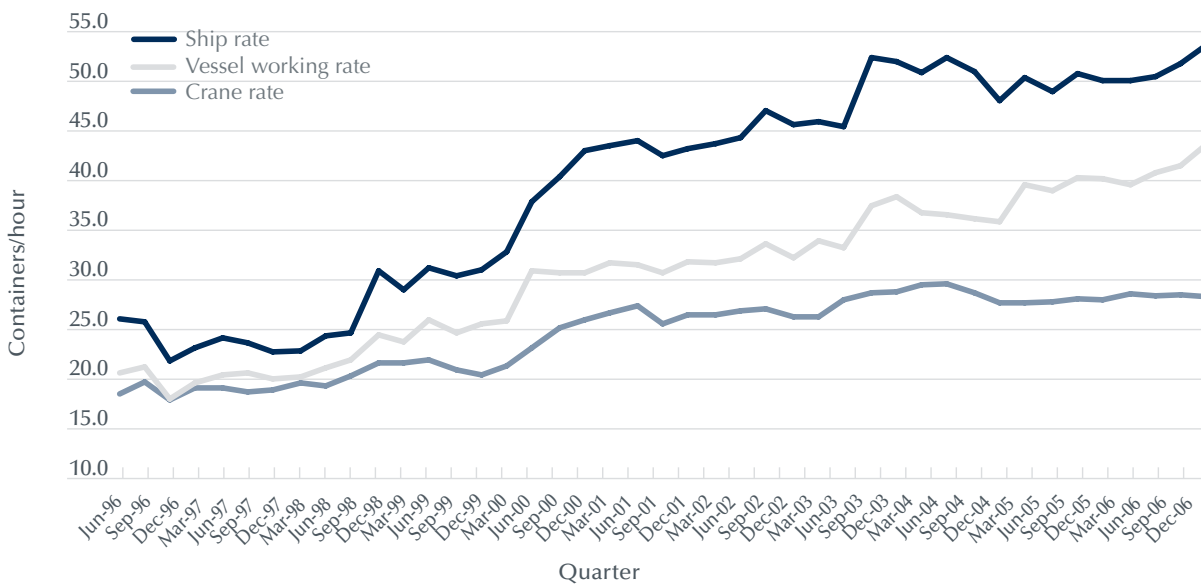


Figure 11 Adelaide

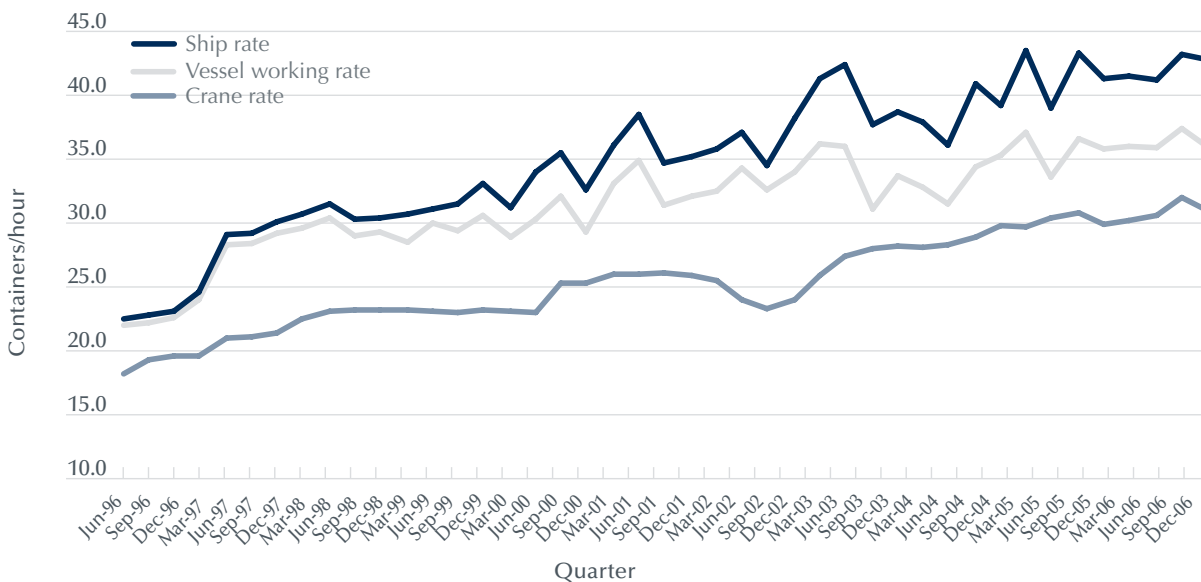
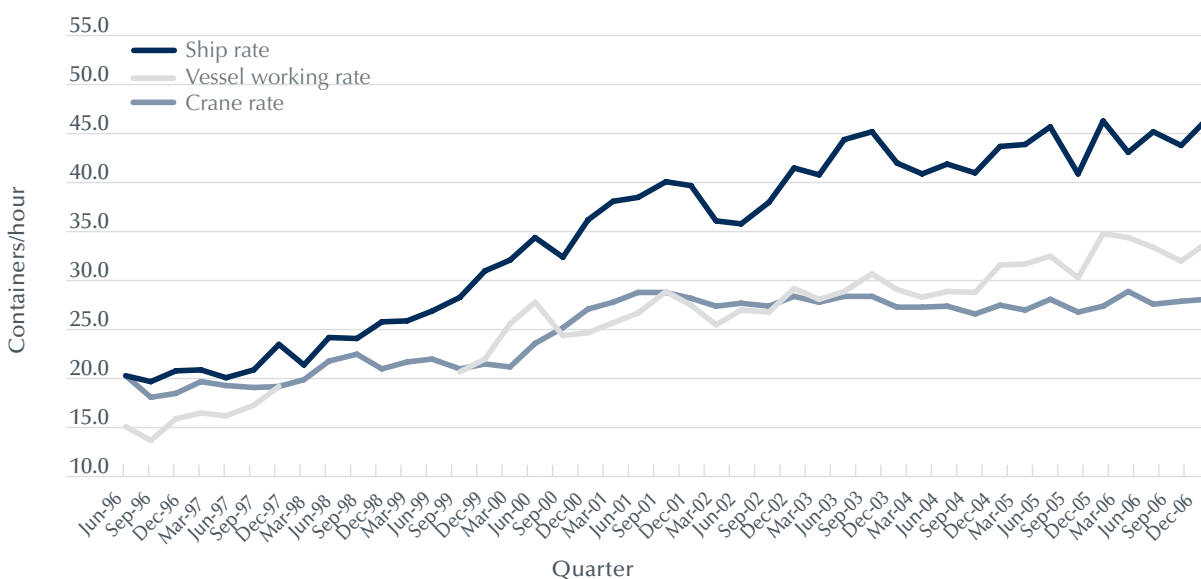


Figure 12 Fremantle



Note These figures are based on data contained in Table 2. Readers should refer to the notes in that table.
Sources Patrick and DP World.

Port interface cost index

The port interface cost index provides a measure of shore-based shipping costs (charges) for containers moved through Australian mainland capital city ports. These five ports account for approximately 90 per cent of Australia's container traffic.¹ Data for January–June 2006 and July–December 2006 are presented in tables 3 to 8. The port interface cost index is based on an indicative approach; that is, the index is not an average of all costs, but is based on those costs typically charged by service providers.

Port and related charges

Table 3 provides the parameters used to determine the port and related charges in tables 4 and 5. These parameters relate to a representative port call by container ships using the Lloyd's ship classification UCC. For the 15 000 to 20 000 GT range² the representative vessel size used is 17 215 GT and 37 394 GT is used to represent the 35 000 to 40 000 GT range.

Tables 6 and 7 provide the port and related charges at the five mainland capital city ports for the 15 000 to 20 000 GT range and the 35 000 to 40 000 GT range respectively, for January–June 2006 and July–December 2006. Port and related charges comprise ship-based charges and cargo-based charges.

Ship-based charges

While overall ship-based charges changed little in July–December 2006, there were some significant

changes in charges per teu, mainly reflecting the variation in the average number of teus exchanged per ship call. If teus increase the charges per teu decrease and if teus decrease charges per teu increase.

Compared to the previous period, the overall changes in total ship-based charges per teu in July–December 2006 for ships in the 15 000 to 20 000 GT range were:

- at *Brisbane*—a 15 per cent decrease;
- at *Sydney*—a 14 per cent decrease;
- at *Melbourne*—no change;
- at *Adelaide*—a 25 per cent decrease; and
- at *Fremantle*—a 31 per cent decrease.

For ships in this range, the average number of teus exchanged increased by 20 per cent at Brisbane, 18 per cent at Sydney, 3 per cent at Melbourne, 27 per cent at Adelaide and by 46 per cent at Fremantle, when compared with the previous period.

Compared with the previous period, the overall changes in total ship-based charges per teu in July–December 2006 for ships in the 35 000 to 40 000 GT range were:

- at *Brisbane*—a 56 per cent increase;
- at *Sydney*—a 13 per cent decrease;
- at *Melbourne*—a 1 per cent decrease;
- at *Adelaide*—a 4 per cent decrease; and
- at *Fremantle*—a 19 per cent decrease.

In the 35 000 to 40 000 GT range, the average number of teus exchanged rose at Sydney, Melbourne, Adelaide and Fremantle in July–

Table 3 Parameters used in the port interface cost indices, 2006

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006
Vessel size GT 17 215										
Average teus exchanged^a										
All	633	761	892	1052	952	985	573	729	822	1204
Loaded	418	570	679	742	821	810	386	441	676	1016
Empty	215	191	214	309	132	175	188	287	146	188
Loaded inwards	242	327	425	479	453	495	114	133	410	594
Loaded outwards	176	243	253	264	367	315	271	308	265	422
Ship call parameters^a										
Number of port calls	3	4	4	28	3	3	2	2	3	2
Elapsed berth time (hrs)	24	26	26	28	26	23	35	20	26	29
Vessel size GT 37 394										
Average teus exchanged^b										
All	980	640	1545	1787	1806	1876	705	724	960	1199
Loaded	763	512	1166	1302	1534	1463	537	576	682	761
Empty	217	128	379	486	272	413	168	148	278	439
Loaded inwards	477	298	757	877	844	883	175	200	290	367
Loaded outwards	286	215	409	425	690	579	362	376	392	394
Ship call parameters^b										
Number of port calls	3	5	3	2	3	2	3	2	3	4
Elapsed berth time (hrs)	27	24	34	37	32	33	29	19	25	29

a. Mean value for ships between 15 000 and 20 000 GT.

b. Mean value for ships between 35 000 and 40 000 GT.

Sources BTRE estimates based on ship call data supplied by relevant port authorities/corporations and other port service providers.

1 Based on TEU numbers for Australian ports published by Australian Association of Port and Maritime Authorities (AAPMA) at <http://www.aapma.org.au/trade/stats/?ld=5>.

2 To obtain a sufficient sample size for Adelaide and Fremantle containers exchanged (average), the ship size range was increased to 10 000 GT–26 000 GT.

Table 4 Port and related charges for ships in the 15 000–20 000 GT range, 2006

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 2006	Jul–Dec 2006	Jan–Jun 2006	Jul–Dec 2006	Jan–Jun 2006	Jul–Dec 2006	Jan–Jun 2006	Jul–Dec 2006	Jan–Jun 2006	Jul–Dec 2006
Ship-based charges (\$/teu)										
Conservancy	4.24	3.64	-	-	-	-	4.47	3.10	-	-
Tonnage	-	-	8.28	7.02	5.47	5.29	11.08	6.98	3.39	2.43
Pilotage	11.12	9.24	3.71	3.15	7.43	7.45	7.68	6.04	2.80	2.01
Towage ^a	14.09	12.18	10.39	9.16	9.62	9.66	20.51	16.62	12.64	8.44
Mooring, unmooring	3.16	2.82	3.16	2.68	1.26	1.37	-	-	1.07	0.77
Berth hire ^b	-	-	-	-	-	-	-	-	-	-
Total ^c	32.61	27.88	25.54	22.00	23.78	23.77	43.74	32.73	19.90	13.65
Cargo-based charges (\$/teu)										
Wharfage										
Imports	28.60	28.60	67.65	67.65	35.75	37.40	61.27	63.17	51.03	53.59
Exports	28.60	28.60	51.15	51.15	35.75	37.40	61.27	63.17	51.03	53.59
Harbour dues	46.20	46.20	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	15.29	16.05
Total port and related charges (\$/teu)^c										
Loaded imports	107.41	102.68	93.19	89.65	59.53	61.17	105.01	95.91	86.22	83.28
Loaded exports	107.41	102.68	76.69	73.15	59.53	61.17	105.01	95.91	86.22	83.28
Charges per ship visit (\$/visit)										
Total ship-based charges	20 637	21 224	22 784	23 145	22 645	23 418	25 067	23 856	16 352	16 429
Empty teus ^d	3 362	2 986	0	0	1 158	1 584	0	0	1 125	1 521

- not applicable

a. After enquiries at all ports the number of tugs required for towage in Adelaide and Fremantle used in PICI calculations has been revised.

b. Charged by stevedores and itemised separately from basic stevedoring charge.

c. Components may not sum to totals due to rounding.

d. Sum of wharfage, harbour dues and berth charge per empty teu, multiplied by average exchange of empty teus.

Note Port and related charges are based on the parameters described in Table 3.

Sources BTRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules of relevant port authorities/corporations, towage operators and pilotage service providers.

Table 5 Port and related charges for ships in the 35 000–40 000 GT range, 2006

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006
Ship-based charges (\$/teu)										
Conservancy	5.95	9.41	-	-	-	-	5.50	6.44	-	-
Tonnage	-	-	10.38	8.97	6.27	6.04	12.69	9.82	6.31	5.30
Pilotage	17.10	26.18	3.90	3.37	4.97	4.97	6.24	6.08	2.40	2.01
Towage ^a	11.50	18.30	6.38	5.70	5.42	5.42	21.46	21.54	16.02	12.58
Mooring, unmooring	2.04	3.35	2.34	2.02	0.66	0.72	-	-	0.92	0.77
Berth hire ^b	-	9.41	-	-	-	-	-	-	-	-
Total ^c	36.59	57.24	23.00	20.07	17.33	17.15	45.89	43.88	25.64	20.66
Cargo-based charges (\$/teu)										
Wharfage										
Imports	28.60	28.60	67.65	67.65	35.75	37.40	61.27	63.17	51.03	53.59
Exports	28.60	28.60	51.15	51.15	35.75	37.40	61.27	63.17	51.03	53.59
Harbour dues	46.20	46.20	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	15.29	16.05
Total port and related charges (\$/teu)^c										
Loaded imports	111.39	132.04	90.65	87.72	53.08	54.55	107.16	107.06	91.97	90.30
Loaded exports	111.39	132.04	74.15	71.22	53.08	54.55	107.16	107.06	91.97	90.30
Charges per ship visit (\$/visit)										
Total ship-based charges	35 856	36 638	35 532	35 866	31 298	32 173	32 370	31 767	24 615	24 787
Empty teus ^d	3 385	2 000	0	0	2 395	3 741	0	0	2 138	3 550

- not applicable

a. After enquiries at all ports the number of tugs required for towage in Adelaide and Fremantle used in PICI calculations has been revised.

b. Charged by stevedores and itemised separately from basic stevedoring charge.

c. Components may not sum to totals due to rounding.

d. Sum of wharfage, harbour dues and berth charge per empty teu, multiplied by average exchange of empty teus.

Note Port and related charges are based on the parameters described in Table 3.

Sources BTRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules of relevant port authorities/corporations, towage operators and pilotage service providers.

December 2006 when compared with the previous period. The increases were, Melbourne 4 per cent and 25 per cent at Fremantle. Sydney increased by 16 per cent and Adelaide by 3 per cent. There was a 35 per cent decrease at Brisbane

Cargo-based charges

Compared with the previous period, the overall changes in total cargo-based charges per teu in July–December 2006 for ships in the 15 000 to 20 000 GT range were:

- at *Brisbane*—no change;
- at *Sydney*—no change;
- at *Melbourne*—a 5 per cent increase;
- at *Adelaide*—a 5 per cent increase; and
- at *Fremantle*—a 5 per cent increase.

Compared with the previous period, the overall changes in total ship-based charges per teu in July–December 2006 for ships in the 35 000 to 40 000 GT range were:

- at *Brisbane*—no change;
- at *Sydney*—no change;
- at *Melbourne*—a 5 per cent increase;
- at *Adelaide*—a 5 per cent increase; and
- at *Fremantle*—a 5 per cent increase.

Stevedoring charges per teu

The stevedoring charges of \$180.80 per teu used in this issue of *Waterline* are those published in the most recently available ACCC report on stevedoring prices (ACCC 2006).

Land-based charges per teu

Average customs brokers' fees and road transport charges for January–June 2006 and July–December 2006 are included in tables 6 and 7. These charges are based on data provided by some 30 customs brokers and 30 road transport operators.

During July–December 2006 the average customs broker fee for imports did not change at Sydney, increased by 4 per cent at Fremantle, 2 per cent at Brisbane, 5 per cent at Melbourne and 2 per cent at Adelaide. For exports the average customs broker's fee remained unchanged at Sydney. It decreased by 4 per cent at Brisbane, and increased by 7 per cent at Melbourne, 3 per cent at Adelaide and 12 per cent at Fremantle.

Road transport charges increased at Sydney and Adelaide and Brisbane by 1 per cent and Fremantle by 16 per cent. They did not change at Melbourne. One of the parameters used to estimate road transport charges is the time taken to move containers between the wharf and the customer's warehouse. Both distance and traffic congestion impact on this parameter and, therefore, help explain the significant difference between road transport charges in Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

Indices for individual ports

Table 6 indicates that for ships in the 15 000 to 20 000 GT range between January–June 2006 and July–December 2006, costs per teu for import containers increased by 1 per cent at Sydney and

Table 6 Port interface costs for ships in the 15 000–20 000 GT range, 2006

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006
Import										
Ship-based charges	33	28	26	22	24	24	44	33	20	14
Cargo-based charges	75	75	68	68	36	37	61	63	66	70
Stevedoring ^a	175	180	175	180	175	180	175	180	175	180
Customs brokers' fees	134	136	135	135	134	140	132	134	160	167
Road transport charges	276	279	432	435	398	396	257	259	270	315
Import total^b	693	698	835	840	766	777	669	668	692	745
Export										
Ship-based charges	33	28	26	22	24	24	44	33	20	14
Cargo-based charges	75	75	51	51	36	37	61	63	66	70
Stevedoring ^a	175	180	175	180	175	180	175	180	175	180
Customs brokers' fees	115	110	107	107	90	97	79	81	81	91
Road transport charges	276	279	432	435	398	396	257	259	270	315
Export total^b	675	672	791	795	723	734	617	616	613	669

a. updated annually after the release of the ACCC stevedoring monitoring report.

b. components may not sum to totals due to rounding.

Notes

1. Based on parameters described in Table 3.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.

3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charge data supplied by the ACCC and industry sources; and ABS 5206.041 National Accounts table.

Table 7 Port interface costs for ships in the 35 000–40 000 GT range, 2006

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006	Jan–June 2006	Jul–Dec 2006
Import										
Ship-based charges	37	57	23	20	17	17	46	44	26	21
Cargo-based charges	75	75	68	68	36	37	61	63	66	70
Stevedoring ^a	175	180	175	180	175	180	175	180	175	180
Customs brokers' fees	134	136	135	135	134	140	132	134	160	167
Road transport charges	276	279	432	435	398	396	257	259	270	315
Import total^b	697	727	833	838	760	771	671	680	698	752
Export										
Ship-based charges	37	57	23	20	17	17	46	44	26	21
Cargo-based charges	75	75	51	51	36	37	61	63	66	70
Stevedoring ^a	175	180	175	180	175	180	175	180	175	180
Customs brokers' fees	115	110	107	107	90	97	79	81	81	91
Road transport charges	276	279	432	435	398	396	257	259	270	315
Export total^b	679	701	788	794	716	727	619	627	618	676

a. updated annually after the release of the ACCC stevedoring monitoring report.

b. components may not sum to totals due to rounding.

- Notes
1. Based on parameters described in Table 3.
 2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.
 3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BTRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charge data supplied by the ACCC and industry sources; and ABS 5206.041 National Accounts table.

Table 8 The national port interface cost indices for ships in the 35 000–40 000 GT range, July–Dec 2002 to July–Dec 2006

	Jul–Dec 2002	Jan–Jun 2003	Jul–Dec 2003	Jan–Jun 2004	Jul–Dec 2004	Jan–Jun 2005	Jul–Dec 2005	Jan–Jun 2006	Jul–Dec 2006
National port interface cost indices									
Import index in current prices	660	653	661	674	684	739	737	764	780
Import index in 2001 prices	644	626	620	621	626	654	643	651	650
Export index in current prices	610	608	614	623	636	691	692	717	733
Export index in 2001 prices	595	584	576	574	582	612	604	611	611

Sources BTRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charges data supplied by the ACCC (ACCC 2006) and industry sources; and the ABS national accounts (ABS 2006).

Melbourne. At these two ports, the costs for export containers increased by 0.6 per cent and 1.6 per cent respectively. At Brisbane, the costs per teu for import containers increased by 1 per cent and costs per teu for exports decreased by 0.4 per cent, while at Adelaide the costs for importing and exporting a container decreased slightly. At Fremantle the costs for importing and exporting a container increased by 8.0 per cent and 9.2 per cent respectively.

Table 7 indicates that for ships in the 35 000 to 40 000 GT range, between January–June 2006 and July–December 2006, there were cost increases at Brisbane of 4 per cent for imports and 3 per cent for exports. At Sydney the port interface costs increased by 1 per cent for both exports and imports. At Melbourne the port interface costs increased by 1 per cent for imports and by 2 per cent for exports. At Adelaide, import and export costs increased by 1 per cent. At Fremantle the port interface costs increased by 8 per cent for imports and 9 per cent for exports.

These results should be interpreted with caution. The use of a single stevedoring charge for all ports reflects the scope of the available information, which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

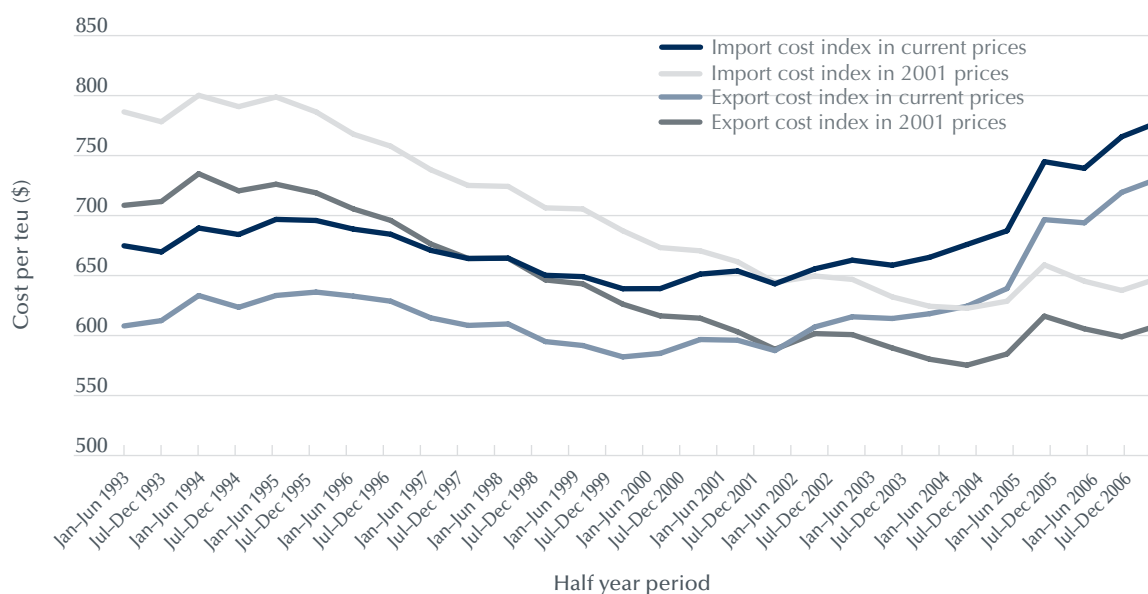
National indices

Figure 13 provides the national port interface cost indices for ships in the 15 000 to 20 000 GT range from 1992 onwards. In current prices, the national index for imports increased from \$766 per teu in January–June 2006 to \$778 in July–December 2006. At the same time the index for exports increased from \$719 per teu to \$731 per teu.

In real terms (2001 prices), the national cost index per import teu has declined by 18 per cent since 1993, and by 14.1 per cent per export teu.

Table 8 shows the national port interface cost index from July–December 2002 to July–December 2006 for ships in the 35 000 to 40 000 GT range.

Figure 13 National port interface cost indices for ships in the 15 000–20 000 GT range, 1993 to 2006



Source BTRE estimates based on: ship call data supplied by port authorities/corporations; price schedules of port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charges data supplied by the ACCC and industry sources; and ABS 5206.041 National Accounts table.

In current prices the national index for imports increased from \$764 January–June 2006 to \$780 per teu in July–December 2006 in current prices. The index for exports increased from \$717 to \$733 per teu in current prices.

References

ABS see Australian Bureau of Statistics.

ACCC see Australian Competition and Consumer Commission.

Australian Competition and Consumer Commission 2006, *Container stevedoring monitoring report* no. 8, November 2006, ACCC, Canberra.

Australian Bureau of Statistics 2006, *Australian national accounts: national income, expenditure and product*, ABS 5206.0 Table 20. Selected analytical series, non farm gross domestic product; chain volume measures, and non farm gross domestic product; current prices, viewed 5 March 2007, <<http://www.abs.gov.au>>.

Ship visits

Table 9 provides the five port total number of ship visits and the average number of teus exchanged per ship visit for container vessels with sizes ranging from 5 000 to 60 000 GT.

Total ship visits increased by 11 per cent to 4304 in the calendar year 2006 compared with the preceding year, with ship visits peaking at 2158 for the six months to December 2006. The largest variation was in the 20 000–25 000 GT and 25 000–30 000 GT range. There were 55 visits in the 50 000–55 000 GT range in the six month period to June 2006 and 55 in the December 2006 period. The average number of teus carried increased in most ranges except for the 40 000–45 000 GT range

where they decreased by 3 per cent and the 50 000–55 000 GT range where they decreased by 18 per cent.

On a five port basis Table 10 shows the distribution of ship visits by vessel gross tonnage. The median for Sydney, Melbourne and Brisbane was in the 20 000–25 000 GT range. For Adelaide it was in the 25 000–30 000 GT range and for Fremantle in the 30 000–35 000 GT range.

For Sydney, the 75th percentile ship visit occurred in the 30 000–35 000 GT range, for Brisbane in the 25 000–30 000 GT range, for Melbourne in the 30 000–35 000 GT range, for Adelaide in the 35 000–40 000 GT range and for Fremantle in the 35 000–40 000 GT range.

The average number of teus exchanged has grown in recent quarters. The trend of decreases shown in the June 2006 quarter has turned around in the December 2006 quarter. There has been an increase of 24 per cent in the 15 000–20 000 GT range, an increase of 18 per cent in the 20 000–25 000 GT range. In the 45 000–50 000 GT range there was a decrease of 3 per cent.

Port performance – non-financial

The July–December 2002 to July–December 2006 non-financial indicators for the five mainland capital city ports are presented in Table 11.

Cargo throughput

Total *cargo throughput* at the five ports was 61.2 million tonnes for July–December 2006, compared with 58.4 million tonnes for the previous half year and 57.8 million tonnes for July–December 2005. The July–December 2006 throughput represented an increase of 5.9 per cent for the five ports

Table 9 Five port average number of teus exchanged and total ship visits per 6 month period, for selected GT ranges, weighted by number of ships

GT	Dec-98	Jun-99	Dec-99	Jun-00	Dec-00	Jun-01	Dec-01	Jun-02	Dec-02	Jun-03	Dec-03	Jun-04	Dec-04	Jun-05	Dec-05	Jun-06	Dec-06
5 000–10 000																	
Average teus exchanged	323	217	369	380	383	456	284	239	187	161	193	333	204	283	368	267	607
Total ship visits	145	143	123	88	118	93	77	66	78	75	72	93	80	71	67	93	108
10 000–15 000																	
Average teus exchanged	530	546	660	683	702	702	706	712	424	405	485	688	628	554	506	464	689
Total ship visits	143	146	183	152	123	106	108	79	59	53	54	40	84	89	106	136	108
15 000–20 000																	
Average teus exchanged	678	656	768	776	813	825	885	763	839	839	826	971	885	693	800	685	852
Total ship visits	309	349	363	255	278	330	293	285	223	181	191	153	266	316	439	406	430
20 000–25 000																	
Average teus exchanged	598	629	790	754	833	838	830	762	818	902	990	1014	935	818	859	685	811
Total ship visits	278	280	249	270	314	276	240	233	241	182	214	199	306	321	294	374	256
25 000–30 000																	
Average teus exchanged	545	591	740	682	636	869	777	888	1 070	1 027	1 031	959	1 071	956	1 021	882	965
Total ship visits	125	95	129	153	132	116	129	186	252	286	323	344	185	332	377	395	475
30 000–35 000																	
Average teus exchanged	695	696	821	912	1 041	991	1 061	1 014	1 149	1 262	1 374	1 478	896	1 216	1 434	1 152	1 276
Total ship visits	251	252	180	208	222	187	196	216	232	175	257	247	191	223	141	198	171
35 000–40 000																	
Average teus exchanged	807	831	945	1 071	1 149	1 111	1 223	1 262	1 403	1 408	1 445	1 474	1 385	1 394	1 454	1 137	1 187
Total ship visits	246	239	207	193	224	210	197	203	223	214	189	225	228	227	225	178	223
40 000–45 000																	
Average teus exchanged	894	878	1 013	1 073	1 133	1 102	1 246	1 228	1 465	1 450	1 558	1 601	1 098	1 511	1 653	1 177	1 137
Total ship visits	146	137	148	153	140	158	176	195	172	162	186	181	143	196	165	223	249
45 000–50 000																	
Average teus exchanged	174	188	233	0	0	0	0	808	938	1 201	1 270	1 379	0 853	1 279	1 433	914	908
Total ship visits	3	3	1	0	0	0	0	5	38	72	77	75	32	65	77	88	81
50 000–55 000																	
Average teus exchanged	810	737	932	1 007	1 274	1 143	1 062	1 134	1 027	995	1 044	1 366	795	1 735	1 250	1 321	1 080
Total ship visits	61	64	68	56	63	55	56	60	55	61	69	22	71	89	60	55	55
55 000–60 000																	
Average teus exchanged	1 026	1 046	1 248	1 099	1 223	1 072	1 019	1 069	1 166	1 252	0	0	681	537	0	0	819
Total ship visits	25	31	28	29	21	13	17	15	14	3	0	0	6	8	0	0	2
Total ship visits	1 732	1 739	1 679	1 557	1 635	1 544	1 489	1 543	1 587	1 464	1 632	1 579	1 592	1 937	1 951	2 146	2 158

Source BTRE estimates based on ship call data supplied by relevant port authorities/corporations.

Table 10 Number of ship visits, by port, 2006

GT range	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total	Percentage
5 000–10 000	72	78	51	0	0	201	4.7
10 000–15 000	29	71	105	0	39	244	5.7
15 000–20 000	311	240	201	63	21	836	19.4
20 000–25 000	134	221	216	18	41	630	14.6
25 000–30 000	258	195	228	74	115	870	20.2
30 000–35 000	86	125	131	12	15	369	8.6
35 000–40 000	70	111	102	59	59	401	9.3
40 000–45 000	62	104	114	64	128	472	11.0
45 000–50 000	27	57	58	9	18	169	3.9
50 000–55 000	2	33	29	14	32	110	2.6
Above 55 000	0	2	0	0	0	2	0.0
Total	1 051	1 237	1 235	313	468	4 304	100.0

Source BTRE estimates based on ship call data supplied by relevant port authorities/corporations.

Table 11 Non-financial performance indicators, selected Australian ports, Jan-Jun 2002 to Jul-Dec 2006

	Jan-Jun 2002	Jul-Dec 2002	Jan-Jun 2003	Jul-Dec 2003	Jan-Jun 2004	Jul-Dec 2004	Jan-Jun 2005	Jul-Dec 2005	Jan-Jun 2006	Jul-Dec 2006
FIVE PORTS^d										
Total cargo throughput ('000 tonnes)	51 422	52 110	51 797	54 283	57 713	58 593	57 064	57 776	58 358	61 175
Non-containerised general cargo ('000 tonnes) ^a	1 964	2 143	2 060	2 316	2 285	2 338	2 518	2 572	2 504	2 522
Containerised cargo (teus exchanged)										
Full import	714 041	898 549	834 191	972 737	952 302	1 104 324	978 300	1 139 342	1 028 263	1 241 216
Empty import	134 785	127 665	117 616	116 179	129 114	125 158	135 088	129 224	199 487	137 904
Full export	632 229	659 965	618 896	651 772	694 261	721 595	719 329	755 826	686 673	807 558
Empty export	213 298	302 462	344 846	373 294	364 000	455 000	411 302	445 509	402 163	500 729
TOTAL	1 694 353	1 988 641	1 915 549	2 113 982	2 139 677	2 406 077	2 244 019	2 469 901	2 316 586	2 687 407
Average total employment ^b	795	803	816	865	914	934	967	1 036	1 056	980
Port turnaround time (hrs) ^c										
Median result	-	-	-	-	-	-	-	-	-	-
95th percentile	-	-	-	-	-	-	-	-	-	-
BRISBANE										
Total cargo throughput ('000 tonnes)	11 525	12 172	12 399	12 745	12 326	13 006	12 967	13 531	13 226	13 936
Non-containerised general cargo ('000 tonnes) ^a	304	316	304	412	392	373	447	461	459	466
Containerised cargo (teus exchanged)										
Full import	85 688	114 878	107 977	137 111	124 773	158 781	133 594	172 175	149 226	186 666
Empty import	32 112	35 719	28 565	31 633	31 676	37 379	34 136	33 218	34 164	40 400
Full export	95 966	101 229	91 446	104 279	100 760	114 029	113 090	130 459	115 564	136 672
Empty export	21 393	41 581	48 809	56 923	52 117	73 495	61 643	60 349	71 123	75 844
TOTAL	235 159	293 407	276 797	329 946	309 326	383 684	342 463	396 201	370 077	439 582
Average total employment ^b	212	215	209	214	225	238	248	253	256	258
Port turnaround time (hrs) ^c										
Median result	32	32	31	35	32	35	28	27	30	36
95th percentile	52	55	49	59	51	57	54	53	51	57
SYDNEY										
Total cargo throughput ('000 tonnes)	11 838	12 073	11 485	12 429	12 738	13 215	12 635	13 219	13 505	14 504
Non-containerised general cargo ('000 tonnes) ^a	279	319	316	320	307	299	329	312	302	331
Containerised cargo (teus exchanged)										
Full import	236 594	309 070	277 860	320 061	323 051	366 037	320 732	378 451	342 216	418 079
Empty import	8 853	8 071	6 005	4 503	7 222	5 262	7 670	9 929	9 490	9 609
Full export	147 918	154 314	139 456	149 314	154 195	161 310	158 342	171 320	173 932	192 559
Empty export	94 027	123 810	141 927	154 189	157 721	185 558	170 699	191 297	168 830	213 224
TOTAL	487 392	595 265	565 248	628 067	642 189	718 167	657 443	750 997	694 468	833 471
Average total employment ^b	199	198	199	198	198	198	200	241	243	246
Port turnaround time (hrs) ^c										
Median result	30	36	32	32	32	33	28	29	28	30
95th percentile	55	63	58	66	55	55	51	50	48	56
MELBOURNE										
Total cargo throughput ('000 tonnes)	12 138	12 388	12 283	12 458	14 222	14 115	14 211	13 978	13 781	14 884
Non-containerised general cargo ('000 tonnes) ^a	834	896	930	984	1 032	1 015	1 126	1 060	1 081	1 061
Containerised cargo (teus exchanged)										
Full import	295 343	358 818	337 671	388 339	386 413	446 960	406 623	456 345	416 323	485 828
Empty import	58 936	52 600	52 238	48 478	57 082	51 113	59 334	51 035	60 806	55 592
Full export	279 866	291 272	277 392	276 401	315 000	323 454	329 766	330 003	339 949	355 544
Empty export	73 547	104 266	119 541	127 967	118 038	152 055	141 136	149 346	126 118	158 613
TOTAL	707 692	806 956	786 842	841 185	876 533	973 582	936 859	986 729	943 196	1 055 577
Average total employment ^b	96	95	102	142	170	171	184	191	199	196
Port turnaround time (hrs) ^c										
Median result	35	37	36	35	38	39	33	32	30	31
95th percentile	63	68	62	57	65	78	60	54	52	62
ADELAIDE										
Total cargo throughput ('000 tonnes)	4 446	4 130	3 524	4 478	4 982	5 273	4 699	4 832	5 137	5 212
Non-containerised general cargo ('000 tonnes) ^a	239	251	171	238	213	263	207	282	193	181
Containerised cargo (teus exchanged)										
Full import	19 591	21 864	19 015	22 214	19 317	20 564	19 785	24 201	23 483	30 277
Empty import	15 055	11 715	13 050	15 895	14 073	16 774	19 663	21 280	18 024	21 342
Full export	35 793	37 358	33 468	43 874	41 734	39 277	40 259	46 933	43 954	46 606
Empty export	3 377	5 660	6 203	6 757	5 244	7 503	6 760	6 562	4 954	7 979
TOTAL	73 816	76 597	71 736	88 740	80 368	84 118	86 467	98 976	90 415	106 204
Average total employment ^b	95	97	95	94	95	97	95	94	97	97
Port turnaround time (hrs) ^c										
Median result	21	19	21	23	24	23	22	21	19	20
95th percentile	43	29	40	41	43	60	41	34	32	32
FREMANTLE										
Total cargo throughput ('000 tonnes)	11 476	11 348	12 105	12 173	13 445	12 984	12 551	12 217	12 709	12 638
Non-containerised general cargo ('000 tonnes) ^a	309	361	338	361	341	389	409	457	468	482
Containerised cargo (teus exchanged)										
Full import	76 825	93 919	91 668	105 012	98 748	111 982	97 566	108 170	97 015	120 366
Empty import	19 829	19 560	17 758	15 670	19 061	14 630	14 285	13 762	77 003	10 961
Full export	72 686	75 792	77 134	77 904	82 572	83 525	77 872	77 111	13 274	76 177
Empty export	20 954	27 145	28 366	27 458	30 880	36 389	31 064	37 955	31 138	45 069
TOTAL	190 294	216 416	214 926	226 044	231 261	246 526	220 787	236 998	218 430	252 573
Average total employment ^b	193	199	211	217	226	230	241	258	261	280
Port turnaround time (hrs) ^c										
Median result	22	25	25	28	29	31	24	23	21	25
95th percentile	52	60	52	57	63	60	51	56	48	54

- not applicable

a. Excludes bulk cargoes.

b. Comparisons between ports are not appropriate because each port authority/corporation has a different structure.

c. Port turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate because each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.

Note Components may not sum to totals due to rounding.

Source Association of Australian Ports and Marine Authorities (AAPMA).

compared with July–December 2005 and an increase of 4.8 per cent compared with January–June 2006.

Compared with July–December 2005, total cargo throughput in July–December 2006 increased by 3.0 per cent at Brisbane, by 9.7 per cent at Sydney, 6.5 per cent at Melbourne, 7.9 per cent at Adelaide and 3.5 per cent at Fremantle.

Non-containerised general cargo throughput at the five ports was 2.5 million tonnes for July–December 2006, compared with 2.5 million tonnes for January–June 2006 and 2.6 million tonnes for July–December 2005. This represented an increase of 0.7 per cent from the previous half-year and a decrease of 2.0 per cent from the corresponding previous half-year.

Total container traffic throughput for the five ports was 2.7 million teus for July–December 2006, compared with 2.3 million teus for January–June 2006 and 2.5 million teus for July–December 2005. This represented an increase of 16.0 per cent from the previous half-year and an increase of 8.8 per cent over July–December 2005.

Compared with July–December 2005, full teus at the five ports increased by 9.2 per cent, with full imports increasing by 8.9 per cent and full exports increasing by 9.6 per cent.

Stevedoring and ship arrival reliability

This section presents two indicators of waterfront reliability; stevedoring cargo receipt and ship arrival advice.

Stevedoring reliability

Table 12 presents the available information on one indicator of stevedoring reliability at major container terminals. The indicator for each port is prepared by combining each stevedore's cargo availability figures with the proportion of container lifts handled at the stevedore's terminals at the

port to produce the weighted mean presented in Table 12.

Stevedoring reliability in the September quarter 2006 increased at Fremantle; was unchanged at Sydney and decreased at Brisbane and Melbourne compared with the previous quarter. Stevedoring reliability in the December quarter 2006 increased for Melbourne and decreased at Fremantle, Sydney and Brisbane compared with the previous quarter.

Ship arrival

Table 12 also includes data for two indicators of ship arrival advice.

The first indicator is the percentage of ship arrivals within one hour of the most recently advised arrival time available to the port authority/corporation at 24 hours prior to actual arrival. Compared with the previous quarter, the September quarter 2006 indicator fell at Brisbane, Sydney and Fremantle. It was not available for Melbourne and Adelaide. In the December quarter 2006, the indicator also fell at Sydney, Brisbane and Fremantle. It was not available for Melbourne and Adelaide.

The second indicator is the percentage of ship arrivals within one hour of the last scheduled arrival time advised inside the 24 hours prior to actual arrival. In the September quarter 2006, this indicator rose at Sydney and fell at Fremantle and Brisbane. In the December quarter 2006, this indicator rose at Sydney, Brisbane and Fremantle.

Coastal shipping permits

Total tonnages planned to be shipped under cargo permits issued to applicants under Single Voyage Permits (SVPs) and Continuing Voyage Permits (CVPs) increased only marginally from 14 973 000 tonnes in 2005 to 14 989 000 tonnes in the 2006 calendar year (Figure 14).

Table 12 Stevedoring and ship arrival reliability indicators, September quarter 2006 and December quarter 2006

Indicator	Brisbane		Sydney		Per cent Melbourne		Adelaide		Fremantle	
	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec
Stevedoring reliability indicator										
Per cent of cargo received by stevedores by the cut-off time	95	95	90	85	87	89	na	na	97	96
Ship arrival reliability indicators										
Per cent of ships arriving on the time they advised at 24 hrs ^a before arrival	47	45	40	33	na	na	98	96	59	50
Per cent of ships arriving on schedule ^b	93	93	90	91	na	na	100	100	93	93

na not available

a That is within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation at 24 hours prior to actual arrival.

b That is within one hour (plus or minus) of the last scheduled arrival time advised inside the 24 hours prior to actual arrival.

Sources Association of Australian Ports and Marine Authorities (AAPMA), Patrick and DP World.

Single voyage permits

Figure 15 illustrates the number of SVPs issued, and the pre-voyage estimation of tonnes of cargo to be carried, between July–December 1990 and July–December 2006. The number of SVPs issued in July–December 2006 increased by 18.2 per cent compared with January–June 2006, and increased by 19.1 per cent compared with July–December 2005. The associated estimated tonnes of cargo to be carried increased by 28.6 per cent compared with January–June 2006, and increased by 18.9 per cent compared with July–December 2005.

On a calendar year basis the total number of SVPs issued in 2006 was 805, compared with 864 in 2005. This represented a decrease of 6.8 per cent. Over the same period estimated SVP cargo increased by 11.7 per cent from 1190 thousand tonnes to 1330 thousand tonnes.

Table 13 gives a breakdown of SVPs by cargo type for July–December 2006. General cargo (including containerised cargo) permits now represent 5.1 per cent by weight, while making up 42.4 per cent of total permits issued. Bulk cargo accounts for over 94.9 per cent of the total tonnage moved under SVPs.

Continuing voyage permits

Although CVPs were available prior to 1998, they were rarely requested or issued during this period. However, as shown in Figure 16, since 1998 there have been significant fluctuations in both the number of permits issued and the tonnage to be carried. In July–December 2006, a total of 813 000 tonnes were carried under CVPs, compared with 877 000 tonnes in January–June 2006 and 152 000 tonnes in July–December 2005. CVPs issued since the start of 2006 have been for 3 months maximum duration rather than the 6 months allowed previously. One CVP is estimated to be equivalent to three SVPs on average.

In 2006 there were 127 CVPs issued compared with 154 in 2005. A total of 1 700 000 tonnes of coastal trade were to be moved using CVPs in

2006, representing a decrease of 44.9 per cent over the previous year.

More information on coastal permits can be found on the Department of Transport and Regional Services' internet site at <<http://www.dotars.gov.au/maritime/freight/licences/index.aspx>>.

Explanatory notes about terms in *Waterline*

Introduction

Waterline was started to provide a vehicle for publishing descriptive data and various productivity indicators related to waterfront activities. These activities take place in three main parts of the port terminal:

- on the landside of port terminal;
- at the wharf side of port terminal; and
- within the port terminal.

The information in *Waterline* falls under these three broad categories. These explanatory notes briefly describe these activities and the indicators associated with them. To correctly interpret the information in *Waterline* the reader should be clear about the following issues: the scope of coverage of *Waterline*, the sources of the various data items, the measures of output used in *Waterline*.

Scope

Waterline data relates to five mainland major ports in Australia—namely Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

Waterline focuses on containerised cargo; and excludes all other cargo types.

Waterline includes only fully cellular ships in its calculations. Fully cellular ships are defined as purpose-built container ships equipped with 40-foot cell guides below deck as a minimum, and exclude such vessels if used for mixed cargoes of containers and general cargo.

Data sources

The measures of port terminal productivity are based on all available data about container movements at the five port terminals. Those measures are based on a census of activities at those port terminals.

Data on costs are based on a sample of ships that call at each of the mainland major ports in Australia. The chosen samples are all ships in the 15 000–20 000 GT range and all ships in the 35 000–40 000 GT range. These vessels represent almost 40 per cent of vessels in the 15 000 to 45 000 GT range, which itself is almost 85 per cent of all ship visits to these ports in 2005.

Table 13 **Summary of single voyage permits issued, July–December 2006**

Cargo Category	Permits	Tonnes
Bulk Cargo		
Petroleum Products	78	2 469 877
Liquefied Gas	11	87 720
Other Bulk Liquids	18	102 688
Dry Bulk	144	4 436 557
General Cargo	185	384 051
Total	436	7 480 893

Note Tonnages are the pre-voyage estimated tonnes to be carried.
Source Office of Transport Security, Department of Transport and Regional Services.

Figure 14 Total coastal trade and permit tonnages, 1990–91 to 2005–06

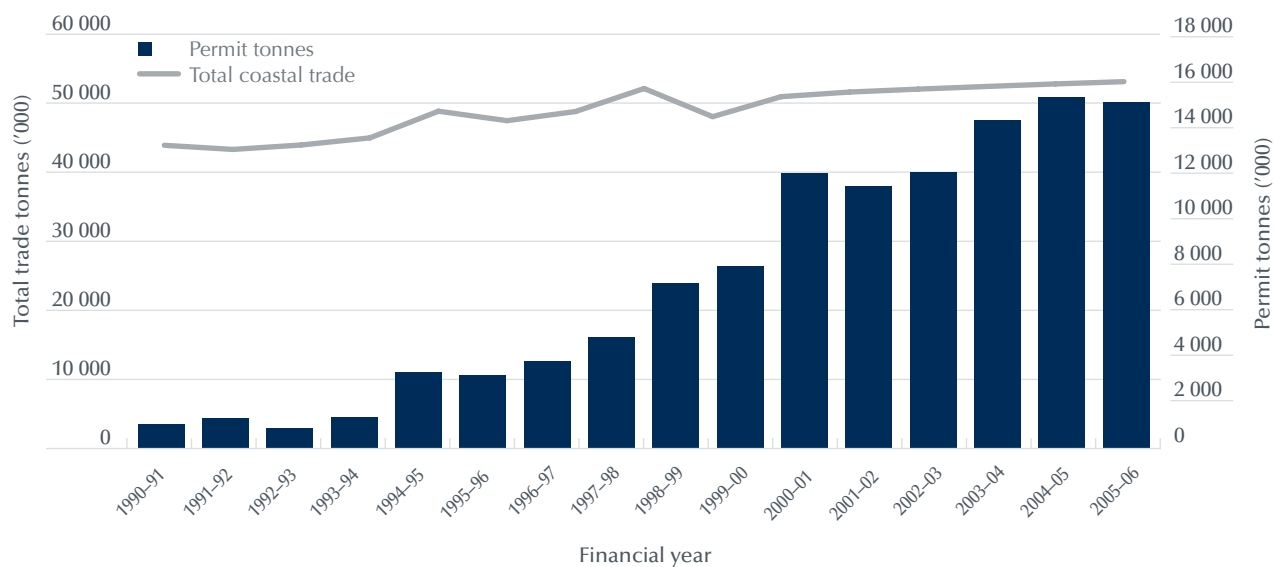


Figure 15 Number of SVPs and tonnes planned to be carried via SVPs, Dec 1990 to Dec 2006

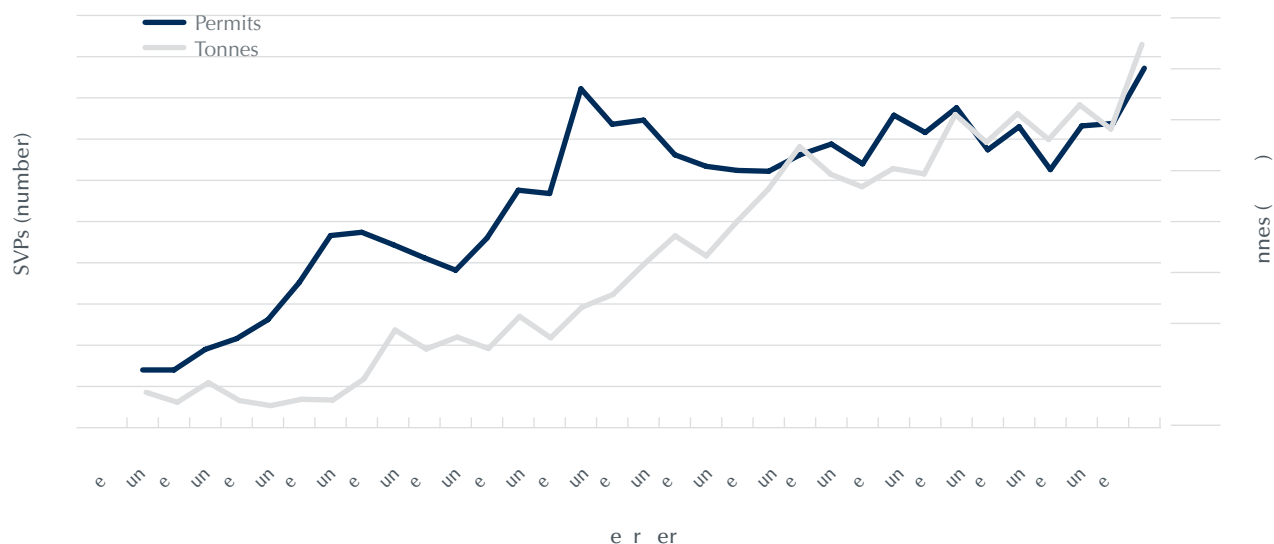
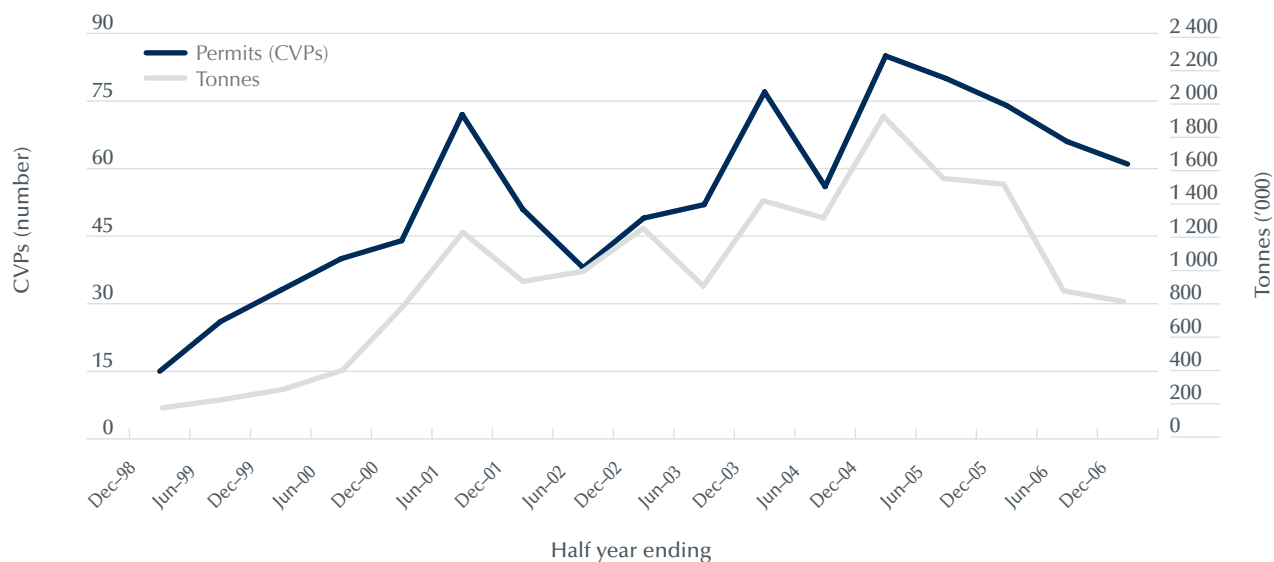


Figure 16 Number of CVPs and tonnes planned to be carried via CVPs, Dec 1998 to Dec 2006



Note All tonnages are pre-voyage estimates.
Source BTRE; Australian Sea Freight series; Office of Transport Security and Maritime and Land Transport Division, Department of Transport and Regional Services, various years.

Two measures of output are used in Waterline

Containers handled—This is the total number of containers lifted on/off fully cellular ships; and

Twenty foot equivalent units (teus)—This is the number of containers calculated as twenty foot equivalent units. This means that a twenty foot container is counted as one container or teu and a forty foot container is counted as two twenty foot containers or two teus. By definition for any given period teus handled are more than containers handled.

Terms used on the landside of the port terminal

Container turnaround time (minutes)—This indicator measures the efficiency in the handling of an individual container at a port terminal in a seven day period. This measure includes more than just the time it takes to bring a container from the container storage yard and put it on a truck or take it from the truck. It is related to the truck turnaround time as follows:

Container turnaround time = (Average truck turnaround time in a quarter) divided by (the average number of containers on a truck in a quarter).

In this definition, average truck turnaround time (TTT) in the quarter is a measure of the efficiency with which trucks are processed within a given terminal. The TTT indicator measures the length of time (in minutes) that a truck takes from the time it enters a port terminal to the time it exits the port terminal. The time spent at the gate is not included in this measure. It also does not include time spent in queuing outside the terminal gate.

Container turnaround time (CTT) recognises the task for the terminal and is a better measure of the performance of a terminal. CTT improves (that is, it goes down) if either the vehicle utilisation rates improves, implying that the number of containers per truck increases, or the port terminal is faster in processing each truck.

Average truck turnaround time in the quarter—This is a measure of the efficiency with which trucks are processed within a given terminal. The indicator measures the length of time (in minutes) that a truck takes from the time it enters a port terminal to the time it exits the port terminal.

Container terminal performance indicators

Container terminal—The movement of containers from the container vessel takes place on to 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 unloaded containers. The containers are placed in stacks of two, three or more and are kept there until they are moved away from the terminal by

truck or train. 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 discharge operation and hires labour for that purpose. Today, a commercial 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 the two major stevedoring companies are Toll/Patrick and PO Ports/Dubai Ports World.

Total containers—This is the total number of containers lifted on/off fully cellular ships in a given period. They should not be confused with teus. "Twenty foot equivalent units" is universally recognised a measure of containers which aggregates both twenty foot and forty foot containers into twenty foot units for statistical purposes.

40 foot containers (per cent)—This is the number of 40 foot containers as a percentage of total containers handled. The higher this indicator is, the larger the degree to which productivity measured as teus per hour, overstates the actual productivity. With teus per hour used as the measure one container lift becomes two lifts. This is why the table which tabulates containers in teus should not be used for measuring productivity.

Crane rate (containers per hour)—This indicator measures the productivity of capital at a port terminal. This is the total containers handled divided by the elapsed crane time. Elapsed crane time is defined as the total allocated crane hours, less operational and non-operational delays.

Vessel working rate (containers per hour) – This indicator measures labour productivity at a port terminal. It is computed as the total containers handled divided by the elapsed labour time (in hours). Sometimes the vessel working rate is referred to as the 'elapsed labour rate'. For a given worker, the elapsed labour time is estimated as the difference between the time when workers first board the ship and the time when they last leave the ship, less the time when the workers have not worked for whatever reason.

Crane time not worked (percent)—This is the time when a crane could not be used for any reason (operational or non-operational) as a percentage of the total time allocated to a crane.

Ship rate (containers per hour)—This indicator measures the combined stevedoring productivity

of capital and labour. It gives the stevedoring productivity per ship while the ship is being worked. It is computed as the crane rate times the crane intensity where crane intensity is (total number of allocated crane hours/ elapsed labour time).

Throughput pbm (tonnes per berth metre squared)—This is the quantity of container and non-container cargo which passes through the port container terminals and is measured in tonnes per berth metre squared. It is a measure of the density of the storage system and reflects the ability of the terminal container storage area to transfer containers from ship to shore and vice versa.

Port interface cost index

The port interface cost index 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, therefore, 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. Also land transport and custom's agent's charges are estimated for a representative transport distance for land transport and a representative consignment for customs agents charges.

The Port Interface Cost Index 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. The construction of the Port Interface Cost Index is a four stage task:

Stage 1: involves the determination of the vessel sizes to represent all vessels of interest that are used to transport containerised cargo. Two vessel sizes are used to represent all vessels of interest. These are: Vessel size of Gross tonnage equal to 17 215 represents all vessels of sizes ranging from 15 000 to 20 000; and Vessel size of Gross tonnage equal to 37 394 represents all vessels of sizes ranging from 35 000 to 40 000. This size determination was calculated at the commencement of the Waterline series and is still used. These two ranges

are selected to provide the standard representative ships used in the calculations.

Stage 2: The BTRE calculates key parameters for containers carried by the two representative vessels from data provided by port authorities.

Stage 3: The BTRE estimates ship-based charges and cargo based charges for the representative vessels from price data obtained from port authorities and other maritime operators and transport companies and customs brokers.

Stage 4: BTRE constructs a Port Interface Cost Index for the five ports showing how the various cost components have changed over the recent past.

Table 3

The following terms are used when discussing the Port Interface Cost Index.

Vessel size: This is the total internal capacity of a vessel. It is often referred to as Gross Tonnage.

Teus: This is an industry standard measure of shipping containers.

Teus are twenty foot equivalent units.

Teus loaded means containers loaded with goods.

Teus empty means empty containers.

Teus loaded inwards means imported.

Teus loaded outwards means exported.

Number of port calls—Average number of visits of vessels in a particular GT range.

Elapsed berth time (hours)—Average time between arrival at and departure from their berth of all vessels in a particular GT range.

Port and Related Charges

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

- 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 vessel. They are port service charges levied by the port authority;
- Pilotage charge to cover services for piloting the ship;
- Towage charges levied by the tug boat operator;
- Mooring & Unmooring – charge levied either by the port authority or the stevedoring company;
- Berth hires charges sometimes charged by the Stevedores.

Cargo-based charges include the following items:

- Wharfage charges that are levied on each container by the port authorities;
- Harbour dues that are levied on each container by the port authorities;
- Berth charge that are sometimes charged by port authorities.

Port Interface Costs

These costs are the sum of the ship based charges and the cargo based charges with the addition of a stevedoring charge and customs brokers and transport charges. They include ship-based charges and cargo-based charges as shown under the heading port and related charges. They also include:

Stevedoring charges—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.

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

Road transport charges—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.

Individual port index—Port interface costs are calculated for each of the five ports for each six month period. They are shown as the import total or the export total in the Port Interface Cost tables and are the total cost of importing or exporting a container (teu).

National Index—The National Port Interface Cost Index is the Australian average for each six month period of importing or exporting a container in an average ship.

Ship visits

Ship visits measures the number of times a ship calls at a port or ports, for example, a ship that sails to Australia 3 times and makes a total of 15 port calls in a year counts as 1 ship, 3 voyages and 15 ship calls.

Non-Financial performance Indicators

Cargo throughput (tonnes)—This is the quantity of container and non-container cargo which passes through the port and is measured in tonnes.

Non-containerised general cargo (tonnes)—This is cargo which is not carried in containers.

Containerised cargo (teus exchanged)—This is the cargo which is carried in containers normalised as twenty foot equivalent containers.

Average total employment—This is the total employment of the port authorities. It does not include the waterside workers employed by stevedoring companies.

Port turnaround times (hours)—This is the time in hours a container ship is in a port. It is measured as a median of all the container ships in port over a six month period. It is also measured as the 95 th percentile for those ships. The 95th percentile says that 95 per cent of the time, the turnaround time is below this amount. Conversely, 5 per cent of the time, turnaround time is above that amount.

Coastal shipping permits

Coastal shipping permits: Under the Navigation Act 1912 (section 286) vessels may be licensed to participate in Australia's coastal trade irrespective of flag and crew nationality. An unlicensed ship may be granted a permit to trade on the Australian coast in the carriage of either cargo or passengers where:

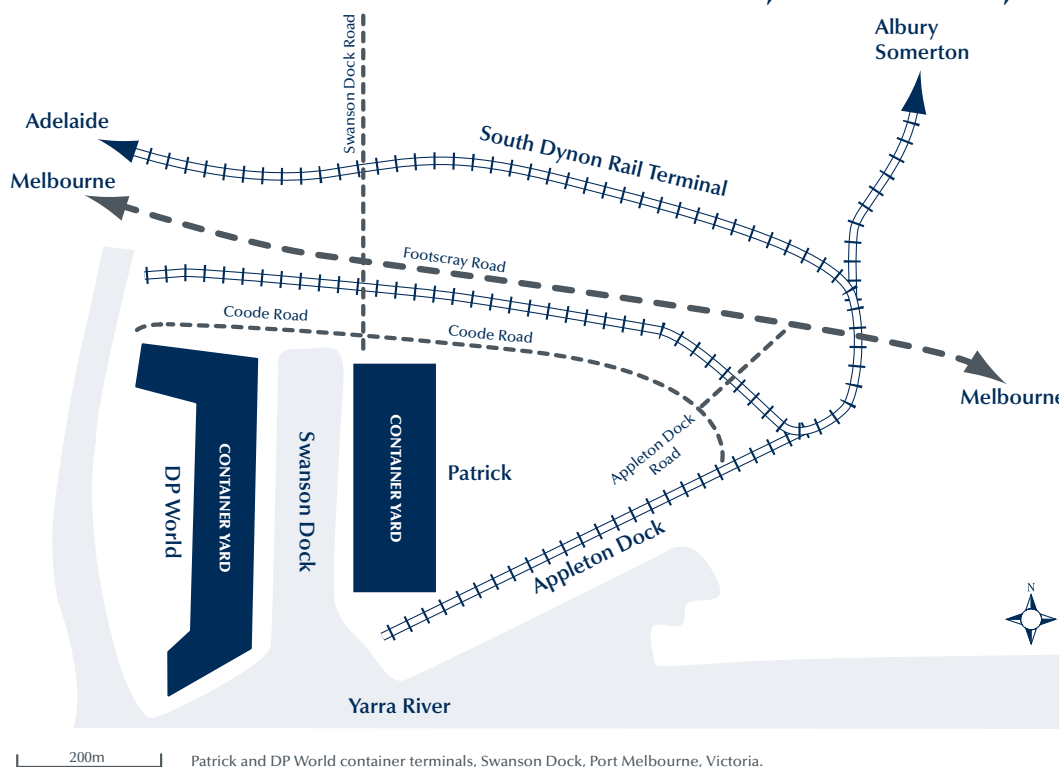
- there is no suitable licensed ship available for the shipping task;
- or the service carried out by licenced ships is inadequate;
- and it is considered to be desirable in the public interest that an unlicensed ship be allowed to undertake that shipping task.

Single voyage permits (SVP)—This permit is issued for a single voyage between designated ports for the carriage of a specified cargo or passengers

Continuing voyage permits (CVP)—This permit is issued for a period of up to three months and enables a vessel to carry specified cargo between specified ports for that period.

Appendix Schematic representations of five major Australian port terminals, as at March 2007

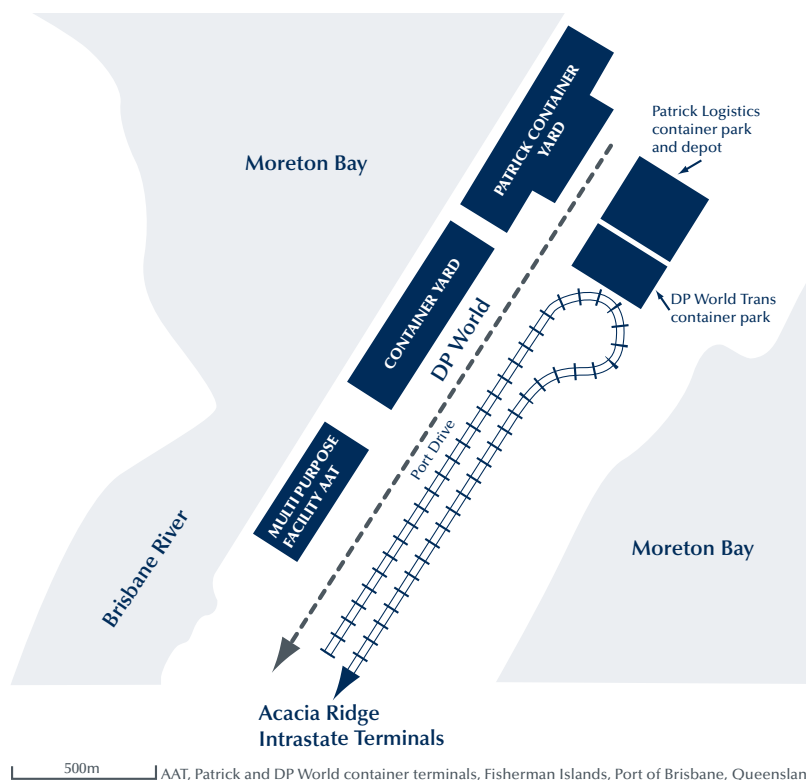
Diagram 1 Patrick and DP World terminals—Swanson dock, Port Melbourne, Victoria



Note For DP World and Patrick trains from the Swanson Dock to access the rail network they have to cross Footscray Road. This access is being improved with a grade separation funded by an Auslink National Project. The trains pass through the South Dynon rail terminal which is only a few hundred metres north of Footscray Road.

Source DOTARS (2006), DOTARS (2007a), DP World (2007), Google Maps Australia (2007), Patrick (2007), Port of Melbourne (2006), SKM (2003).

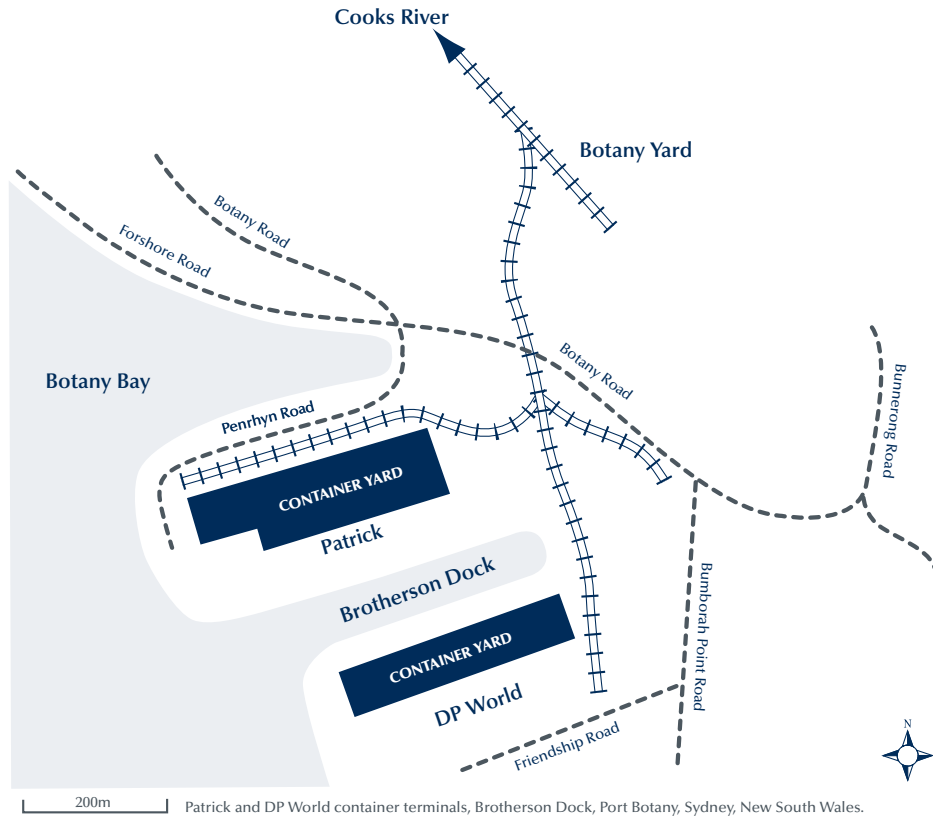
Diagram 2 Patrick and DP World terminals—Fisherman Islands, Port of Brisbane, Queensland



Note This is a purpose built container terminal and includes a near dock rail terminal shared by the two stevedores for export and import containers and Australian Amalgamated Terminals (AAT) which provides a multi purpose facility with container handling capacity which can be used for motor vehicles as well as other stevedoring activities. Berths 1 to 3 are leased by AAT, berths 4 to 6 are leased by DP World and Berths 7 to 9 are leased by Patrick for their Autostrad container terminal. The rail terminal has a direct turning loop which avoids shunting of trains. The Fisherman Islands terminal is connected to the Acacia Ridge terminal and to regional terminals. The Acacia Ridge multi-modal container terminal is connected to the intrastate narrow gauge rail network as well as the interstate standard gauge network.

Source DP World (2007), Google Maps Australia (2007), DOTARS (2006), Patrick (2007), Port of Brisbane (2007).

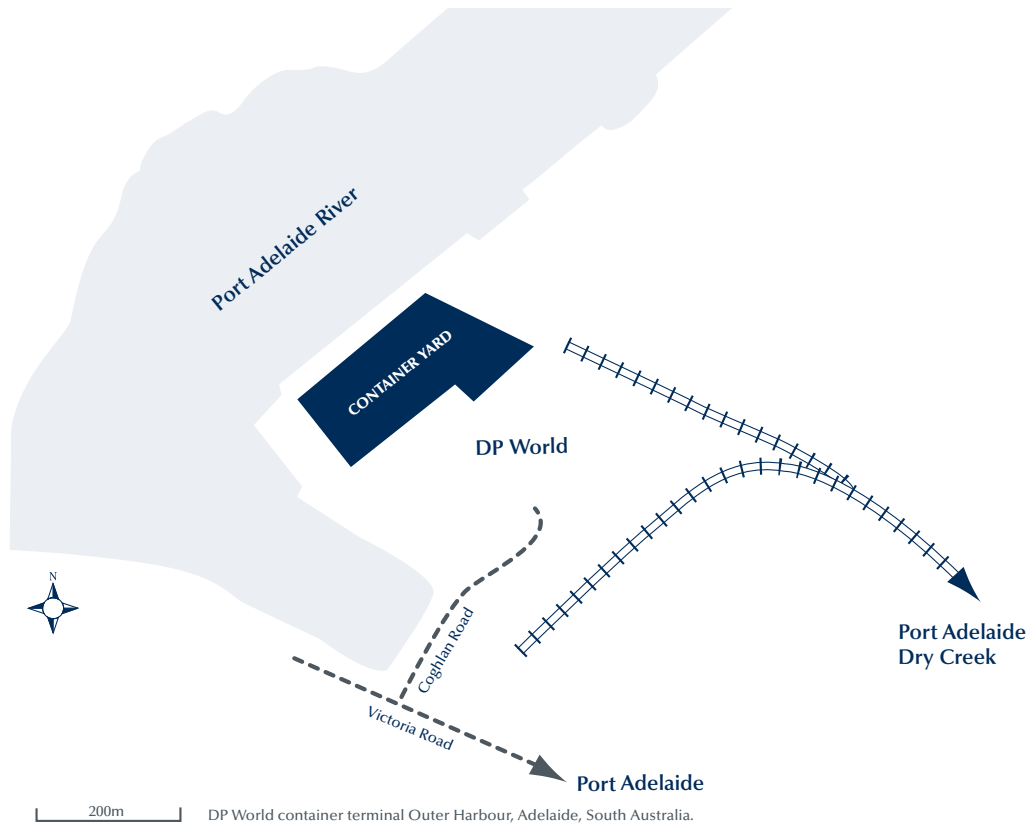
Diagram 3 Patrick and DP World terminals—Brotherson dock, Port Botany, Sydney, New South Wales



Note Port Botany has on-dock rail terminals. Access for both DP World and Patrick is directly adjacent to the container yards making it easier to load containers directly on to trains. Trains with containers for both the stevedores are split up at the Botany Rail Yard which is adjacent to the container terminal at Brotherson dock. DP World Transport has an intermodal terminal adjacent to the Port Botany container terminals which is used primarily for empty containers. Further down (about eight kilometres) along the Botany Freight Rail Line, the Cooks River terminal is also used for empty containers. To the West of the metropolitan area are intermodal terminals at Yennora, Leightonfield, Minto and Camellia. Development of the Port Botany rail link is planned as part of an Auslink National Project.

Source DOTARS (2007b), DP World (2007), Freight Industry Advisory Board (2005), Google Maps Australia (2007), DOTARS (2006), Patrick (2007).

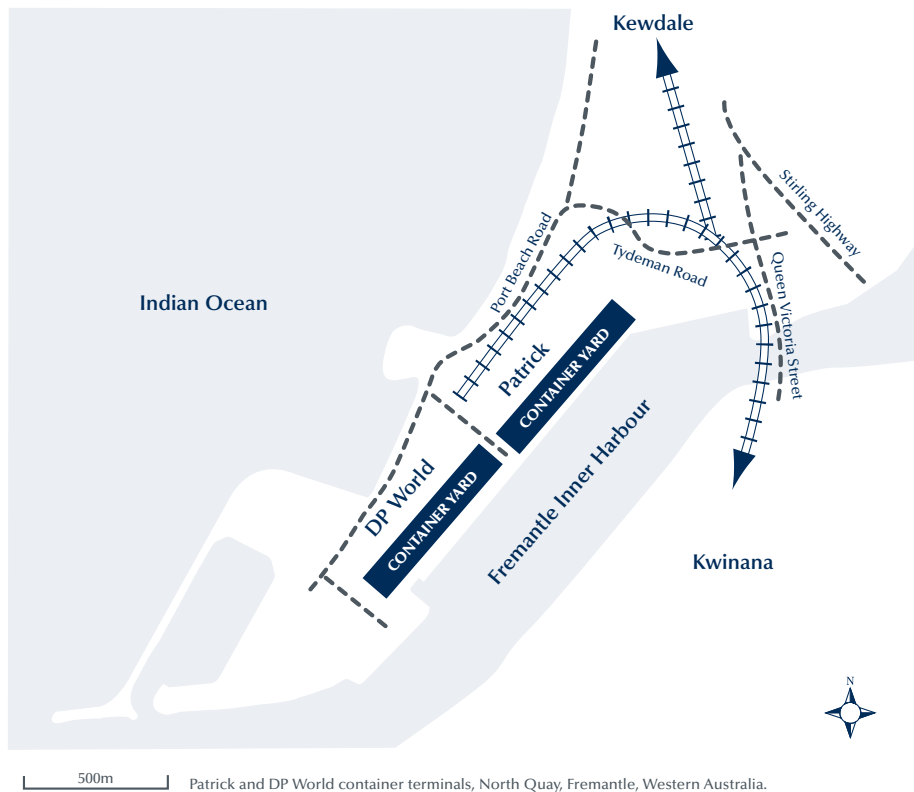
Diagram 4 DP World terminal—Outer Harbour, Adelaide



Note This is the only container terminal at Adelaide. It is operated by DP World stevedores, is located at Pelican Point, Outer Harbour, approximately 10 kilometres from Port Adelaide. It has an on-dock rail terminal adjacent to a container depot which in turn is connected via Port Adelaide to the Dry Creek intermodal terminal by a dual gauge (broad and standard gauge) line. The link is to be improved as an Auslink National Project by a new rail bridge across the Port River and Port Adelaide as Stage 3 of the Port River Expressway Upgrade (DOTARS 2007c).

Source DOTARS (2007c), DP World (2007), Google Maps Australia (2007), DOTARS (2006).

Diagram 5 Patrick and DP World container terminals—North Quay, Fremantle



Patrick and DP World container terminals, North Quay, Fremantle, Western Australia.

Note The container terminal has a rail terminal adjacent to the Patrick container yard. The DP World terminal is located further along the dock. The rail terminal on North Quay has recently been upgraded as an Auslink National Project. The new link is dual gauge providing access for narrow gauge trains to the terminal. Containers travelling by rail have as origin/destination the Perth metropolitan area, regional Western Australia or are land bridged to Adelaide. However interstate containers (land bridge) are not dispatched directly from the Inner Harbour rail terminal but from Kewdale, which is Perth's only intermodal terminal.

Source Department of Planning and Infrastructure (2004), DOTARS (2006), DP World (2007), Fremantle Ports (2007), Google Maps Australia (2007), DOTARS (2007d), Patrick (2007).

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Annex 1 Container terminal performance indicators, selected Australian ports — productivity in teus per hour

FIVE PORTS

	Dec-02	Mar-03	Jun-03	Sep-03	Dec-03	Mar-04	Jun-04	Sep-04	Dec-04	Mar-05	Jun-05	Sep-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06
Ships handled	856	821	822	841	850	801	825	905	936	890	993	1 027	1 043	1 026	1 075	1 117	1 094
Total teus	938 913	871 089	870 861	952 273	1 023 224	963 667	1 018 623	1 096 611	1 161 451	1 042 313	1 035 658	1 107 901	1 194 998	1 048 694	1 120 123	1 229 340	1 329 707
Crane rate	35.6	35.3	37.4	38.5	37.8	38.2	39.0	38.9	38.4	38.2	38.6	38.0	39.5	39.4	38.0	38.4	38.5
Vessel working rate	42.2	42.9	44.3	47.9	46.5	46.7	47.3	46.2	46.6	48.9	49.3	49.5	51.0	49.3	49.6	50.1	51.9
Ship rate	59.4	58.8	61.7	67.4	64.4	64.6	66.1	65.0	64.8	65.4	64.8	63.8	66.8	63.8	63.7	65.6	67.4
Throughput pbm	131.6	122.1	122.0	133.4	143.4	135.0	142.7	153.7	162.7	146.1	145.1	155.2	167.4	146.9	157.0	172.3	186.3

BRISBANE

Ships handled	216	206	184	192	194	179	175	219	227	205	222	244	261	262	257	280	271
Total teus	143 882	130 384	124 854	147 273	158 065	146 104	151 138	188 092	191 414	165 403	158 860	173 665	204 553	176 840	184 468	208 853	226 197
Crane rate	35.6	33.8	35.8	35.0	35.4	36.1	37.5	37.7	37.8	38.5	37.4	35.9	39.7	35.8	34.4	32.7	33.0
Vessel working rate	32.3	32.6	36.3	34.2	36.3	36.9	40.7	36.9	33.1	37.1	36.7	36.6	38.8	36.2	38.8	35.9	36.0
Ship rate	53.9	50.4	55.3	53.7	55.9	57.7	61.5	59.3	58.9	58.8	55.1	50.0	58.5	49.7	51.1	50.6	52.4
Throughput pbm	89.5	81.1	77.7	91.6	98.4	90.9	94.0	117.0	119.1	102.9	98.9	108.1	127.3	110.0	114.8	130.0	140.8

SYDNEY

Ships handled	210	211	217	228	238	221	231	253	262	258	283	294	297	293	307	318	322
Total teus	302 267	278 456	271 501	303 745	336 988	306 080	327 661	347 047	371 243	330 140	330 816	364 083	385 180	334 708	358 563	399 648	441 497
Crane rate	35.2	35.7	38.0	39.4	37.3	37.7	39.0	39.0	38.6	38.3	39.5	37.5	39.7	40.4	38.2	38.7	38.9
Vessel working rate	45.8	46.2	49.5	53.3	47.1	51.0	51.0	48.5	50.4	49.9	52.6	50.3	52.2	50.3	48.8	50.0	51.0
Ship rate	61.7	61.9	67.2	73.0	64.8	67.8	67.7	65.1	68.0	66.8	68.8	65.1	68.9	66.8	64.6	67.5	67.4
Throughput pbm	155.6	143.4	139.8	156.4	173.5	157.6	168.7	178.7	191.2	170.0	170.3	187.5	198.3	172.4	184.6	205.8	227.3

MELBOURNE

Ships handled	243	229	235	240	241	223	244	266	272	260	299	293	300	293	318	321	314
Total teus	342 684	317 711	327 822	342 966	361 225	351 753	379 002	397 048	425 247	392 776	386 211	406 855	428 845	384 742	415 981	445 767	470 823
Crane rate	35.7	35.3	38.0	39.7	39.8	40.6	40.8	40.5	38.7	38.4	38.4	39.4	39.4	40.0	39.3	40.0	40.0
Vessel working rate	43.8	45.7	45.1	51.9	53.0	50.4	50.3	50.9	50.1	54.8	53.7	56.5	56.5	55.3	56.5	58.4	61.9
Ship rate	61.9	61.8	61.6	72.4	71.8	69.9	72.1	71.7	67.2	69.6	67.5	71.3	70.5	70.0	70.0	72.8	76.1
Throughput pbm	187.7	174.0	179.5	187.8	197.8	192.6	207.6	217.4	232.9	215.1	211.5	222.8	234.9	210.7	227.8	244.1	257.8

ADELAIDE

Ships handled	58	50	58	62	63	60	60	54	56	53	68	66	66	66	67	68	65
Total teus	39 354	37 731	40 012	44 510	47 571	43 768	44 335	44 741	43 850	43 588	47 775	52 432	48 319	45 721	49 296	51 899	55 227
Crane rate	31.3	33.2	34.2	35.4	36.4	35.0	35.7	36.0	37.7	37.4	38.7	39.8	39.7	40.33	40.14	42.3	41.8
Vessel working rate	44.3	46.5	44.9	39.4	43.4	40.9	39.7	42.9	44.7	46.8	42.7	47.5	47.5	48.08	47.07	49.5	48.6
Ship rate	49.7	53.1	52.8	47.6	49.9	47.3	45.4	50.9	49.6	54.8	49.5	56.1	54.8	55.38	53.99	57.2	57.8
Throughput pbm	83.7	80.3	85.1	94.7	101.2	93.1	94.3	95.2	93.3	92.7	101.6	111.6	102.8	97.3	104.9	110.4	117.5

FREMANTLE

Ships handled	129	125	128	119	114	118	115	113	119	114	121	130	119	112	126	130	122
Total teus	110 726	106 807	106 672	113 779	119 375	115 962	116 487	119 683	129 697	110 406	111 996	110 866	128 101	106 683	111 815	123 173	135 963
Crane rate	38.4	36.7	37.3	38.7	36.7	36.7	36.3	36.4	38.3	36.5	38.7	37.0	38.6	39.5	37.6	39.4	40.0
Vessel working rate	39.5	37.2	38.3	42.3	40.0	38.2	38.5	40.1	44.6	43.4	45.0	42.2	49.4	47.2	45.9	45.2	48.3
Ship rate	56.2	54.2	59.1	62.5	57.6	55.4	56.1	57.0	61.7	60.1	63.5	57.0	65.7	59.2	62.2	62.0	66.6
Throughput pbm	85.7	82.7	82.6	88.1	92.4	89.8	90.2	92.7	100.4	85.5	86.7	85.8	99.2	82.6	86.6	95.4	105.3

pbm per berth metre

Notes 1. Data from CSX World Terminals at Brisbane are incorporated from the December quarter 1999 until June quarter 2001.

2. For data back to the December quarter 1993, refer to Waterline 34.

Sources Patrick, DP World.

Abbreviations and other port service providers

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTCE	Bureau of Transport and Communications Economics
BTRE	Bureau of Transport and Regional Economics
CVP	Continuing Voyage Permit
DOTARS	Department of Transport and Regional Services
Five port	The five mainland capital city ports (Brisbane, Sydney, Melbourne, Adelaide, Fremantle)
GT	Gross tons, formerly abbreviated as GRT
hrs	hours
na	Not available
Mins	minutes
Pbm	Per berth metre
PICI	Port Interface Cost Index
R	revised
SVP	Single Voyage Permit
Teus	Twenty-foot equivalent units
TTT	Truck turnaround time
UCC	Unitized Cellular Container vessel
VBS	Vehicle Booking System

Stevedoring productivity definitions

Containers handled	The total number of containers lifted on/off fully cellular ships.
Crane intensity	This is the total number allocated crane hours, divided by the elapsed time from labour first boarding the ship to labour last leaving the ship.
Crane rate	The total containers/teus handled divided by the Elapsed Crane Time.
Elapsed crane time	The total allocated crane hours, less operational and non-operational delays.
Elapsed labour time	This is the elapsed time between labour first boarding the ship and labour last leaving the ship, less non-operational delays.
Ship rate	The Crane Rate multiplied by Crane Intensity (as defined above).
Ships	Only fully cellular ships are included in calculations. Fully cellular ships are defined as purpose-built container ships equipped with 40-foot cell guides below deck as a minimum, and exclude such vessels if used for mixed cargoes of containers and general cargo.
Teus handled	The total 40-foot containers lifted on/off fully cellular ships multiplied by 2, plus the total 20-foot containers lifted on/off fully cellular ships.
Vessel working rate	The total containers/teus handled divided by the Elapsed Labour Time.



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