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Foreword

As Australia’s traded industries become more exposed to the pressures of international competition there is an increasing need for infrastructure services to be supplied on an internationally competitive basis. In the absence of market forces, performance benchmarks can be used to promote productivity improvements.

In March 1991, the Prime Minister announced that the BIE would undertake a project to develop international performance benchmarks for the more significant infrastructure service industries and monitor performance relative to these benchmarks through time. To date reports covering the electricity, rail freight, telecommunications, road freight, waterfront, coastal shipping, aviation and gas supply industries have been published. The initial overview report covering the first five industries was published in February 1994. This second overview report presents a summary and synthesis of the latest information for all eight industries and comments on the progress of reform to date.

The BIE would like to thank the International Benchmarking Advisory Group convened by the Business Council of Australia and comprising representatives from the Australian Chamber of Commerce and Industry, the Minerals Council of Australia, the Chamber of Manufactures of NSW and the NSW Treasury.

The report was researched and written by John Houghton, Denis Lawrence, Anna George, Paul Bilyk, Andrew Morris, Jennifer Orr, Ruth Thomson, Rosalie McLachlan, Ron Arnold, Julia Lynch, Andrew Welsh and Stephen Brown, with the assistance of Andrea Versteegen. The project was supervised by DenisLawrence, Assistant Secretary of the BIE’s Business Infrastructure Branch.

November 1995

Bob Hawkins
Director

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Executive Summary

International Benchmarking Overview 1995 is the second report to review and summarise the performance comparisons undertaken as part of the BIE's infrastructure benchmarking program. The industries covered in this report include: electricity, rail freight, telecommunications, waterfront, coastal shipping, aviation, and gas supply. Two additional infrastructure industry studies, road construction and water supply, are due to be completed during 1996-97. A broader benchmarking program, which covers government services and the impact of microeconomic reform, has recently begun.

The BIE has developed performance measures which compare Australia's infrastructure services with those of our international competitors from the perspective of the users of those services. In particular, we assess whether Australia's traded goods sector is disadvantaged by the performance of domestic infrastructure service industries. We then examine the labour and capital productivity of Australia's infrastructure service industries relative to their overseas counterparts to assess the scope for performance improvement.

The importance of infrastructure performance (Chapter 2)

By sector, direct and indirect infrastructure services inputs comprise between 7 and 16 per cent of the costs of producing final output. Agriculture directly and indirectly requires $7 of infrastructure services to produce $100 of output, with energy and water being the major infrastructure service input. In manufacturing, nearly $16 of infrastructure services are required to produce $100 of output, with transport being the major infrastructure service input.

Over $11 of infrastructure services are directly and indirectly required to produce $100 of national output. Of this amount, energy and water comprise $5, transport $4.40 and communications $2.30. However, the efficient delivery of infrastructure services is even more important to Australia's international competitiveness than these cost shares suggest, because infrastructure plays such a key role in facilitating international trade.

Performance gaps — the key results (Chapter 12)

The key result emerging from the BIE's international benchmarking of Australian infrastructure is that while progress has been made in some areas of microeconomic reform, much remains to be done. Recent reform initiatives have tended to narrow performance gaps between some Australian infrastructure industries and observed international best practice. However, international best practice is a moving target and we have to run fast to keep pace with the world leaders. The fact that we have actually stepped backwards in waterfront container handling and aviation, while the rest of the world has been moving ahead, must be cause for concern.

In figures 1 to 4 we analyse infrastructure performance gaps. Australian best practice is set equal to 100 and all performance gaps are expressed as a percentage of it. The performance gap between Australian best practice and best observed practice is represented by the bar above the horizontal line marked 100. A higher bar above this line indicates that we are further behind best practice. The graphs are thus like a thermometer with the highest bars above the 100 line indicating the biggest problem areas. Where there is a bar below the horizontal line marked 100 it represents the distance between Australia's best observed and worst observed practice (the performance range of Australian utilities).

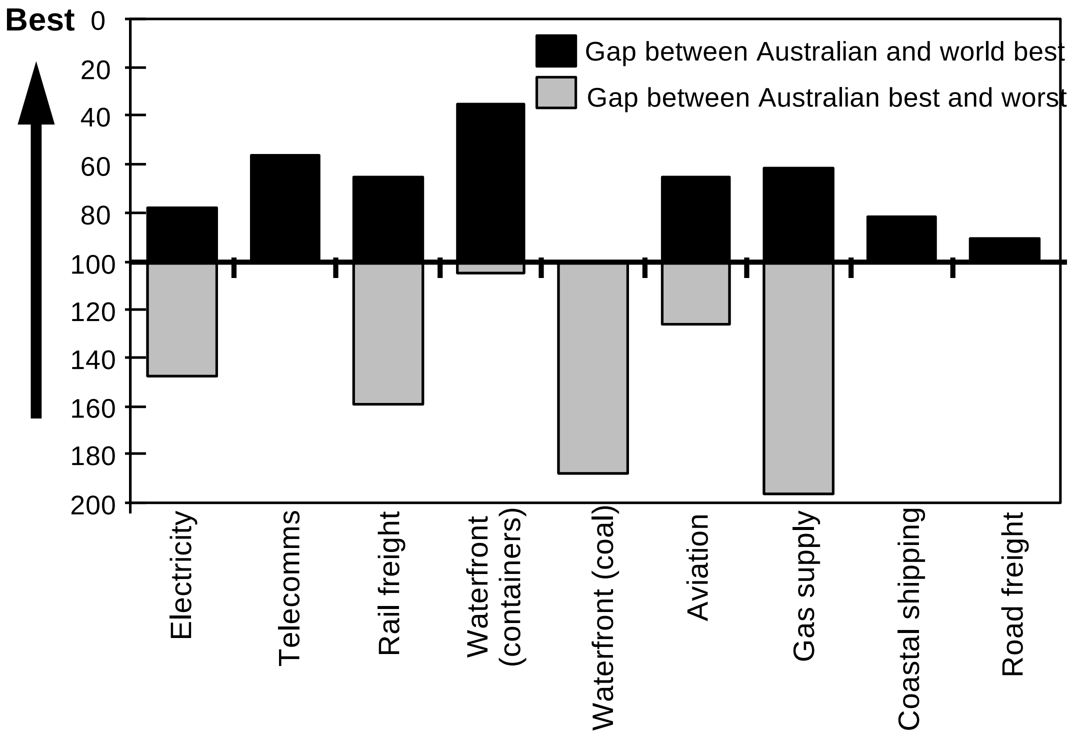
Prices

Australia's best observed price performance is in waterfront coal handling. Australia also performs relatively well in respect to charges for road freight, dry bulk vessel coastal shipping and electricity. More significant price performance gaps are observed in waterfront container handling, telecommunications, rail freight, aviation (airport charges) and gas supply (figure 1).

The largest of the price performance gaps between Australian best practice and world best practice occurs in waterfront charges for containers. Charges at Johor in Malaysia in 1995, at $98, are $180 or 65 per cent lower than Adelaide, which is Australia's lowest price container port. Charges at Klang (Malaysia), a port viewed as being more comparable within the industry, are only slightly higher than those at Johor. In contrast, the best observed Australian coal handling port, Hay Point, was the best observed price practice in the world.

The second largest price performance gap between Australian and world best observed practice occurs in telecommunications, where the price of a composite basket of business services in Finland in 1994 was 44 per cent lower than in Australia. Australian coastal shipping vessel costs are higher than those in five of the seven countries sampled. However, Australia was close to best practice in respect to road freight charges in 1992, when long haul charges (cents/tkm) in Australia were only 9 per cent higher than in the United States.

Figure 1 Price performance gaps — Australian and best observed (index relative to Australian best = 100)



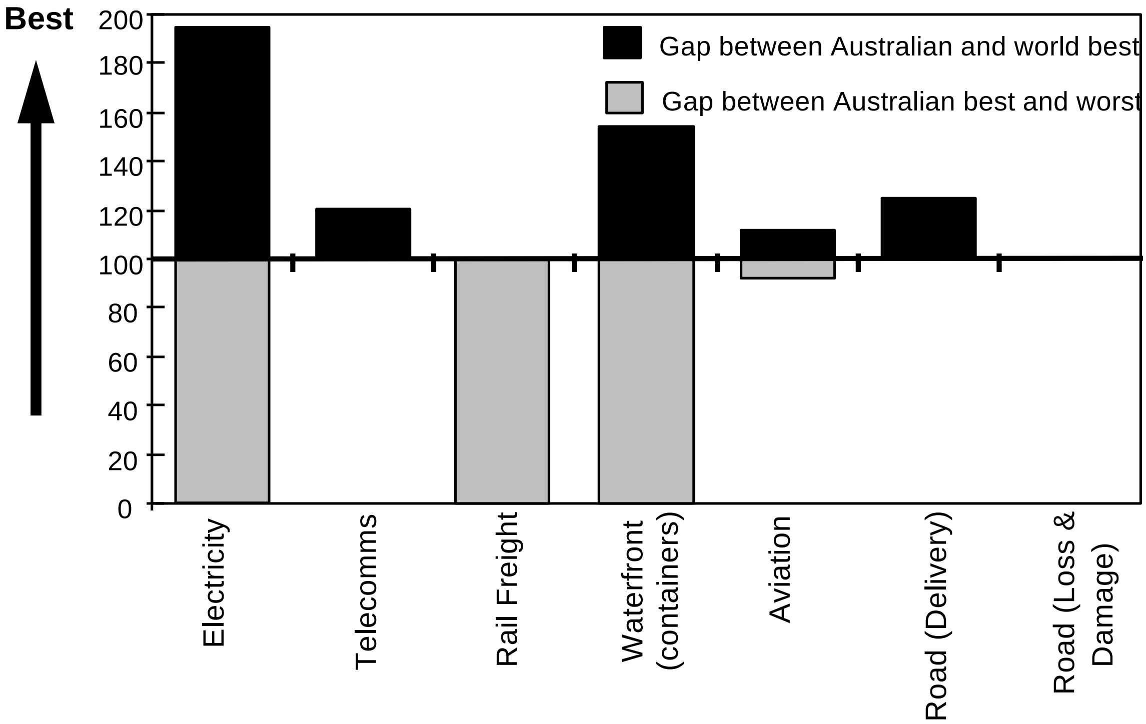
Note: A larger bar above the 100 line indicates a larger gap relative to international best practice.
Source: BIE chart based on data reproduced in appendix A, table A1.

Service quality

Figure 2 summarises observed performance gaps in respect to the reliability of service. Reliability of waterfront services in the Australian ports lags well behind world's best practice. The best performed Australian port, Adelaide, takes more than twice as long to work a box than the best observed comparably sized port, Zeebrugge in Belgium. Australia also performs particularly poorly on timeliness variability with a high proportion of delays to container ships in excess of 40 hours. Short delays can usually be made up in subsequent sailing time but delays of this length necessitate the omission of subsequent port calls or the hiring of charter vessels. Both options are very costly to ship operators.

In 1993, Australia's aviation industry was performing relatively well in terms of on-time departures with 85 per cent of flights from Cairns, our best performer, being on time. However, subsequent setbacks have seen the percentage of delays from Sydney incease by around 70 per cent between the year to March 1993 and the year to March 1995 (OAA 1995).

Figure 2 Service quality performance gaps — Australian and best observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap relative to international best practice.
Source: BIE chart based on data reproduced in appendix A, table A2.

Australia's good performance on road freight pricing carries over to reliability. Australian road freight delivery time and loss and damage rates are both relatively close to best practice. In terms of the rail freight loss and damage indicator, the value of claims in cents per $100 revenue in 1994, the State Rail Authority of New South Wales was the world best observed practice at 2 cents per $100 revenue.

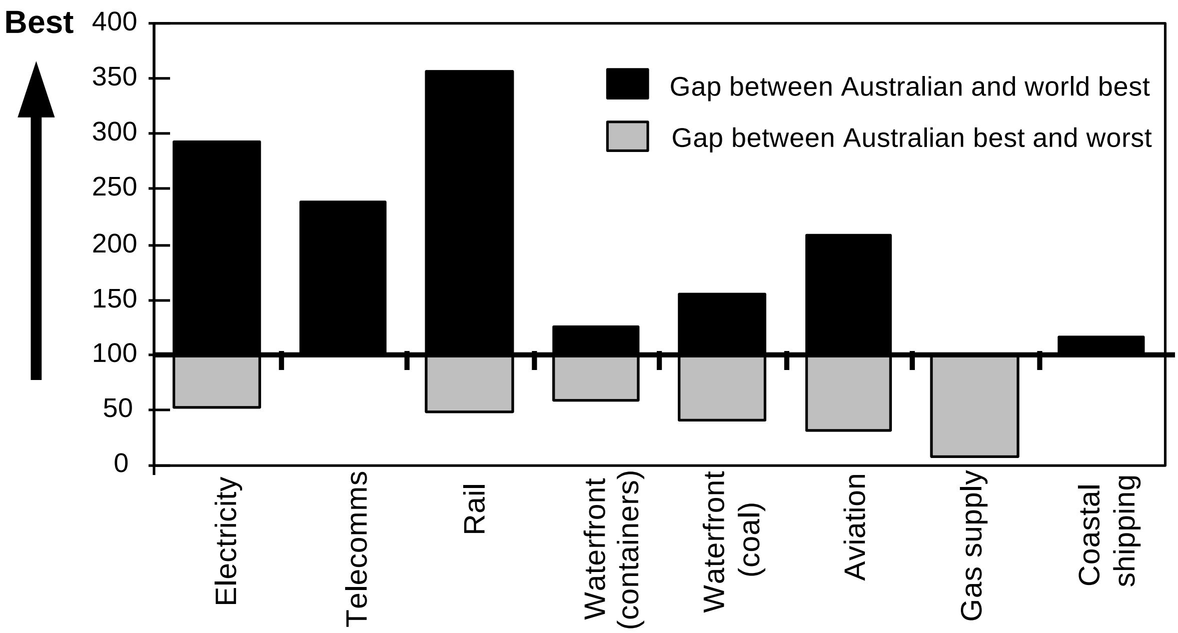
Operational efficiency

Operational efficiency performance gaps relating to labour and capital productivity are summarised in figures 3 and 4.

Labour productivity

The greatest labour productivity performance gaps are in rail freight and electricity (figure 3). World best observed rail labour productivity, measured as net tonne kilometres per employee, was Burlington Northern in the United States which out performed AN, Australia's best observed, by a factor of 3.6. Labour productivity in electricity, measured as gigawatt hours per employee, was 3 times greater at TransAlta in Canada than in Victoria, Australia's best observed practice.

Figure 3 Labour productivity performance gaps — Australian and best observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap relative to international best practice.
Source: BIE chart based on data reproduced in appendix A, table A3.

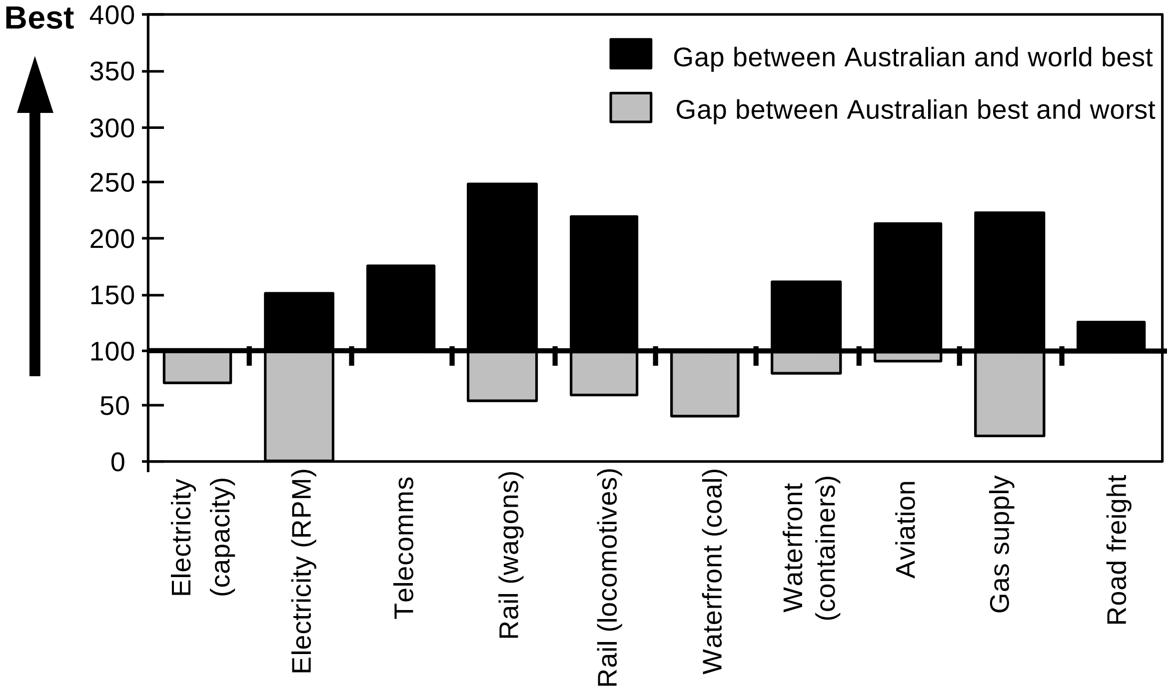
In telecommunications Australia's partial labour productivity, measured as lines and calls per employee, was the worst of the 11 countries sampled in 1992. World best observed labour productivity practice, that of the United States, was more than double that of Telstra.

Australia's best labour productivity performance occurred in the gas supply industry, in which SECWA (Western Australia) was the world best observed practice in terms of throughput per employee in 1994. Australia also performs relatively well in terms of coastal shipping labour productivity, measured as the manning level for a small dry bulk vessel in 1994. Australia's manning level performance was only 17 per cent below the world best observed practice, that of Norway.

Capital productivity

Based on unadjusted costs, the greatest capital productivity performance gap between world best practice and Australian best practice occurs in the use of rail rolling stock (figure 4). The gas supply and aviation industries also exhibit significant capital productivity performance gaps.

Figure 4 Capital productivity performance gaps — Australian and best observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap relative to international best practice.
Source: BIE chart based on data reproduced in appendix A, table A4.

World best observed capital productivity in the gas supply network, measured as terajoules per total main kilometre in 1994, occurred at Peoples Energy in Illinios (United States). Its performance was more than double that observed in Western Australia, Australia's best observed practice. In aviation, the number of passengers per terminal gate through Hong Kong airport in 1993 was double that of Cairns airport, Australia's best observed.

A significant capital productivity performance gap also exists in telecommunications, where capital productivity, measured as calls per line, was 75 per cent higher in the United States in 1992 than it was in Australia. The waterfront produced the most mixed performance results. Container handling crane rates were around 60 per cent higher in Laem Chabang, Oakland and other comparable ports in 1994 than in Fremantle, Australia's best performing port. On the other hand, Newcastle achieved the best observed coal handling capital productivity.

Infrastructure performance — are we closing the gap?

This analysis of the performance gaps suggests that there is a marked difference in performance between the various categories of indicators. The largest price performance gap between Australia's best and best observed practice is 65 per cent for waterfront container handling. Labour and capital productivity gaps are both larger and more varied. The largest capital productivity performance gap between Australia's best and best observed practice is 150 per cent for wagon utilisation in rail freight. The largest labour productivity performance gap is also found in rail freight at more than 250 per cent. Four industries (rail freight, electricity, telecommunications and aviation) have labour productivity gaps in excess of 100 per cent while three industries (rail freight, gas supply and aviation) have capital productivity gaps in excess of 100 per cent. So, it would appear that it is in the area of operational efficiency, especially labour productivity, that Australia falls furthest behind world best practice.

To see whether or not Australia is gaining ground on world best practice we examined relative performance gaps over time. In respect to price indicators, Australia has moved closer to best practice in the electricity, rail freight, telecommunications and coastal shipping industries. Comparable reliability data is fairly sparse, but it appears that electricity reliability has improved in Australia in recent years. Australia also continues to lead the field in achieving low loss and damage rates to rail freight.

The major problem area in terms of reliability remains waterfront container handling. Australian ports are not only among the slowest to move a specified number of containers, but are also among the most variable. In particular, we have a high proportion of delays in excess of 40 hours, which are very costly to ship operators as they usually necessitate missing subsequent ports on the route to maintain overall sailing schedules.

There are larger changes in relativities, but more mixed results, in respect to labour and capital productivity indicators. Australia has moved closer to best practice in telecommunications and rail freight labour productivity, although the gaps remain wide. Comparisons of capital productivity indicators suggest that Australia has closed the performance gaps in respect to rail wagon utilisation and electricity capacity factors. However, excess capacity remains a significant problem in some states' electricity systems, with NSW having one of the worst reserve plant margins observed.

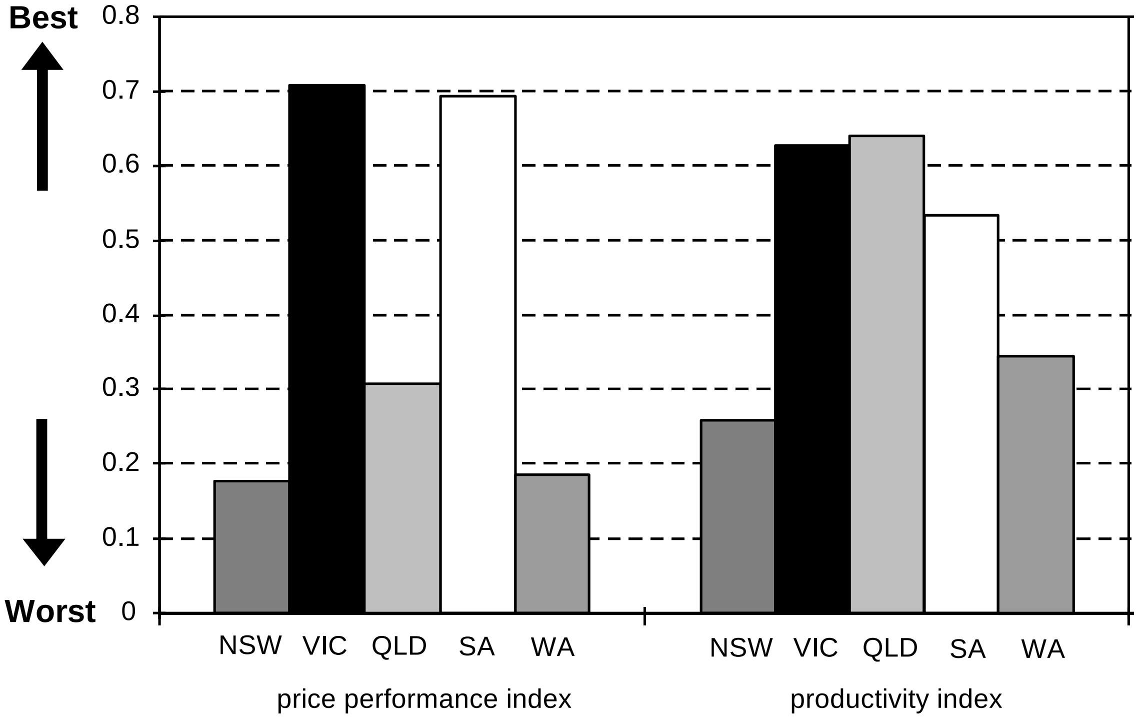
The largest productivity decline is in waterfront container handling. Australia was achieving crane rates close to those of comparably sized ports overseas at the end of the WIRA process. However, subsequent setbacks in Australia and continuing improvement overseas saw our crane rates fall back to be 25 to 50 per cent below those of the better comparably sized ports overseas in 1994. In the June quarter of 1995 crane rates fell at all five mainland capital ports, widening this gap even further.

Relative State performance (Chapter 11)

The performance of a state in providing a range of different infrastructure services can vary widely across those services. One state may have a competitive waterfront, yet have an uncompetitive electricity industry.

The BIE has constructed indexes to measure how each state performs in terms of both price and efficiency in the provision of a basket of infrastructure services (figure 5). The indexes include the four state-based industries for which a full data set is available — electricity, rail, waterfront and gas supply. The productivity index combines both capital and labour productivity. For both price performance and productivity, the higher the index the better the performance — ie. a high price performance index indicates that a state provides a cheap infrastructure basket and a high productivity index indicates superior overall productivity performance. It should be noted that the price performance index reflects the infrastructure prices faced by business users and will be influenced by the strategies adopted to allocate fixed costs.

Figure 5 Indexes of state performance in infrastructure provision, 1994 or latest data



Note: The highest bar represents best performance.
Source: BIE chart based on data reproduced in appendix A, table A5.

The price index indicates that Victoria offers the cheapest basket of infrastructure services. This is due in large part to its cheap electricity, which has the greatest weight of the industries included. Victoria also has competitive rail freight and gas supply by Australian standards (rating second in both). However, Melbourne has the highest Australian waterfront prices examined. South Australia offers the next cheapest basket of infrastructure services, offering the cheapest gas supply and waterfront charges in Australia. It also offers the cheapest rail freight, although this is due to Australian National being included as the South Australian figure.

New South Wales has the most expensive basket of infrastructure services, although Western Australia is close behind. Both these states have relatively expensive electricity supply. New South Wales offers mid-range rail charges, although their gas supply and waterfront charges are nearing the most expensive. Western Australia has the most expensive rail freight, but the Port of Fremantle offers the second cheapest waterfront charges in Australia. Queensland ranks mid-range for all its infrastructure service prices, resulting in a mid-range price index.

Queensland does, however, have the most productive infrastructure services, closely followed by Victoria. Although Queensland does not offer the most productive labour or capital in any industry, they provide mid to high productivity across all industries, except labour productivity in gas supply. Victoria has the highest labour and capital productivity for the electricity industry, although its capital productivity is only marginally ahead of Queensland's. It rates well on the other indicators, except for rail where both its labour and capital productivity are poor.

New South Wales' productivity performance is marred by continuing high levels of excess capacity in the electricity industry. Western Australia rates the lowest on the productivity index, due to poor productivity in the electricity industry.

Overall, high productivity has been accompanied by low infrastructure prices in Victoria. South Australia also has reasonably high productivity and the second lowest infrastructure prices. Both New South Wales and Western Australia have low productivity and high infrastructure prices. Only Queensland, which has the highest productivity but mid-range prices, provides an exception to the inverse relationship between productivity and prices. This may reflect a higher level of cost recovery in Queensland contributing to its superior government sector financial performance.

Constructing similar indexes for 1992 revealed that Victoria had the lowest productivity index at that time. Its rapid productivity improvement in the years since shows that a serious and well targeted reform program can provide tangible benefits quickly.

Conclusions

The main message emerging from this review of our recent infrastructure performance is that reform is not easy — it is a long, hard slog that we have to keep at if we are even to approach international best practice. While progress has been made in some key areas of microeconomic reform, our performance is still mixed and much remains to be done. In many instances large performance gaps exists and we are not closing those gaps fast enough.

There are pockets of good performance in Australia's infrastructure industries, such as waterfront coal handling. There are pockets of relatively poor performance, including waterfront container handling and some aspects of rail freight operations. There are infrastructure industries in which performance is very uneven — the waterfront being the main example. And there are differences in performance over time.

Some of the infrastructure industries are closing the performance gap, including some aspects of electricity supply and telecommunications. Others, such as waterfront container handling and aspects of aviation, are losing ground. Further falls in container handling productivity at all five mainland capital city ports in the June quarter of 1995 highlight the major challenge we face.

In the last benchmarking overview we noted that the results obtained suggested that the **degree of competition** within an infrastructure industry and the **rate of change of demand** and **technology** were key determinants of infrastructure performance. While the range of industries covered in this report is different the evidence supports the same conclusions.

It was noted at that time that the industry where Australia's performance was closest to international best practice — road freight — enjoyed the greatest degree of competition, while the industry where the performance gap was largest — rail transport — suffered from the least competition, highest degree of government involvement and subsidisation. While reform has progressed, this observation holds true.

The relatively slow rate of demand growth in industries, such as rail transport, has limited their ability to introduce new equipment and make associated changes in work practices. The pace of technological change in such industries further limits the scope for introducing new technology as a catalyst for change. Whereas, rapid technological developments and demand growth in industries such as telecommunications furnishes greater opportunity and greater motive to hasten the pace of reform and restructuring.

The poor performances on the waterfront and in some aspects of aviation demonstrate two of the dangers facing the reform process. The waterfront experience highlights the need for reform to be viewed as a continuous process, and not a one-off event. It is essential that reforms implemented provide in-built incentives to continuously improve performance. Actions that do not tackle the causes of poor performance head-on are unlikely to lead to sustainable improvements. In aviation, a relatively high level of intervention in investment decisions has adversely affected the reliability and timeliness of services.

The analysis of performance gaps suggests that it is in the area of operational efficiency, especially labour productivity, that the largest performance gaps remain. Otherwise relatively good performances in such industries as coastal shipping and telecommunications are compromised by poor labour related performance. In coastal shipping vessel manning costs in Australia are high due to high leave and on-costs, not because of manning levels. In telecommunications Australia's relatively poor labour productivity performance over recent years is a cause for concern. Further reforms of the labour market and work practices are required to consolidate gains made in the reform process so far.

Since the late 1980s, Australia has embarked on an increasingly focused reform agenda. However, international best practice is a moving target and we must continually be striving to improve our performance simply to maintain our relative position. Now is certainly not the time for reform fatigue. Relaxing the pace of reform or letting the process falter would see Australia fall back into the trailing group of international also-rans.

1 Introduction

This *International Benchmarking Overview* report is the second to review and summarise the performance comparisons undertaken as a part of the BIE's infrastructure benchmarking program. The program develops international performance benchmarks for the more significant infrastructure service industries and monitors performance relative to these benchmarks through time. To date, we have completed studies covering the electricity, rail freight, telecommunications, road freight, waterfront, coastal shipping, aviation and gas supply industries.

1.1 Why benchmark infrastructure?

The competitiveness of Australian enterprises in international markets is determined, in part, by the cost of inputs, including services. The provision of infrastructure services inputs is dominated by government business enterprises (GBEs). Hence, a significant proportion of infrastructure inputs and services are obtained from enterprises that are not directly subject to competitive pressures. Moreover, many of these enterprises operate in industries that have some monopoly elements, or are characterised by regulatory and institutional barriers to competition. In such cases market-based performance incentives are weakened and actual performance may fall below best practice. Performance measurement and monitoring provides an alternative and complementary form of competitive pressure.

Benchmarking, the development of performance measures and performance monitoring, is undertaken in pursuit of two major objectives. First, to compare the performance of Australian infrastructure and services provision against that of international counterparts and competitors. Second, to measure the operating efficiency of Australia's infrastructure services industries relative to overseas counterparts and competitors in order to assess the extent to which efficiency might be improved.

1.2 International benchmarking project

Over the past decade governments in Australia and overseas have embarked on microeconomic reform programs aimed at lifting the performance of their economies. A common feature of these programs has been concerted efforts to improve the performance of the infrastructure service industries.

The importance of microeconomic reform in the services sector can hardly be overstated. Services account for approximately 70 per cent of Australia's gross domestic product (GDP) and embedded services account for an increasing proportion of almost all products. Consequently, reform in the services sector has a major impact on national welfare.

In the Prime Minister's statement of March 1991, *Building a Competitive Australia*, the BIE was directed to undertake a project which would identify the importance of major infrastructure services to business costs, develop an understanding of relevant measures for the international comparison of infrastructure services provision, and publish comparisons on a regular basis. The project was extended in the 1994 *Working Nation* statement to include core government services used by industry.

The international benchmarking project is an explicit recognition by the Commonwealth that the competitiveness of Australian enterprises in international markets is determined, in part, by the costs of infrastructure inputs and services. A focus on international performance indicators for the various infrastructure service industries raises awareness of both relative performance and, importantly, of key drivers of performance in the infrastructure industries. In this way performance monitoring can identify whether reform in Australia is keeping pace with improvements overseas. It can also identify priority areas for future reform initiatives.

The BIE's international benchmarking project complements the work of other agencies engaged in monitoring the performance of infrastructure service industries. For instance, work by the joint Commonwealth and State Steering Committee on National Performance Monitoring of Government Trading Enterprises plays a role in the development of a consistent set of performance indicators across Government Trading Enterprises. Its focus is on national indicators from the perspective of the owners - governments. Similarly, state governments utilise performance indicators to monitor the management and general performance of the many infrastructure utilities they own.

Since its inception in 1991, the BIE's international benchmarking project has played a key role in highlighting the importance of infrastructure performance and the ongoing process of microeconomic reform from the perspective of the business user. The industries covered to date include: electricity supply, rail freight, telecommunications, road freight, waterfront, coastal shipping, aviation and gas supply. International performance comparisons for each of these industries focus on price, quality of service and operational efficiency indicators.

1.3 Performance Indicators

The performance measures developed for this project fall into two broad categories:

- price and timeliness indicators; and
- productivity indicators.

The price and timeliness indicators compare the performance of Australia's infrastructure services against that of international competitors from the perspective of business users. They show whether Australia's traded goods sector is advantaged or disadvantaged by the performance of domestic infrastructure industries.

While price and timeliness indicators are useful in identifying the impact of infrastructure services on users, they do not explain the cause of performance differences. For instance, some of the performance gaps will be due to the nature of providing infrastructure services in the Australian environment, and may not be readily amenable to remedial action by management or government (eg economies of scale). Some of the differences in the price and timeliness indicators, however, *can* be influenced by government and management action (eg dividend policy, work practices and capital investment).

Comparisons of productivity indicators attempt to reveal the extent of potential efficiency improvements. The key questions are how do we rate against world best practice, and to what extent can we improve our performance?

The selection of performance indicators and the identification of world best practice are difficult tasks. The process followed by the BIE is to involve infrastructure service suppliers and industrial consumers in the selection of performance indicators and the determination of appropriate international comparisons. The intention is to develop credible and relevant measures, which both suppliers and users are interested in monitoring to assess performance changes.

This mode of selection results in the development of indicators that are consistent with the guidelines for effective performance monitoring identified by Hilmer (1991). According to Hilmer performance measures should: deal with relatively few factors; highlight tangible factors; encourage improved performance; and relate to credible goals. In other words, a few outputs and inputs are critical, and the aim is to focus on the key drivers of performance.

1.4 Outline of this report

The following chapters review the role of infrastructure as an industry input and explore the progress of recent microeconomic reform. Chapters 4 through 10 review and summarise the findings of the BIE's studies of electricity supply, rail freight, telecommunications, waterfront, aviation, gas supply and coastal shipping industries. Chapter 11 explores state performance and examines the link between infrastructure performance and overall state performance. Chapter 12 examines performance gaps, analysing Australian performance relative to world best practise on an industry-by-industry basis in relation to price, quality of services and operational efficiency.

2 Australia's infrastructure service industries

This chapter provides an indication of the economic importance of infrastructure services industries in Australia and of their contribution to the costs of other sectors.

2.1 Infrastructure services in the Australian economy

The service industries dominate economic activity in Australia, comprising two-thirds of gross domestic product (GDP) (table 2.1). Infrastructure services, comprising energy supply, transport and communications, are an important part of the services sector. For example, the infrastructure services sector is nearly three times larger than the government sector (including the defence forces), and employs more people than the entire construction industry. Infrastructure service industries employ over half a million people, 7.6 per cent of total employment. Overall, infrastructure services account for around 11per cent of Australia's GDP.

Table 2.1 Significance of infrastructure and other services in the Australian economy, 1993-94

	Gross product[(a)] *$ billions*	*Proportion of GDP per cent*	*Persons employed '000*
Infrastructure			
Electricity	8.9	2.3	-
Gas	0.8	0.2	-
Water, sewerage and drainage	3.4	0.9	92.2
Rail transport	1.8	0.5	-
Water transport	1.8	0.5	-
Air and space transport	4.6	1.2	-
Road and other transport services	11.3	2.9	366.4
Communication services	11.9	3.0	128.5
Total infrastructure services	*44.6*	*11.4*	*587.1*
Other services			
Construction	26.4	6.7	559.6
Wholesale & retail trade	65.1	16.6	1 627.7
Accommodation & restaurants	7.1	1.8	347.4
Finance, property & business	47.7	12.2	990.3
Government admin & defence	16.1	4.1	368.3
Education, health & community	39.6	10.1	1 224.7
Other	14.5	3.7	469.3
Total services	*261.1*	*66.6*	*6174.4*
Total all industries	***392.0***	***100.0***	***7 755.1***

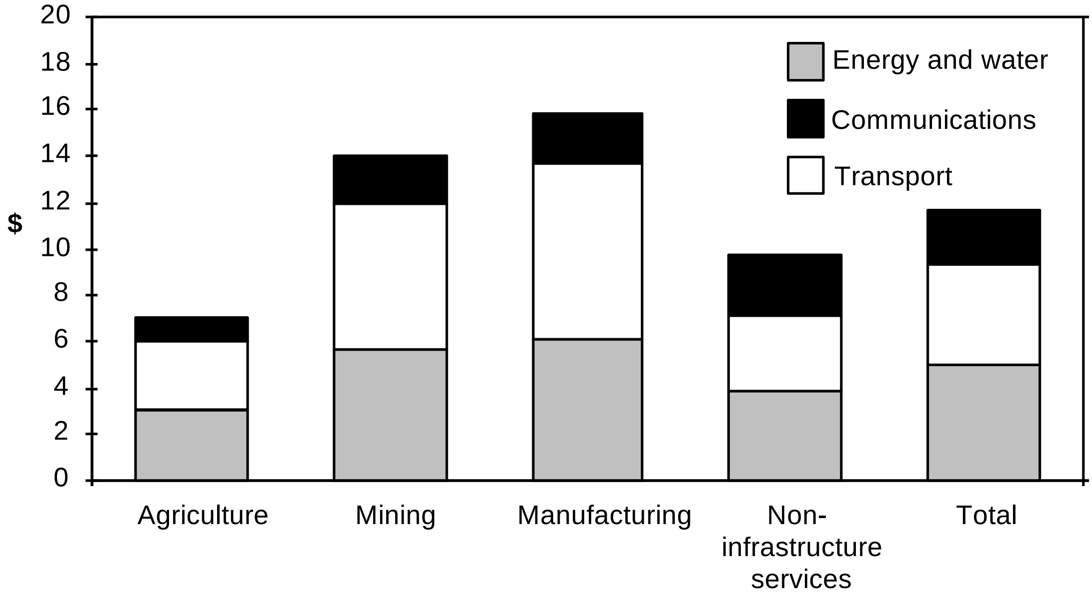
Note: (a) Constant 1989-90 prices
Source: ABS 1995 a,b.

The largest industry, as measured by its contribution to GDP, is the communications industry, comprising telecommunications and postal services. Road transport and electricity supply are the other major infrastructure industries. The relative importance of infrastructure services has changed somewhat since the previous benchmarking overview. The largest single infrastructure industry (in value terms) in 1992-93 was road and other transport. This has recently been overtaken by the communications industry.

2.2 Infrastructure services as industry inputs

All industries use infrastructure services as inputs in production. Figure 2.1 shows the proportion of infrastructure services input costs in sectoral output — both direct and indirect. *Direct* usage is where inputs are purchased directly form infrastructure services providers. Where, for example, the alumina industry purchases electricity as an input to production. *Indirect* usage occurs where that alumina is subsequently sold to the automobile manufacturing industry — because electricity has been used to produce the alumina the automobile manufacturing industry can be thought of as *indirectly* purchasing that electricity.

Figure 2.1 Infrastructure required to produce $100 of final output, by sector, 1993-94



Note: Energy and water comprises electricity, gas and water, sewerage and drainage; transport comprises rail, water, air, space and road transport as well as other transport services; communications comprises telecommunications and postal services

Source: BIE estimates derived from COPS 1995. Chart based on data reproduced in appendix A, table A6.

By sector, direct and indirect infrastructure services inputs comprise between 7 and 16 per cent of the costs of producing $100 of final output. Agriculture, for example, directly and indirectly requires $7 of infrastructure services to produce $100 of output, with energy and water being the major infrastructure services input. In manufacturing, nearly $16 of infrastructure services are required to produce $100 of output, with transport being the major infrastructure services input. Over $11 of infrastructure services are directly and indirectly required to produce $100 of national output. Of this amount, energy and water comprises $5, transport $4.40 and communication $2.30. However, the key role infrastructure plays in facilitating international trade gives it an importance to Australia's international competitiveness far greater than its share in the cost of production.

2.3 Conclusions

Australia's infrastructure service industries represent a considerable proportion of national output. They are an important element in the costs of all sectors and especially important to the traded goods sector. Hence, microeconomic reform and the performance monitoring of infrastructure services industries have an important role to play in the ongoing battle to improve our international competitiveness.

3 Microeconomic reform

To put recent microeconomic reform in perspective section 3.1 presents a brief review of the reform process in Australia. Recent microeconomic reform initiatives affecting the sectors covered by the BIE's international benchmarking project have focused on reforms to competition policy and government business enterprises (GBEs). Section 3.2 summarises the *Report by the Independent Committee of Inquiry into National Competition Policy,* the 'Hilmer Report' (Hilmer 1993). Section 3.3 explores the likely quantitative impact of Hilmer and related reforms.

3.1 Background

Following the post-war boom years, and in the wake of the OPEC oil price shock, Australia found that a protectionist regime was no longer appropriate to emerging world trade conditions and no longer able to deliver sustainable economic growth and employment. High tariff levels were believed to have contributed to an inward looking manufacturing sector which was becoming increasingly uncompetitive on international markets, and the 1970s saw a move towards the reduction of trade barriers. Nevertheless, government continued to focus primarily on macroeconomic policy instruments.

During the 1970s it became apparent that Australia's financial regulations were having a negative impact on the effectiveness of monetary policy, and the government established a committee of inquiry into the financial system (the 'Campbell Committee'). The committee recommended that there be a more open, less regulated financial system, and the government took steps towards the removal of controls on banks. Following a change of government, the 'Martin Committee' undertook a further examination of the financial system. Its findings lent new impetus to the deregulation of the financial system. The Australian dollar was floated in 1983 and most exchange controls abolished.

As a result of one-off tariff reductions and changing circumstances during the 1970s and 1980s Australian industry was increasingly exposed to international competition. The government recognised that reductions in protection could play an important role in encouraging the development of more efficient industry structures. During the 1980s it introduced a program of phased reductions in tariff protection, while offering temporary assistance in the form of industry plans to a few industries which may have had difficulty coping with such a rapid reduction in protection.

Trade policy reforms during the 1970s and 1980s had increased the competitiveness of the traded sector, and yet there were many goods and services inputs to the traded sector being provided by enterprises not themselves subject to the same competitive pressures — such as public utilities, some of the professions and some areas of agriculture. By the late 1980s, there was an increasing focus on the need to reduce the cost of basic infrastructure and services inputs to trade exposed industries.

In 1987, the government introduced a packaged of reforms aimed at establishing processes for better defining the objectives of government business enterprises (GBEs) and reducing the extent of government intervention in their operations (Walsh 1987). The economic statement of May 1988 represented a significant move away from the piecemeal approach to reform to a broadly-based reform agenda. A program of phased tariff reductions was complemented by further GBE reform initiatives. GBEs were freed from administrative constraints and encouraged to operate in a more commercial manner. The two-airline agreement was terminated and competition was introduced to some aspects of telecommunications.

In March 1991, the BIE was directed to undertake international performance benchmarking of business input services. The significance of this benchmarking work was that it was to identify the importance of infrastructure services to industry costs, and develop performance measures for international performance comparisons. By comparing the performance of Australia's infrastructure services against world best practice, benchmarking provides a useful tool for promoting yardstick competition to improve efficiency in markets not directly subject to competitive pressures. It also provides a means for assessing the impact of infrastructure services on the competitiveness of user industries. By indirectly introducing competitive pressures this initiative represented a significant step towards making Australia's infrastructure more efficient.

By the late 1980s and early 1990s it was becoming increasingly apparent that to gain the full benefits of microeconomic reform a national approach was needed. In many areas where large gains from microeconomic reform had been identified, such as electricity and rail, reforms required co-operation between governments. Progress was made towards removing inter-state trade barriers at the 1991 Special Premiers Conference when the heads of state governments agreed, in principle, that there be mutual recognition of regulations and standards. The Conference also agreed to establish a National Rail Corporation (NRC) to overcome inefficiencies associated with carrying freight across the different states' rail systems, establish a National Grid Management Council to manage the eastern Australian electricity grid and introduce nationally consistent road regulations.

Building on these initiatives in its *One Nation* statement of 1992, the Commonwealth Government announced proposals for developing integrated infrastructure networks, including an interstate electricity grid and a national standard gauge rail freight highway. Other important initiatives announced in *One Nation* included measures aimed at improving competition in the supply of electricity, measures designed to allow further entry of foreign banks and a program for reducing the barriers between Australia's domestic and international aviation sectors.

The establishment of the Council of Australian Governments (COAG) in May 1992, represented a further significant step towards facilitating a national approach to microeconomic policies and reforms. COAG was to be the main forum for discussions between heads of governments on issues of national importance and for establishing plans to facilitate national networks in Australia. Following the first COAG meeting, the government initiated a review of competition policy which sought to create a more open and unified market within Australia and to ensure that maximum competitive pressure be exerted on those enterprises supplying the basic infrastructure and services inputs to industry. The results of this review are described in the next section.

3.2 Competition policy

At the inaugural COAG meeting commonwealth, state and territory governments agreed on the need to develop a national competition policy. In October 1992, the Prime Minister commissioned an inquiry into national competition policy, to be chaired by Professor Fred Hilmer.

Throughout its inquiry the committee considered competition policy in terms of six specific elements:

- limiting anti-competitive conduct;
- reforming regulation which unjustifiably restricts competition;
- reforming the structure of public monopolies to facilitate competition;
- providing third party access to facilities that are essential to competition;
- restraining monopoly pricing behaviour; and
- fostering 'competitive neutrality' between government and private businesses when they compete (Hilmer 1993).

The national competition policy outlined in the 'Hilmer Report' comprises three main elements; extending both the content and coverage of the competitive conduct rules of the commonwealth *Trade Practices Act, 1974*, reviewing and reducing regulatory restrictions on competition and increasing the impact of competitive forces on public sector monopolies. Each of these is briefly discussed below. This discussion borrows heavily from the Hilmer Report (Hilmer 1993).

Competitive conduct rules

Competitive conduct rules are designed to ensure that the competitive market process is not undermined by anti-competitive behaviour. Typically, such rules prohibit agreements or arrangement that increase a firm's market power, and prohibit firms that possess a substantial degree of market power from using it in an anti-competitive way. In Australia these rules are contained in Part IV of the *Trade Practices Act, 1974*

In respect to the *content* of Australia's competitive conduct rules the committee focused on the need to strengthen the prohibition on price fixing arrangements, by removing the distinction between goods and services and relaxing prohibitions on certain forms of exclusive dealing and resale price maintenance where they can be demonstrated to offer net public benefits.

In respect to the *coverage* of Australia's competitive conduct rules the committee focused on the need to extend the coverage of Part IV of the Act to previously exempt areas, such as unincorporated businesses, statutory marketing authorities (SMAs) and government business enterprises (GBEs). The committee also recommended that there be a more rigorous and transparent exemption process.

Regulatory restrictions on competition

The committee suggested that government regulation imposed considerable restrictions on competition in some key sectors of the economy. Examples include legislated monopolies for public utilities, statutory marketing arrangements for agricultural products and licensing arrangements for various occupations, businesses and professions.

The committee recommended that governments adopt a set of principles to ensure that these restrictions not be allowed unless they can be clearly demonstrated to be in the public interest. It also recommended that such restrictions be subject to an automatic five year sunset clause at which time their impact would be thoroughly reassessed.

Increasing competitive forces on public sector monopolies

The committee suggested that increasing the impact of competitive forces on public sector monopolies involves a number of key elements. These include reviewing and reforming the structure of public sector monopolies, ensuring private sector access to the infrastructure facilities of public monopolies, restraining monopoly pricing behaviour and ensuring 'competitive neutrality' when public enterprises compete with the private sector.

Structural reform

The committee recommended that public monopolies be restructured according to principles dealing with:

- the separation of regulatory and commercial functions;
- the separation of natural monopoly and potentially competitive activities; and
- the separation of potentially competitive activities into independent business units.

The separation of regulatory and commercial functions, and the establishment of an independent regulator, is an essential basis for the operation of a market and the entry of competitors into that market. The separation of natural monopoly and potentially competitive activities quarantines those activities, reduces the opportunity for cross-subsidisation and increases the opportunity for competitors to enter the market for the potentially competitive activities. And the separation of potentially competitive business units into independent units helps to reduce the opportunity for cross-subsidisation and potential conflicts of interest.

In the electricity industry, for example, transmission is often considered to be a natural monopoly while generation is a potentially competitive activity. The separation of these activities can prevent monopoly profits from transmission being used to cross-subsidise losses made in the competitive generation market and/or squeezing out competitors operating only in the generation industry. It increases the opportunity for competitors to enter the generation industry.

Access to essential facilities

Realising that the introduction of competition in some markets requires that competitors be assured access to certain facilities, such as the electricity transmission grid, telecommunications and railway networks, the committee recommended that specific conditions apply to such facilities. These included their declaration as 'essential facilities', that an access price be negotiated on a commercial basis between the parties and that failing this, access conditions would be set through a binding arbitration process.

Monopoly pricing

Monopoly pricing involves charging at above long-run average costs for a sustained period. The committee recommended that the primary response to monopoly pricing should be to increase competitive pressures by removing regulatory restrictions, implementing structural reform and allowing third party access to essential facilities. When and where these are insufficient, price monitoring and surveillance may provide a substitute. And the committee recommended that a carefully targeted price monitoring and surveillance process be developed.

Competitive neutrality

Competitive neutrality becomes increasingly important as the private sector becomes involved in infrastructure services provision. For competition to work, GBEs and private sector enterprises must compete on equal terms. But private enterprises and GBEs have been treated differently. GBEs have been exempt from taxation, enjoyed immunity from bankruptcy, and received explicit or implicit government guarantees on debt and thus enjoyed favourable investment conditions. At the same time, however, GBEs have been required to comply with various community service obligations (CSOs) and have often enjoyed less operational freedom.

Competitive neutrality requires that these differences be eliminated as far as possible. To this end, the committee recommended that, in principle, GBEs should not enjoy any net competitive advantages. Suggested mechanisms to achieve this include corporatisation and/or the application of effective pricing directions.

Obstacles to successful implementation

While the goal of the national competition policy reform proposals, promoting competition and thereby efficiency, has universal appeal, the means suggested by the Hilmer committee have been somewhat less universally accepted. The national competition policy proposals represent a major challenge to co-operative federalism and state sovereignty. The national competition policy proposals would also require explicit decisions to be made about the value the community places on some community service obligations (CSOs). However, with the exception of the telecommunications industry, little has been done to value or even identify the major CSOs. Without addressing these issues head-on as a top priority, the rest of the reforms may be put at risk.

One of the major omissions of the Hilmer report is the failure to link competition and trade policies. It focuses exclusively on the domestic context, and does not explore the interrelation of domestic and international measures. There is no explicit recognition of the limitations placed on Australia by international initiatives towards the convergence of competition policy, such as that begun through the GATT. Nor is there explicit recognition of the likely reluctance of Australia to act unilaterally in areas where there exists a complex web of international agreements, such as international liner shipping and passenger aviation.

In recognition of the imbalance between benefits and costs to different levels of government, state and territory governments will receive financial compensation for the timely implementation of agreed reforms. However, doubts have been expressed about the incentives this creates and a more general review of commonwealth/state financial relations is necessary (BIE 1995c). State GBEs represent very significant assets and revenue flows. Given their narrow taxation bases, states have a strong incentive to use them as de facto tax collectors and/or resist the fragmentation of monopolies in order to maximise their dividend potential and potential sale price. Given the proposed compensation arrangements, governments may be tempted to pursue a ‘facade of compliance’ in order to receive financial compensation, while in reality achieving little in the way of pro-competitive reform.

The national competition policy reform proposals recognise the possibility that granting infrastructure access rights might undermine future investment, but do not offer an entirely convincing method of dealing with the issue. While a declaration of access rights is to include an assessment of the potential impact on investment, it cannot encompass the likelihood that the mere possibility of third party access might undermine potential investment. Moreover, while there is now draft legislation which addresses procedures for the declaration of services and offers general guidelines for the negotiation of terms and conditions for access, the full implications of third party access to private facilities are not yet clear. This adds to investment uncertainty.

The potential losses from the adjustments associated with the withdrawal of long established cross-subsidies and unbundling also fall outside the ambit of the Hilmer report. And yet all of these issues raise very considerable barriers to the implementation and operation of the reforms proposed.

Subsequent developments

On 11 April 1995, commonwealth, state and territory governments agreed to a new national competition policy based on the recommendations of the Hilmer Report. The extension of the *Trade Practices Act* to cover all businesses and state and local government enterprises came into effect from 1 July 1995. Principles for reforming public monopolies, such as electricity, gas and water were agreed. New access regimes to allow third party access to essential facilities, such as power grids, gas pipelines and railways are to be in place by January 1996. States and Territories are required to develop a timetable for reviewing all laws that restrict competition by June 1996, and governments are required to publish statements detailing policy for competitive neutrality.

3.3 Quantifying the benefits of Hilmer and related reform

On 19 August 1994, the Council of Australian Governments requested the Industry Commission to undertake an assessment of the benefits to economic growth and revenue from implementing Hilmer and related reforms. The Hilmer reforms considered cover the legislative and regulatory changes required to provide a national competition policy framework outlined above. The related reforms considered cover moves to foster competition in national infrastructure areas, such as electricity, gas, telecommunications and transport, and promote the free movement of goods and occupations between the states. The following discussion draws on IC (1995).

The assessment of the impact of Hilmer and related reforms attempted to cover the three basic elements:

- the scope of reforms — which activities and enterprises are affected;
- the nature of the direct impacts — how activities and enterprise are affected; and
- the flow-on effects to others — users, consumers, employees and governments.

The task involved considerable difficulties. The scope and extent of Hilmer and related reforms are difficult to assess. The reforms are as much about strategies to foster a more competitive economic climate as they are about implementing specific changes. The extent of unknowns and intangibles involved in Hilmer and related reforms made the task of modelling their impact necessarily imprecise. There is no single number that could possibly capture the full benefits of such reforms and/or of the wider reform process.

None of the modelling frameworks available were ideally suited to the task. None could estimate the extent of productivity gains likely to flow from an improved regulatory or legislative governance structure for competition policy, or the speed with which such productivity improvements might be expected to occur. These are questions of judgement that had to be made outside the framework of the model. What the modelling exercise was able to do was to trace the flow-on economic impacts of productivity improvements to the rest of the economy. In quantifying the productivity shocks the Industry Commission used data derived from the BIE's benchmarking project extensively.

The results obtained from this modelling exercise suggest that in the long run, once all adjustments have taken place in the context of the model, Hilmer and related reforms would lead to an annual gain in real GDP of 5.5 per cent, equivalent to $23 billion a year in 1993-94 dollars. Of this, reforms by the Commonwealth were projected to contribute $4 billion, while state, territory and local government reforms were projected to contribute $19 billion.

Of the total GDP gain, almost $9 billion was projected to accrue in the form of higher household spending. This amounts to an additional $1,500 a year for each household in Australia. Real after-tax wages were projected to be 3 per cent higher, while projected employment gains from higher participation rates amount to 0.4 per cent or 30,000 extra jobs. A 6 per cent revenue increase, worth some $5.9 billion, was projected for the Commonwealth government, while state, territory and local government revenues were projected to increase by 4.5 per cent, or $3 billion.

According to the model, estimated gains though productivity improvement are spread fairly evenly through the economy. Where reforms lead to changes in domestic pricing the sectoral impacts are more uneven, reflecting which sectors suffer from cost increases and which benefit from cost declines. Nevertheless, it is a case of swings and roundabouts in which losses from one type of reform are offset by gains from others. All broad sectors were projected to gain from the full package of Hilmer and related reforms considered.

GBE-related reforms

GBE-related reforms represent about 45 per cent of the total increase in GDP, or almost $11 billion a year. Of these, the most important in terms of their impact on real GDP and real consumption are electricity and gas, telecommunications and rail reform (table 3.1).

Table 3.1 Projected macroeconomic and sectoral effects of GBE-related reforms (per cent changes, with monetary accommodation)

	Electricity and Gas	*Telecom*	*Rail*	*Aviation*	*Ports*	*Total GBE reforms*[(a)]	*Total Hilmer reforms*
Macroeconomic effects							
Real GDP	1.39	0.65	0.27	0.03	0.02	2.54	5.47
Real consumption	1.07	0.61	0.12	0.02	0.00	1.97	3.40
Real investment	1.44	0.21	0.07	0.02	0.01	1.83	5.73
Real government spending	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Export volume	2.85	1.62	1.25	0.03	0.09	6.39	15.38
Import volume	0.03	0.05	0.07	-0.05	-0.01	0.17	1.16
Nominal exchange rate	0.21	0.74	-0.03	0.02	0.00	1.08	4.27
Sectoral outputs							
Agriculture	-0.01	0.61	-0.07	0.01	0.00	0.78	4.44
Mining	2.60	2.02	2.27	0.05	0.15	7.75	18.56
Manufacturing	0.90	0.74	-0.03	0.02	0.02	1.90	5.35
Services	0.73	0.54	0.07	0.01	0.00	1.48	3.41

Notes: (a) Rows do not add because totals include industries other than those shown in columns 2 through 6.
Source: Industry Commission (1995).

Electricity and Gas

For electricity, Hilmer and related reforms are expected to lead to improved capital and labour productivity, pricing reform and the removal of cross subsidies. For gas, the major effect of these reforms is expected to be a reduction in the price of gas and a consequent increase in usage. For both sectors, competitive neutrality was modelled by adjusting the rate of return and dividend payment ratios to those of the private sector. Reform of the electricity and gas industries is expected to lead to an increase in real GDP of 1.4 per cent, or $5.8 billion per annum.

Cheaper electricity and gas lower users' costs. The major beneficiaries are in the mining sector. The fall in electricity prices leads to growth in the alumina industry, which relies on output from the mining sector. And, since unprocessed mineral exports are relatively price-sensitive in the ORANI model, the mining sector is able to take advantage of an overall reduction in its costs by increasing exports.

The agricultural sector contracts following reform of the electricity and gas industry. Agriculture is a relatively light user of electricity and gas, and receives little benefit from these particular reforms. Moreover, higher wages and greater resource usage in the mining sector increase the cost of other key inputs to agriculture.

Telecommunications

The reform process is well under way in the telecommunications sector and the Hilmer reforms are expected to have relatively minimal additional impact. Indeed, most of the reforms considered by the Industry Commission are ongoing reforms, rather than those announced in the Hilmer report. They were, nevertheless, considered integral to the wider reform process.

Reform of the telecommunications sector is expected to lead to an increase in real GDP of 0.7 per cent, or $2.9 billion per annum. Cheaper telecommunications lower the cost structure of all users, leading to lower prices and greater competitiveness throughout the economy.

Rail

While reform is already advancing in the rail sector, applying Hilmer reforms to government rail authorities is expected to result in greater competition in rail transport specifically, and transport more generally. Of particular importance for rail reform are access to essential facilities, the identification and funding of community service obligations and achieving a commercial rate of return on capital in the interests of competitive neutrality.

Rail-related reforms are expected to contribute a 0.3 per cent increase in real GDP or $1.1 billion, some 5 per cent of the total revenue impact of Hilmer and related reforms. Reduced rail costs are most beneficial to those sectors using a greater proportion of rail transport inputs.

Not surprisingly, the main beneficiary is the mining sector. The agricultural and manufacturing sectors are projected to be adversely affected on average by the moves to full cost recovery in rail. While grain producing industries benefit from reductions in freight costs, industries producing wool and sheep are adversely affected by non-bulk freight price increases. Capital productivity improvements in rail operations reduce demand for rolling stock, and thereby contribute to the projected decline of the manufacturing sector.

Caveats relating to the estimates

Although the projected benefits from Hilmer and related reforms appear substantial, the quantification must be interpreted with a degree of caution. Such a modelling exercise has its weaknesses.

As with any model, the quality of the information input will determine the quality of the output. The critical element is determining the size of the shocks to be applied, and the quality of the data from which the shocks were estimated in this case varied considerably. In some cases extensive benchmarking studies, particularly the BIE's infrastructure benchmarking, provided more rigorous information. In other cases little information was available and reliance was placed on 'guestimates'.

The analysis also included some reforms that have already taken place. Microeconomic reform in telecommunications, for example, has been underway for a number of years and some of the benefits have already been realised.

3.4 Conclusions

The microeconomic reform process is well under way, but there remain significant reforms yet to be implemented and it will take a number of years for the benefits to be realised. It is a race that never ends. The Hilmer report identified priority areas of reform to reduce impediments to competition. One important aspect of these is continued reform of infrastructure. The quantitative effect of Hilmer and related reforms is claimed to be a gain of around $23 billion per annum in terms of real GDP. Reform of GBEs makes up nearly half of these potential savings and more than half of the gains to real consumption.

Attaining international best practice in the provision of infrastructure is critical to the competitiveness of Australian enterprises in international markets and achieving the potential estimated GDP gains. Australia's progress in achieving international best practice in electricity, rail freight, telecommunications, the waterfront, coastal shipping, aviation and gas supply industries is examined in the following chapters.

4 Electricity

4.1 Introduction

This chapter compares the performance of Australian electricity utilities with that of their overseas counterparts. It begins by summarising recent reforms to Australian electricity supply operations. Performance comparisons are then made on the basis of price, service reliability and operating efficiency. These comparisons draw on 1993-94 data except where otherwise noted. Results are preliminary and foreshadow the forthcoming BIE report *International Benchmarking — Electricity 1996*, due for publication early in 1996.

4.2 Recent reforms

Substantial reform is occurring within the Australian electricity supply industry, although the rate of progress of electricity reform varies by jurisdiction. At the national level, preparations for an interconnected electricity grid are well advanced. Commonwealth, state and territory governments have corporatised electricity GBEs and are now restructuring them in preparation for inter and intra state competition. There has also been some progress in pricing reform, with the winding back of cross-subsidies.

Progress towards a national grid

Planning for an interstate electricity transmission network commenced in July 1991 with the decision to establish the National Grid Management Council (NGMC). The NGMC has released several publications outlining how the national grid might operate and be administered. The NGMC has also coordinated a national market 'paper trial' between November 1993 and April 1994 to allow participants to gain experience with a 'competitive' market.

After some delays, the national grid is now set to commence in September 1996. Victoria, New South Wales and South Australia will be interconnected. If it is "economically feasible", the grid may be extended to include Queensland and Tasmania. Two new organisations will be created to administer an industry code of conduct and operate the national grid — the National Electricity Code Administrator (NECA) and the National Electricity Market Management Company (NEMMCO). The new Australian Competition and Consumer Commission (ACCC) will be responsible for market conduct matters and prices oversight (except where state and territory governments have established their own independent regulatory agencies).

Some key details pertaining to the operation of the national grid remain unresolved. These include access arrangements to essential facilities, the nature and extent of price regulation, and transition arrangements.

Industry restructuring

Generation, transmission and distribution businesses have been the responsibility of integrated, government owned enterprises. In the lead up to a competitive market, most governments are now vertically separating the (natural monopoly) transmission business from potentially competitive generation and distribution functions. This is intended to encourage fair and transparent pricing of grid access, which is necessary for effective competition in upstream and downstream markets.

Generation, transmission and distribution functions are now the responsibility of separate corporatised or private entities in Victoria and New South Wales. In Queensland, generation is undertaken separately from (combined) transmission and distribution functions. In South Australia, generation, transmission and distribution business unit accounts have been 'ring fenced' — a weaker form of separation than structural separation. In Western Australia, electricity and gas responsibilities have now been disentangled.

Horizontal separation of generation and/or distribution occurs only in Victoria and New South Wales. In Victoria, there are now 5 competing generator businesses and 5 separate distributor businesses. One of the distributor businesses has been privatised and other sales are planned. In New South Wales, only the distribution function has been horizontally separated. Recently, a decision was made to integrate the 25 mostly local council distributor businesses to form 6 competing corporations.

4.3 Performance indicators

This section reports on price and reliability of service. It also reports indicators of capital and labour productivity.

Prices

For customers, price and reliability of service are the most critical aspects of electricity supply performance. The price comparisons provided below are based on utilities' published tariffs and data obtained from the United Kingdom Electricity Services Association (UKESA).

Australia

By averaging distributors' published industrial electricity prices over a range of annual maximum demands (100, 500, 2 500 and 10 000 KW) and load factors (20, 40, 60 and 80 per cent), it is possible to obtain a broad indication of how various Australian distributors compare on price.

On this basis, Electricity Services Victoria had the lowest average price in Australia for industrial electricity in January 1994 at 8.35 cents per kWh (table 4.1). ETSA and SEQEB followed closely with 8.84 cents per kWh and 8.94 cents per kWh, respectively. SECWA in Western Australia had the highest average industrial price in Australia at 11.04 cents per kWh — 32 per cent higher than the lowest average price.

Table 4.1 Australian industrial electricity prices as at 1 January, 1993 and 1994

	Average price			*10/80 tariff*		
	1993	*1994*	*% change*	*1993*	*1994*	*% change*
Sydney Electricity	10.22	10.13	-0.09	6.85	6.95	1.5
ESV	8.17	8.35	2.2	4.75	4.89	2.9
SEQEB	8.58	8.94	4.2	6.25	6.48	3.7
ETSA	9.16	8.84[a]	-3.5[a]	5.98	6.10[a][b]	2.0
SECWA	11.16	11.04	-0.1	7.21	7.21	0

Notes: (a) estimate, (b) As a January 1994 price was not available, this figure was calculated by applying the average change in published 10/80 tariffs to ETSA's January 1994 price. The BIE notes that as at

August 1995, ETSA's published 10/80 tariff was 5.52 cents per kWh — around 8 per cent less than the January 1993 price.

Sources: UKESA, 1994 and information supplied by individual utilities.

The use of average prices to assess pricing performance can be misleading. They do not, for example, provide an indication of the variability between particular demand/load factor categories. For this reason it is useful to look at prices for a specific demand/load factor category. The 10MW, 80 per cent load factor (referred to as 10/80) tariff is typical of mineral processing operations such as copper, steel and alumina refineries. Published 10/80 tariffs are presented in table 4.1.

Electricity Services Victoria had the lowest published 10/80 tariff in January 1994, at 4.89 cents per kWh. This was followed by ETSA at 6.10 cents per kWh, SEQEB at 6.48 cents per kWh and Sydney Electricity at 6.95 cents per kWh. SECWA had the highest published 10/80 tariff in Australia, at 7.21 cents per kWh. The highest published 10/80 tariff in Australia was 2.3 cents (or 47 per cent) greater than the lowest observed 10/80 price. However, actual prices may vary where customers are able to negotiate off-tariff contracts.

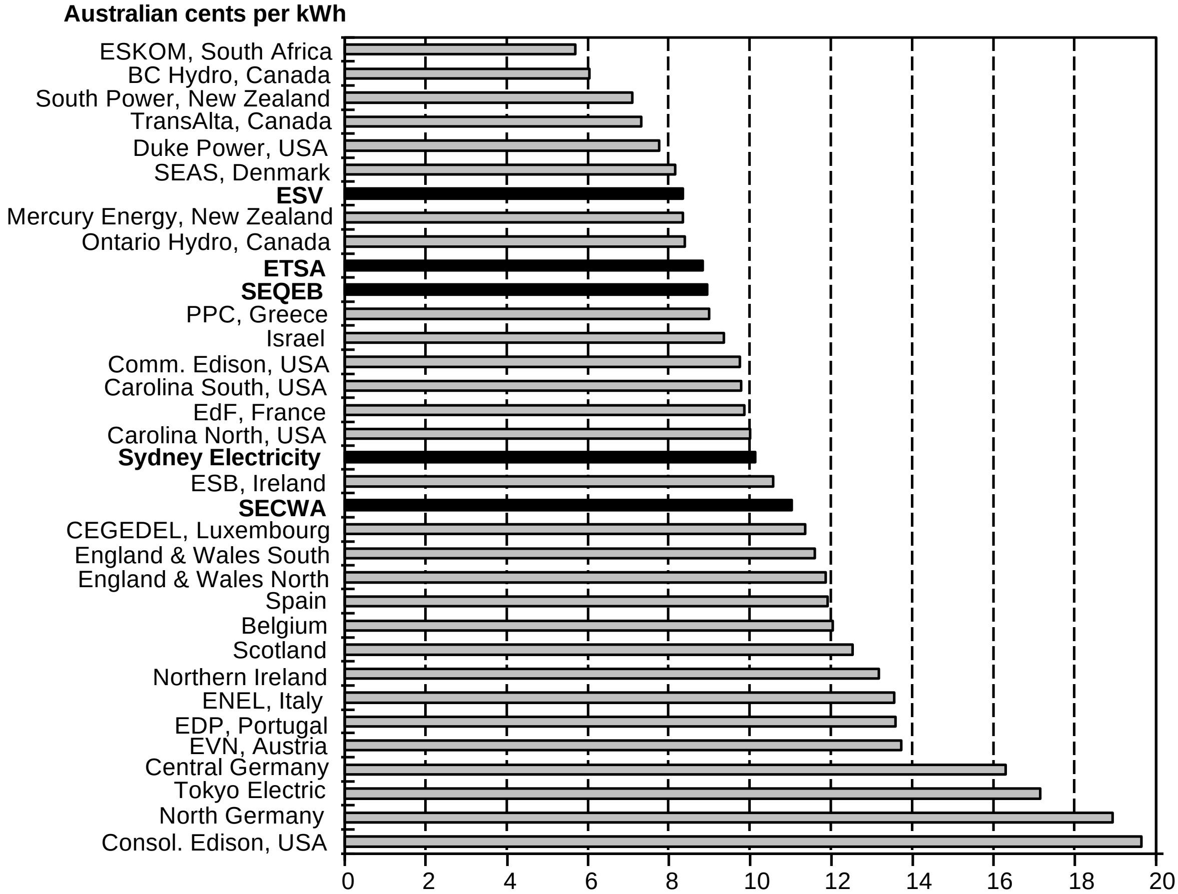
All states recorded a slight increase in nominal 10/80 electricity prices between January 1993 and January 1994, except Western Australia where they remained unchanged. The largest increase in 10/80 tariff, 3.7 per cent, occurred in Queensland.

International comparisons

International average industrial electricity prices vary considerably. The best and worst observed average prices varied by some 14 cents per kWh (figure 4.1).

The best observed Australian distributor, Electricity Services Victoria, ranked 7 among 34 observed international utilities in terms of average industrial prices. The worst Australian performer, SECWA, was ranked 20th. The gap between the best Australian and best observed international average price decreased between January 1993 and January 1994 from 5.49 cents per kWh to 2.68 cents per kWh.

Figure 4.1 Average industrial electricity prices, January 1994

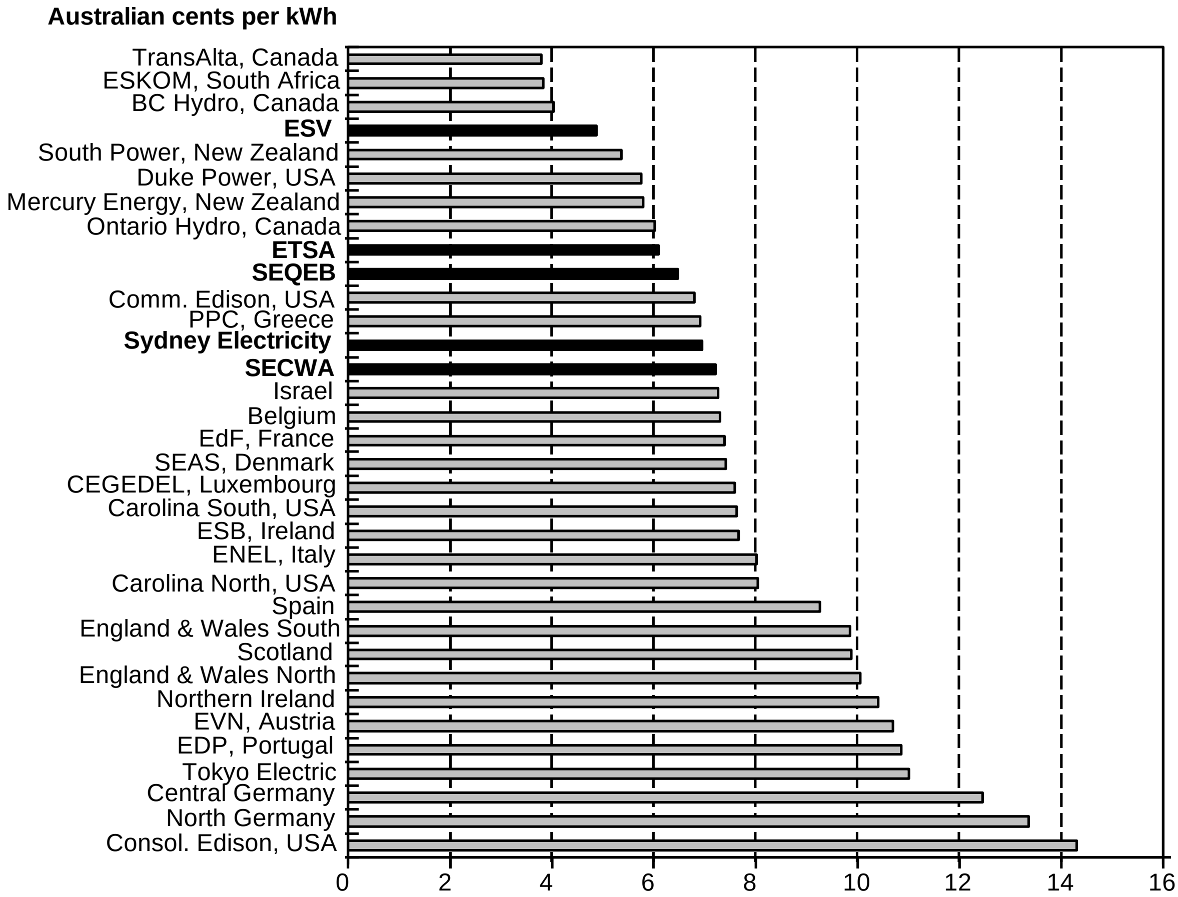


Note: Average across 16 demand/load factor categories.
Source: UKESA 1994 and information supplied by individual utilities. Chart based on data reproduced in appendix A, table A7.

In terms of world best practice, ESKOM (South Africa) — which, like most Australian utilities, relies on coal-fired generation technology — had the lowest observed average price for industrial electricity at 5.67 cents per kWh. Other low price utilities included BC Hydro (Canada) and South Power (New Zealand), which rely predominantly on cheaper hydro technology. TransAlta, the predominantly coal-fired Canadian utility, also performed well.

The difference between highest and lowest published 10/80 electricity prices was approximately 10.5 cents per kWh (figure 4.2). The best observed Australian distributor, Electricity Services Victoria, ranked 4th among 34 observed utilities in terms of 10/80 tariffs. The worst Australian performer, SECWA, ranked 13th. The gap between the best Australian and best observed published 10/80 tariffs widened by 9 per cent, from 0.8 cents per kWh to 1.09 cents per kWh between January 1993 and January 1994.

Figure 4.2 International published 10/80 industrial prices, January 1994



Sources: UKESA 1994 and information supplied by individual utilities. Chart based on data reproduced in appendix A, table A7.

TransAlta had the lowest observed 10/80 tariff at 3.79 cents per kWh. ESKOM had the second lowest published 10/80 tariff at 3.82 cents per kWh. Both rely predominantly on coal-fired generation technology, which is usually more costly to run than hydro technology.

Consolidated Edison in the United States had the highest observed average and 10/80 prices. It had an average industrial electricity price of three and a half times that of the best observed performer, and a published 10/80 price of nearly four times that of the best observed performer. Other poor performers were German and Japanese distribution businesses. The Japanese electricity supply industry is renowned for system-wide gold plating which may, in part, explain their higher prices.

Service reliability

Reliability of electricity supply is important to all classes of users. Supply interruptions can lead to loss of production and suspension of trading. The cost of interruptions to industrial and commercial users can be high, depending on the frequency and duration of interruptions.

Two performance indicators commonly used to assess service reliability are *average system outage duration* and *average customer outage time.* These indicators are complementary. The first shows the length of time, on average, that the customer is without power over the course of a year. The second shows the average time that a customer is without power per interruption. The difference between the two is best illustrated by a simple numerical example.

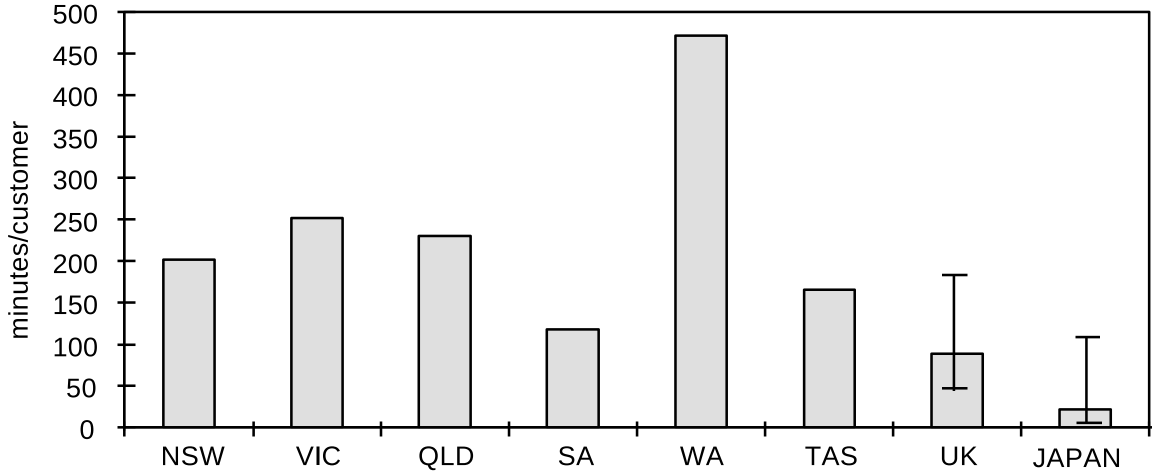
Electricity distributors A and B provide power to 100 and 150 customers, respectively. Over the course of a year, customers serviced by distributor A lost 1000 minutes of supply, whereas distributor B's customers went without power for 1500 minutes. Both have a *system average outage duration* of 10 minutes per customer for that year (ie 1000 divided by 100 and 1500 divided by 150). However, distributor A's customers had, on average, one power interruption, while distributor B's customers had 5. Hence, the *average customer outage time* of distributor A's customers is 10 minutes (ie 10 divided by 1), whereas that of distributor B's customers is 2 minutes (ie 10 divided by 5).

System average outage duration

The majority of Australian utilities reduced system outage duration between 1991-92 and 1993-94. Ophir Electricity, a rural distributor in New South Wales, had the lowest system average outage of observed Australian distributors in 1993-94, at 55 minutes outage per customer. Sydney, Prospect and SEQEB had the next best results over the period with outage durations of 76, 84 and 106 minutes per customer, respectively. The worst observed result was recorded by SECWA, at 472 minutes outage per customer. However, this result was due to severe weather conditions and is not consistent with SECWA's previous performances, which over the last 4 years averaged 163 minutes outage per customer.

Figure 4.3 shows Australian state, United Kingdom and Japanese average 'average system outage durations' for 1993-94. On average, Japan and the United Kingdom have substantially shorter supply restoration times than Australian utilities. This reflects such factors as population density and 'gold plating'. Tokyo Electricity had the shortest system average outage of all observed utilities, with an average outage duration of 3 minutes per customer in 1993-94. This was 18 times lower than the best observed Australian utility. Okinawa Electricity was the worst performed Japanese utility, taking an average of 105 minutes to restore supply. The system average outage duration of the United Kingdom's 14 distributors ranged between 47 and 180 minutes.

Figure 4.3 Average system outage duration, by Australian state and selected overseas countries 1993-94



Sources: ESAA 1995, OFFER 1994, and information supplied by FEPC, Japan. Chart based on data reproduced in appendix A, table A8.

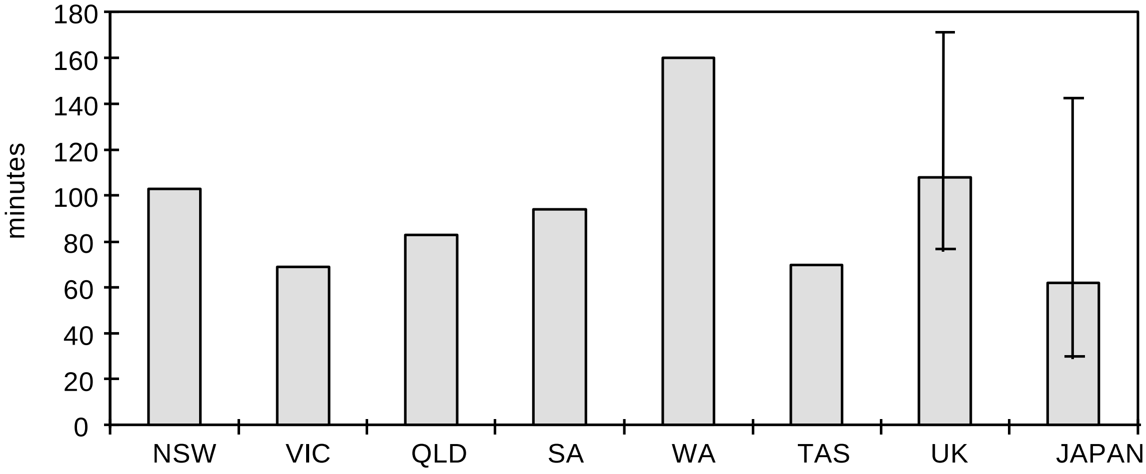
Average customer outage time

Average customer outage time is a more comprehensive indicator of reliability because it provides an indication of the severity of interruptions as well as the time taken to restore supply.

Within Australia, Sydney Electricity recorded the lowest average customer outage time in 1993-94. Each power interruption lasted an average of 48 minutes. Shortland, CEB and ESV were the next best Australian utilities with average customer outage times of 61, 65 and 69 minutes, respectively. North West Electricity, a rural distributor in New South Wales had the worst observed Australian average customer outage time at 232 minutes.

On average, Australian utilities had shorter average customer outage times than their United Kingdom counterparts, but longer outage times than Japanese utilities (figure 4.4). Kansai, Japan had the best observed average customer outage time, with interruptions lasting an average of 33 minutes — 45 per cent less than the best observed Australian distributor. Average customer outages for the United Kingdom's distributors ranged from 76 to 173 minutes.

Figure 4.4 Customer outage times by Australian state and selected overseas countries, 1993-94



Sources: ESAA 1995, OFFER 1994, and information supplied by FEPC, Japan. Chart based on data reproduced in appendix A, table A8.

Operating efficiency

This section compares partial measures of labour and capital productivity for Australian and overseas electricity supply operations. These partial indicators provide useful information on utility performance and are commonly used by utilities in assessing their own performance. However, care should be taken when considering them in isolation.

Capital productivity

Capital productivity in electricity generation is multifaceted as electricity is not storable and is subject to peak demands both daily and seasonally. Consequently, a variety of indicators are needed to provide information on different aspects of capital asset performance. Two of the best indicators are the capacity factor and the reserve plant margin (RPM). The capacity factor shows the average utilisation of available generating capacity for electricity production in a year. The RPM takes account of the difference between installed capacity and peak demands.

Capacity factor

A high capacity factor indicates that a generator is operating close to effective plant capacity. However, capacity factors also reflect the technological configuration of electricity generation. Generally, hydro-electric, oil and other peak load power plant have lower capacity factors than conventional thermal base-load power plant.

Overall, the capacity factor of the Australian electricity supply industry has been relatively stable over the period 1992-93 to 1993-94 (table 4.2). Rises by ETSA (by 3.9 points), SECWA (by 2.7 points) and PAWA (by 1.9 points) have been balanced by falls from Pacific Power (1.9 points), Generation Victoria (1.9 points), QEC (1.9 points) and the Snowy Mountains Hydro-electric Authority (3 points). QEC and Generation Victoria continue to have the highest capacity factors in Australia. Of conventional thermal systems, ETSA in South Australia and PAWA in the Northern Territory have the lowest capacity factors in Australia.

Table 4.2 Capacity factors of selected utilities and regions (per cent)

	1992-93	*1993-94*	*% change*
Utility			
Pacific Power[a]	46.7	44.8	-4.1
Pacific Power[b]	55.5	53.2	-4.1
Generation Victoria[a]	55.4	55.4[c]	0
Generation Victoria[b]	60.8	na	na
QEC	65.5	63.6	-2.9
ETSA	40.6	44.5	9.6
SECWA	45.8	48.5	5.9
HEC	41.0	40.6	-0.4
PAWA	39.3	41.2	4.8
SMHEA	19.9	16.9	-15.1
ESKOM, South Africa	46.8	50.9	8.8
TransAlta, Canada	74.1	74.8	0.7
NARC Region, U.S.			
ECAR	-	53.9	-
ERCOT	-	42.8	-
MAAC	-	45.5	-
MAIN	-	49.3	-
MAPP	-	46.1	-
NPCC	-	39.7	-
SERC	-	50.9	-
SPP	-	41.3	-
WSCC	-	46.6	-

Notes: (a) Includes SMHEA entitlements. (b) Excludes SMHEA entitlements.
(c) Generation Victoria's RPM for 1993-94 is estimated.
Sources: ESAA 1995, EIA 1994 and utility Annual Reports.

Some Australian generators out-performed many of their international counterparts in terms of capacity factor. QEC ranked second to TransAlta, Canada in 1994. The gap between TransAlta's capacity factor and the best Australian performer narrowed from around 20 per cent to 11 per cent between 1992-93 and 1993-94. Both QEC and Generation Victoria had better capacity factors than ESKOM and the provincial systems of North America. However, the worst performers in Australia, ETSA and the two predominantly hydro systems of SMHEA and HEC, had capacity factors less than most United States' utilities.

Reserve plant margin

Reserve plant margin (RPM) is calculated as the difference between generating capacity and peak load expressed as a proportion of peak load. Reserve plant is needed to cover the risk of plant failure.

The reserve plant requirement is affected by the mix of generating plant, the scale of operations and interconnection with other utilities. Generally, hydro-based systems are likely to have substantial reserve plant to cope with seasonal fluctuations in water availability. This is particularly the case in countries subject to climatic extremes, such as Australia. Large, interconnected systems, such as those in North America and Europe, are able to spread the risk of plant failure and tend to cope with seasonally driven demand variations and unplanned outages in generating capacity better than the relatively isolated Australian utilities.

Since reserve plant is often idle capital, reductions in RPM improve the measured productivity of capital. However, too small a RPM may be responsible for system failure and poor customer reliability. Consequently, beyond an optimal level there is a trade-off between improving capital productivity and technical efficiency, and risking a decline in service reliability and customer satisfaction.

RPMs for Australian utilities and United States Reliability Council regions in 1993-94 are presented in table 4.3. South Australia had the best RPM of all observed Australian generators in 1993-94. This is partly due to ETSA's high net imports of electricity, relative to total generation. HEC in Tasmania had the worst RPM of all Australian utilities. However, this can be explained by its near 100 per cent reliance on hydro technology. Of the conventional thermal systems, PAWA had the worst RPM at 54.2 per cent, followed by Pacific Power at 48.2 per cent.

Of the observed North American regions, the Southeastern Electric Reliability Council (SERC) region had the lowest RPM at 10.0 per cent of peak load. The highest United States performance of 30.2 per cent was by ECAR, which had the best observed Unites States capacity factor performance.

Table 4.3 Reserve plant margins of selected utilities and regions

	1992-93	1993-94	% change
Utility			
Pacific Power[a]	41.6	48.2	15.9
Pacific Power[b]	15.3	22.0	43.8
Generation Victoria[a]	24.6	24.6[c]	0
Generation Victoria[b]	4.8	4.8[c]	0
QEC	25.8	27.5	6.6
ETSA	12.4	19.7	58.9
SECWA	33.8	36.7	8.6
HEC	70.0	81.3	16.1
PAWA	59.5	54.2	-8.9
SMHEA	46.7	44.0	-5.8
NARC Region, U.S.			
ECAR	-	30.2	-
ERCOT	-	19.5	-
MAAC	-	11.0	-
MAIN	-	19.9	-
MAPP	-	26.7	-
NPCC	-	20.0	-
SERC	-	10.0	-
SPP	-	24.3	-
WSCC	-	32.2	-

Notes: Generation Victoria's RPM for 1993-94 is estimated. (a) Includes SMHEA entitlements. (b) Excludes SMHEA entitlements. (c) estimated.

Sources: ESAA 1995, EIA 1994 and utility Annual Reports.

Labour productivity

Labour accounts for only 15 per cent of costs in the Australian electricity supply industry (Orchisson and Beardow 1993). Improvements in labour productivity, therefore, will have less impact on overall technical efficiency than proportionately equivalent improvements in capital productivity. Nevertheless, improvements in labour productivity are likely to have a more immediate impact on overall electricity industry performance given the long-lived, lumpy nature of capital assets.

In this study, labour productivity is measured as GWh of electricity sold per state electricity supply industry employee. Utilities reliant on relatively capital intensive technologies (eg hydro systems) and those with relatively high industrial demand tend to score highly on this measure.

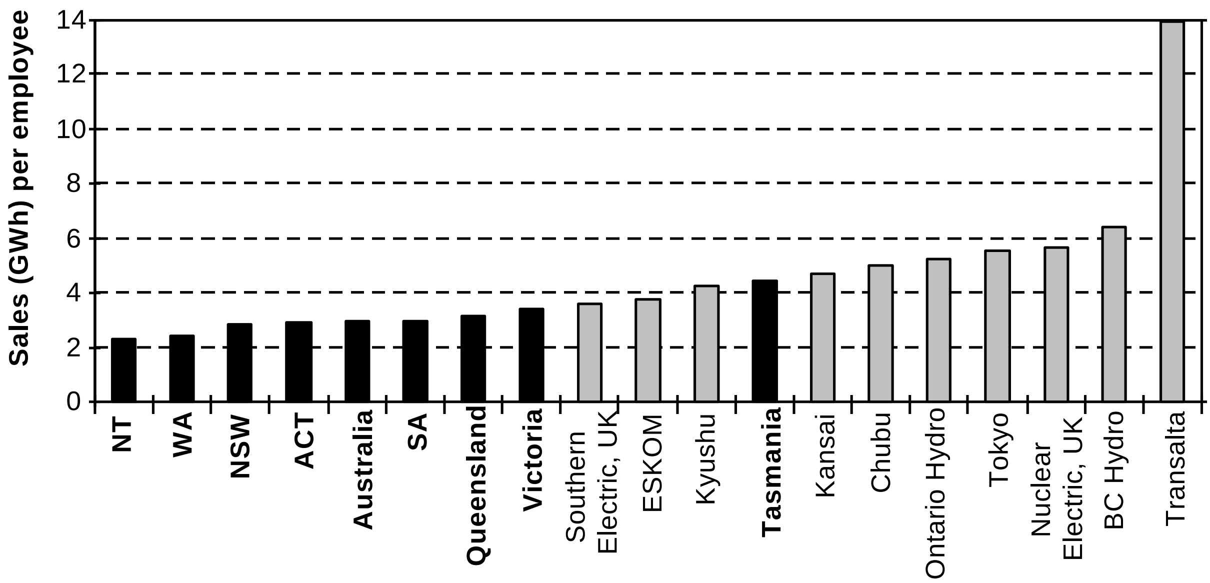
Employment and sales per employee data are provided are table 4.4. Total employment in the industry fell by 13 per cent between 1993 and 1994 to 45 398 persons, while electricity sales increased by 2 per cent. Consequently, labour productivity as measured by sales per employee improved substantially in all Australian states over the period. The largest increases in labour productivity occurred in Tasmania (41.7 per cent), South Australia (35.9 per cent) and Victoria (28.6 per cent). Labour productivity in Australia's electricity supply industry has increased by 58 per cent since 1990. However, Australia still ranks well below Canadian, Japanese and Swedish systems and some systems in the United States and Europe.

Table 4.4 Employment and sales per employee, Australia 1993 and 1994

	Employment[a]			*GWh/employee*		
	1993	*1994*	*% change*	*1993*	*1994*	*%change*
New South Wales	18205	17060	-6.3	2.55	2.84	11.4
Victoria	12090	9382	-22.4	2.62	3.37	28.6
Queensland	8298	7658	-7.7	2.88	3.13	8.7
South Australia	3822	2881	-24.6	2.20	2.99	35.9
Western Australia	4961	4669	-5.9	2.15	2.43	13.0
Tasmania	2615	1848	-29.3	3.14	4.45	41.7
ACT	796	763	-4.1	2.82	2.90	2.8
Northern Territory	601	480	-20.1	1.86	2.30	23.7
Australia	52110[b]	45398[b]	-12.9	2.53	2.96	17.0

Notes: (a) Includes construction personnel. (b) Includes Snowy Mountains Authority personnel.
Source: ESAA 1995.

Figure 4.5 Electricity sales per employee for Australian states and selected international utilities, 1994



Sources: ESAA 1995 and information supplied by individual utilities. Chart based on data reproduced in appendix A, table A9.

In 1994, TransAlta had the best observed labour productivity, some four times higher than the best observed Australian performance (figure 4.5). This may be due, in part, to the utility's less extensive distribution network. (It is the distribution network that is usually the most labour intensive function in electricity supply.) Nevertheless, TransAlta has around 350 000 direct customers. Other top performers in terms of electricity sales per employee were BC Hydro (Canada), Ontario Hydro (Canada) and Tokyo Electric (Japan). However, the tendency for Japanese systems to score well on this measure reflects, at least in part, their propensity to contract out labour-intensive operations and maintenance functions. Hydro systems tend to score well because they are typically more capital intensive and require less labour than conventional thermal power plants.

4.4 Conclusions

The Australian electricity supply industry is undergoing substantial change, including restructuring and the removal of cross-subsidies. Some jurisdictions are progressing with reforms more rapidly than others. While planning has been considerable, progress towards the implementation of a national grid is to-date disappointing.

The best Australian utilities perform relatively well in international price comparisons. However, the worst performers rank substantially lower. Further elimination of cross-subsidies and the introduction of a national grid should stimulate price reductions in industrial electricity prices in the future and may further improve Australia's ranking.

Most Australian distributors have improved service reliability. However, most distributors in Japan and the United Kingdom continue to out-perform Australian utilities.

The gap between the best Australian utility in terms of capacity factor and world best observed practice has narrowed by 9 per cent since 1992-93. However, at an aggregate level Australia's reserve plant margin is nearly double that of the United States.

Substantial reductions in electricity supply industry employment have improved labour productivity in all Australian states. The greatest improvements have occurred in Tasmania, South Australia and Victoria. Nevertheless, best observed international labour productivity is four times greater than the best observed Australian performance.

5 Rail Freight

5.1 Introduction

This chapter compares the performance of Australia's rail freight industry relative to world best practice. It begins by summarising recent reforms to Australian rail freight operations. It then reports on customer based and operating efficiency indicators. It finishes with an evaluation of the operating cost gap between Australian rail systems and achievable world best practice.

The BIE report, *International Benchmarking — Rail Freight 1995* (due for publication in late 1995), is the main source of information for this chapter. Although operating cost comparisons are based on material from an earlier report.

5.2 The reform process

Six separate rail authorities currently operate in Australia. The pace and nature of reforms in each rail system varies, due to differences in internal management priorities and government policy initiatives.

A comprehensive reform strategy began for the Public Transport Corporation of Victoria (PTC) in January 1993. Since then, PTC's freight division, V/Line Freight, has significantly reduced its labour force and rolling stock fleet. Employment fell by more than 1,600 between 1992-93 and 1993-94 and wagon numbers dropped by over 1,000 (including wagons transferred to National Rail).

Western Australia's Westrail has also reduced freight employee numbers in recent years. The closure of the Midlands workshop in 1993 was an example of both labour shedding and service rationalisation through the use of private contractors.

National Rail (NR) is in the process of taking control of the interstate rail network. It commenced operations on 1 February 1993 and undertook to complete this process within three years. To date, it has taken responsibility for most client services, terminal operations, and wagon and train operations. Some of NR's achievements include reducing the operating deficit on the interstate rail network by about half (or around $150 million per year) and introducing individual customer service agreements.

Australian National (AN) has transferred 65 per cent of its business to NR. This has required significant restructuring. AN has targeted efficiency improvements so that it is better placed to provide contract rail services to other Australian rail systems. AN's workforce declined by 12 per cent during 1993-94. It operates in partnership with NR to provide a successful roadrailer service.

Queensland Rail (QR) is phasing in commercial pricing principles for coal and minerals. By the year 2000, all coal haulage contracts will be on a commercial basis with no royalty element. A $526 million upgrade of the Brisbane-Cairns line is due for completion in 1996. Accrual accounting was adopted in 1992-93 and QR was corporatised in July 1995.

The State Rail Authority of NSW (SRA) has been restructured. Most significantly, an access management unit (RailNet) will oversee the process of allowing third parties to access the state's rail network. A Railway Services Group has been introduced to manage the non-core assets of individual business units.Activities in a number of areas have been contracted out.

Reforms to rail systems are being strongly influenced by competition policy initiatives, coordinated through the Council of Australian Governments and based on Hilmer reform proposals. These reforms are in the early stages. They include: allowing third party access to rail track (eg Track Australia proposals and Hunter Valley coal lines); eliminating monopoly pricing behaviour (eg for railing coal in Queensland); eliminating regulations which unjustifiably restrict competition by other modes of transport (eg bulk commodities in Western Australia and Queensland); and ensuring rail systems operate on a commercial basis — reducing the extent of cross subsidies, providing services at efficient cost, requiring a normal commercial return on assets and clearly specifying and reporting community service obligations (CSOs).

5.3 Performance indicators

This section reports on indicators of rail system performance from the customer's perspective (price and service quality), and indicators of operating efficiency (labour and capital productivity). It also estimates the cost gap between Australian railroads and achievable world best practice.

Price

Australian rail freight rates are, with the exception of general freight, much higher than best practice rates (table 5.1). Average rates, in cents per net tonne kilometre, decreased slightly in Australia between 1991-92 and 1993-94. The international best practice (Burlington Northern) rates increased significantly over the period due to the impact of exchange rate changes and inflation. On the basis of real domestic currency, Burlington Northern's rate decreased by 4 per cent, similar to the average for the Australian systems.

Table 5.1 Australian rail freight price (cents per net tonne kilometre) and quality of service (percentage of trains arriving within 30†minutes of the scheduled arrival time and loss and damage in cents per $100 freight revenue), 1993-94 and 1991-92[(a)]

	QR	SRA	Westrail	AN	PTC	Aust(b)	Best observed
Price							
Average price to industry(d)	**4.78** 4.65	**4.59** 5.02	**4.91** 5.26	**3.08** 3.34	**4.20** 4.17	**4.45** 4.59	**2.00** 1.71
- coal(e)	**4.82** 4.85	**5.67** 6.02					**1.17** 1.15
- grain(f)	**5.59** 5.50	**5.56** 5.54	**5.52** 5.71	**7.95** 7.95	**5.91** 6.01	**5.97** 6.05	**1.82** 1.54
- general freight(g)						**2.87** 3.41	**2.88** 2.88
Service quality							
On-time running(h)	**50** 45	**85** 78	**70** 72	**65** 81	**70** 81		**85** 81
Ratio of lost plus damaged freight(i)	**2** 4	**2** 21	**0** 1	**3** 20	**na** 30		**0** 1

Notes: (a) 1993-94 data are reported in bold, 1991-92 in normal font. (b) Data for Australia are weighted sums of the five public systems. (c) Best practice is the best observed performance, identified separately for each category, and as such involves a number of domestic and US systems. (d) Revenue cents per net tonne kilometre, all traffic. (e) Does not take account of haul length, which significantly favours best observed. (f) Does not take account of haul length, which significantly favours best observed. Data for Australian systems has been provided by the Australian Wheat Board. (g) Data for Australia is NRC average rate for 1994-95, with 1993-94 in brackets. 1994 data for best practice. (h) Percentage of trains arriving within 30 minutes of the scheduled arrival time. (i) Cents per $100 freight revenue. For example, SRA paid 2 cents in freight claims for every $100 freight revenue in 1993-94. na. Not available.

Sources: Rail systems Annual Reports, various years.

Average rail freight rates for coal are significantly higher in Australia than in comparable countries, such as the United States, Canada and South Africa and up to 5 times the lowest observed average rate for an individual United States railroad when measured on the basis of coal revenue per ntk. Reductions in rates for railing coal have been more rapid in the United States than in Queensland and NSW in recent years when measured in real domestic currency. The average annual decline in rates was 3.8 per cent for all United States Class 1 railroads and for Burlington Northern (best practice) between 1990 and 1993. Between 1990-91 and 1993-94, rates in Queensland and NSW declined by 3.0 and 1.7 per cent annually, respectively. Thus the gap between the major Australian rates for railing coal and United States rates (including best practice) has widened in recent years.

Rates paid by grain producers in Australia for rail transportation are typically around three times higher than those paid in North America, when measured in c/ntk. This is primarily due to the much longer haul lengths in North America. Average grain hauls are about 1100 kilometres in the United States, compared to about 330 kilometres in Australia. When adjusted for haul length, rates were about 15 per cent lower in Australia than in the United States. Freight rates for transporting grains have fallen for all selected rail systems between 1992 and 1994 when measured in real terms.

Australian rates for general freight (comprising containers, steel, motor vehicles, paper products and other general merchandise) closed the gap to best observed overseas rates in 1994-95. NRC reduced the average rate to general freight customers by 16 per cent in that year. Data for 1993-94 indicates that door to door rail rates were about 20 per cent below road rates.

Service quality

Lack of reliability of freight trains, including failure to run on-time, and other problems regarding service quality are of significant concern to firms despatching general freight, and of lesser concern to bulk freight customers. In Australia, the reliability of rail, whether measured by transit time, on-time arrival performance, or availability of goods to the customer at the time promised, is generally inferior to that of road transport.

Rail transit times were on average 35 per cent longer than road for the main intercity transport corridors in Australia in 1993-94. The corridors where rail transit times are proportionately the longest compared to road were Brisbane-Cairns, Melbourne-Brisbane and Sydney-Adelaide.

Trains carrying general freight in Australia typically arrived on-time about 70 per cent of the time in 1993-94. However, Australian systems varied substantially in their reliability, with the State Rail Authority of NSW (SRA) the best at 85 per cent, and Queensland Rail (QR) the worst with 50 per cent of trains arriving on time. National Rail (NR) recorded 61 per cent on time arrivals. In contrast, competing truck operators arrive on-time about 96 per cent of time (BIE 1992b). Thus road has a significant competitive advantage in this area.

While SRA and QR have continually improved, the performances of each of the other systems (except NRC) have deteriorated — noticeably for Australian National (AN) and the Public Transport Commission of Victoria (PTC). Westrail, PTC and AN have also exhibited relatively large swings between years.

Loss and damage rates (and rates of change) were quite varied between the Australian systems, but overall performance was good compared to North American systems. Westrail was observed best practice.

Operating efficiency

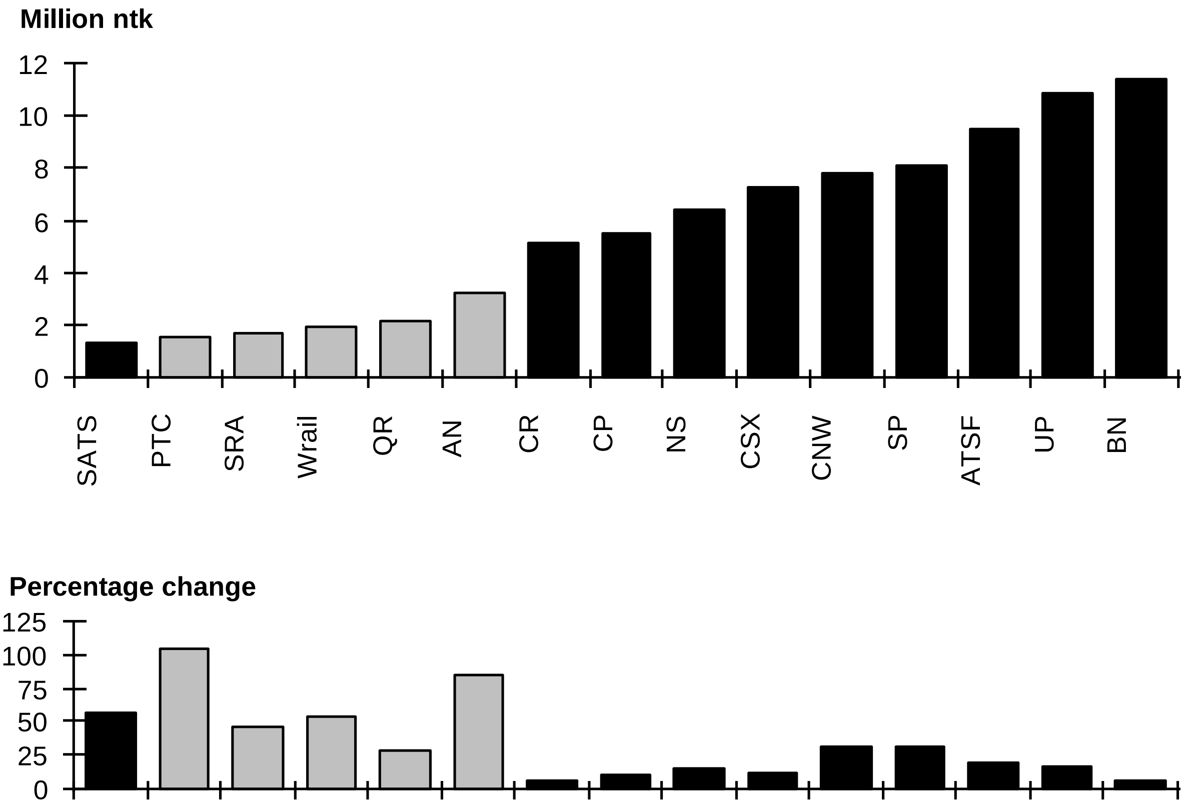
This section compares measures of labour and capital productivity for Australian and North American systems.

The comparisons presented below have not been adjusted to reflect the impact of differing system characteristics, such as terrain, average haul length, traffic density and traffic mix. Differences between the operating efficiency performance of the Australian systems and North American systems could be expected to be lower if these 'uncontrollable factors' were taken into account.

Labour productivity

Labour productivity, measured as net tonnes kilometres per freight employee, is much lower in Australian systems than North American systems (figure 5.2).

Figure 5.2 Ntk per freight employee, 1993-94 and percentage change since 1991-92[(a)]



Note: (a) Calendar year 1993 for North America, financial year 1993-94 for Australia and South Africa
Source: BIE Chart. Chart based on data reproduced in appendix A, table A10.

In the two years 1991-92 to 1993-94 labour productivity in most Australian rail systems improved dramatically. PTC recorded a productivity increase of 112 per cent over the two year period, while AN improved by 84 per cent. These improvements stemmed in large part from reducing the workforce. Most North American rail systems improved labour productivity by about 10 to 20 per cent over the same period. Overmanning is more of a problem in Australian than North American rail systems. North American rail systems rationalised their labour forces during the 1980s. Thus there is more scope for Australian rail systems to shed labour and thereby improve labour productivity. Nevertheless, Australian rail systems, particularly PTC and AN, and to a lesser extent Westrail and SRA, have registered impressive labour productivity improvements.

Capital productivity

Locomotive productivity is defined as net tonne kilometres per 3000 horsepower equivalent freight locomotive. Locomotive productivity is lower in Australian systems than in most North American systems. The best practice United States system, Burlington Northern, had more than double the locomotive productivity of the best Australian system (AN) in 1993-94. Some of this difference is due to more favourable operating conditions in North America, which allow longer trains to be run. However, better fleet management is also an important factor.

Australian systems improved locomotive productivity by about 20 to 40 per cent between 1991-92 and 1993-94. These improvements exceeded those in the United States, where improvements were of the order of 5 per cent. As with labour productivity, this differential in rates of improvement stemmed from Australian systems having more excess resources (ie locomotives) to shed. Among the Australian systems, PTC and Westrail have registered the greatest improvements.

Wagon productivity is defined as average net tonne kilometers per freight wagon. Wagon productivity in the Australian systems was significantly lower than in a number of North American systems, but slightly higher than in some others in 1993-94. Again, of more interest is whether Australian systems are approaching achievable best practice through better matching their wagon fleet to their freight task. Three of the Australian systems, AN, PTC and Westrail, improved their wagon productivity by more than 50 per cent between 1991-92 and 1993-94. United States systems recorded improvements of the order of 15 to 20 per cent over the same period.

Operating cost performance gaps

Using a cost standardisation model to adjust for operating environment influences on costs, such as price of inputs, size of task, traffic density and terrain, reduces the performance gap between Australian rail operations and world best practice (table 5.2).

Table 5.2 Australian rail freight services operating cost performance indicators, 1991-92 and 1990-91[a]

Performance against world best practice	*QR*	*SRA*	*Westrail*[b]	*AN*	*PTC*	*Aust*
Reduction needed to reach WBP costs (%)	29 (33)	26 (31)	18 (21)	(c) (c)	35 (38)	27 (31)
Reduction in fleet to reach WBPutilisation[d] (%)						
• locomotives	16 (28)	35 (36)	31 (35)	19 (23)	50 (47)	27 (32)
• wagons	13 (26)	34 (31)	47 (53)	52 (53)	72 (70)	35 (39)

Notes: (a) 1990-91 data are reported in brackets. (b) Westrail costs are estimates by Travers Morgan, and are not attributable to inputs fromWestrail. (c) AN data on operating costs is not reported separately as its accuracy could not beverified by AN. However, estimates for AN are included in the Australian totals. (d) Percentage reduction required in the number of loomotives and wagons to achieve WBP rolling stock utilisation. Some figures for 1990-91 differ from those reported in the initial rail report due to revisions.

Sources: Travers Morgan and BIE 1993b.

In 1991-92, the operating costs of the Australian systems needed to fall by about 27†per cent, or $578 million, to match world best practice costs according to analysis based on a standardised cost model. The improvement required by Australian systems to reach best practice costs varied significantly from system to system, with the largest gap being 35 per cent for PTC and the smallest being 18 per cent for Westrail. This variation between systems is also evident in the case of fleet reductions required to meet world best practice, with QR having the smallest gap and PTC the largest. The gap between 1991-92 cost levels and world best practice is smaller for all the four reported Australian systemsthan it was in 1990-91.

Based on 1991-92 data, the standardised costs analysis suggested that while Australian systems are making headway in reducing the performance gap relative to best practice operating cost levels, they would not reach world best cost levels until 1998-99. This assumed that they maintained their rate of progress in reducing costs (annual reductions of around 4.4 per cent) and that world best practice remained unchanged at its 1991-92 level. Put another way, Australian rail systems would have to almost double their rate of improvement to reach world best practice cost structures during 1995-96. However, improvements to operating costs of this scale would require additional capital investments by each of the Australian systems.

While this rate of improvement may appear unrealistic, it should be considered in the context of existing performance improvement targets. For example, NR is aiming to reduce operating costs by 45 per cent in real terms, and to increase labour and capital productivity by three-fold or more by 1995-96. Preliminary examination for 1993-94 indicates that some Australian systems (eg PTC) have made significant progress towards achieving world best practice cost levels.

5.4 Conclusions

Some Australian rail systems have improved their performance markedly in recent years, while others have improved more modestly. Labour and capital productivity have increased over the period 1991-92 to 1993-94, especially for PTC, AN and Westrail. These improvements have stemmed from reducing surplus employees, locomotives and wagons. While recognising that many of these improvements have been from a ‘low base’, credit must be given in recognition of the pace and extent of these improvements.

However, further significant reforms are essential if Australian systems are to close the very considerable performance gaps and reach achievable world best practice. These gaps exist in regard to labour and capital productivity, some freight rates (eg coal) and the level of operating costs.

The major problems in Australian rail freight are high cost levels and non-commercial rate setting. The latter involves extensive cross-subsidies, most commonly from bulk freight users to urban passengers. These problems may be remedied through the implementation of a national competition policy which advocates:

- allowing third party access to rail track;
- removing restrictions to freight tasks which limit inter-modal competition;
- adopting commercial pricing policies; and
- introducing direct and transparent financial support for non-commercial services.

Such reforms should be vigorously pursued by the relevant governments and their rail systems.

6 Telecommunications

6.1 Introduction

This chapter compares Australia's performance in the provision of telecommunications infrastructure and services with that of OECD and Asian counterparts. International comparisons are made on the basis of price, quality of service, innovation and operational efficiency indicators. The chapter summarises findings from *International Performance Indicators — Telecommunications 1995* (BIE 1995a), published in March 1995.

6.2 Telecommunications reform in Australia

The structure of the telecommunications market in Australia has been reviewed a number of times. The first major review was undertaken by the *Committee of Inquiry into Telecommunications Services in Australia* in 1982 (the Davidson Report). This was followed by a review in 1987, which led to the introduction of a number of reforms embodied in the *Telecommunications Act, 1989.* These included the establishment of the Australian Telecommunications Authority (AUSTEL) as an independent regulator for the telecommunications industry, and opening value added services to full competition.

Following further review during 1990, the government introduced a number of reforms, which formed the basis for the regulatory arrangements currently governing the Australian telecommunications industry. The key elements of these arrangements included:

- the establishment of a duopoly on fixed network provision until 30 June 1997;
- the merger of Telecom and OTC into the Australian and Overseas Telecommunication Corporation (AOTC) — now trading domestically as Telecom and internationally as Telstra;
- the sale of the national satellite operator AUSSAT to the second carrier (Optus Communications);
- the issuing of three public mobile telephone licences (to Telstra, Optus and Vodafone);
- allowing full resale of domestic and international capacity; and

- extending the regulatory responsibilities for AUSTEL to cover interconnection arrangements between the general carriers.

These arrangements were introduced in the *Telecommunications Act, 1991*.

The government announced a further review in 1994 with the aim of examining what changes in policy, legislation and regulation will be required following the expiry of the duopoly in June 1997. In August 1995, the government released a set of 99 policy principles which are to form the basis of the post-1997 communications environment. These principles include:

- no restriction on the number of network infrastructure providers or installers after July 1997;
- no distinction between fixed network and mobile carriers;
- no restriction on the number of carrier licences;
- open and seamless network access for all carriers and service providers; and
- the integration of competition policy related issues into the Australian Competition and Consumer Commission (ACCC).

6.3 Performance indicators

Performance is considered at the national level, rather than that of the individual operator, to ensure that all core services and lines of business are incorporated into the comparison. Aggregated data are used where possible, but for some countries the data reflect the major supplier or a representative supplier. Price comparisons are based on Telstra's published tariffs for Australia, while discounted price comparisons are based on the best available published discounts, and for Australia include both Telstra and Optus prices. Quality of service comparisons are based on data that for Australia relate to Telstra only.

Prices

Communications prices are multifaceted. Charges are made for installation, rental, subscription and usage. Simple rate comparisons compare each of these charges individually. They have the advantage of simplicity and of wider international coverage, but they do not reflect the total service charge picture very well. Using a basket approach combines all these charge elements into a representative user basket, and gives a better view of the overall picture. The coverage of internationally comparable data for baskets is, however, limited to OECD countries. Both simple rate comparisons and basket comparisons are undertaken in an attempt to get as wide an international coverage as possible, and as a double check on the results. All price comparisons are in $US using annual average exchange rates.

In terms of simple rate comparisons, Australia performs relatively well on cellular mobile charges and international call charges, but rather less well on business user fixed and national trunk usage charges. Affordability comparisons, using the yardstick of GDP per capita, suggest that Australian prices are relatively competitive. Scandinavian countries perform well on price comparisons across the board, and in some comparisons Asian countries also perform well. The Asian countries in the sample (Korea, Taiwan, Singapore, Hong Kong and Malaysia), excluding Japan, have among the lowest business user fixed charges, but do not perform so well in terms of usage charges. Malaysia and Singapore also enjoy relatively low cellular mobile charges, while Japan is probably the most expensive country for mobile overall in our sample (table 6.1).

Table 6.1 Prices: Australia, Best and Worst Observed

	Year	Best Observed	Worst Observed	Australia Ranked
Simple Rate Comparisons				
Business Fixed Charges	1993	United States	Canada	18th of 28
Long Distance Call Charges	1993	Iceland	Portugal	16th of 25
International Call Charges	1994	Norway	Japan	14th of 24
Mobile Fixed Charges	1992	Malaysia	Luxembourg	8th of 29
Mobile Call Charges	1992	Singapore	Germany	7th of 29
Basket Comparisons				
National basket	1994	Iceland	Austria	14th of 23
International call basket	1994	Australia	Turkey	1st of 24
Mobile basket	1994	Iceland	Japan	4th of 24
PSDN basket	1994	Finland	Japan	18th of 24
Leased line Basket, 9.6 Kbit	1994	Belgium	Austria	9th of 24
Leased line Basket, 64 Kbit	1994	Australia	Spain	1st of 24
Leased line Basket, 1.5/2 Mbit	1994	United Kingdom	Luxembourg	5th of 22
Composite basket	1994	Finland	Japan	11th of 22

Source: BIE 1995a.

In terms of basket comparisons, Australia performs relatively poorly for the business user national services basket (including fixed, local and long distance charges), with charges above the OECD average and higher than the Scandinavian countries, the United Kingdom, United States, New Zealand and Canada. While national differences in geography, demography and regulation regarding local call charging make the comparison of national call charges relatively vulnerable to external factors, we must conclude that Australia falls some way behind international best practice on this indicator (table 6.1).

In contrast, Australia performs well in comparisons of international call basket charges. Telstra also performs relatively well in comparisons of cellular mobile charges, currently ranking 4th among the 24 mobile operators listed. In light of the likely disadvantage of distance assumptions in the model for larger countries this is a particularly good performance. A comparison of the 1992 and 1994 rankings suggests that mobile charges in Australia are moving in line with those of OECD counterparts.

Australian charges for the basket of packed-switched data network (PSDN) services are marginally above the OECD average, ranking 18th among the OECD countries. Australia's ranking in terms of charges for this basket of PSDN services has deteriorated from 7th in 1992. However, prices for these services are volatile, suggesting that caution should be exercised in interpreting this finding. In terms of the leased line basket Australia performs relatively well overall, ranking 9th for the slower 9.6 Kbps rate lines, 1st for the mid-range 56/64 Kbps line speeds and 5th for the high speed 1.5/2 Mbps lines. Australia has been improving its position over the period 1992 to 1994 relative to OECD counterparts in terms of charges for this basket of leased line services.

Putting this all together into a composite business basket we find that Australia ranks slightly above the OECD average, at 11th out of 24 in both 1992 and 1994. Australia performs better in price comparisons than Japan, Germany, France and the United States for the composite basket, but below the Scandinavian countries, New Zealand, the United Kingdom and Canada.

A comparative static analysis over the period 1992 to 1994 gives a picture of Australia's position relative to OECD counterparts that is substantially independent of the effects of the tariff basket modelling assumptions. And in comparative static terms, Australia's position has remained unchanged in respect to the national business basket, the international call basket and the mobile basket; improved in respect to the leased line basket; and deteriorated in respect to the packet-switched data network services basket. Australia's relative position in terms of the price of the composite business basket has remained *unchanged since 1989*.

The overall picture from price comparisons based on tariff baskets is one of having to run to keep pace with international counterparts, and barely managing to keep up. Prices appear to be falling more slowly in Australia than in some other comparable countries. It is also noticeable that Australia's performance seems better in the more highly contested markets of mobile and international than in markets where there is less competition.

Price trends

A time series analysis of a basket of national services charges for business users reveals that charges have fallen since the introduction of competition in 1992. However, price falls for the basket of national services in Australia, at 8.9 per cent over the period 1990 to 1994, were somewhat less than the OECD average price fall of 15.3 per cent (table 6.2). A time series analysis for peak rate 3 minute international call charges indicates that although prices in Australia declined by 28.4 per cent over the period 1990 to 1994, the OECD average price decline was 34.6 per cent. Charges for the basket of cellular mobile services declined 20.6 per cent on average across OECD countries over the period 1990-94, while mobile charges in Australia declined by 26.3 per cent. Australia is performing well in mobile, but it appears that price falls in other categories are less than the OECD average.

Table 6.2 Price trends (1990-94)

	Australia	OECD Average	Competitive	Non-competitive
National Business Basket	-8.9%	-15.3%	-21.6%	-12.0%
International Calls	-28.4%	-34.5%	-	-
Mobile Basket	-26.3%	-20.6%	-31.4%	-16.9%

Source: BIE 1995a.

Time series analysis also reveals that countries with competitive market structures experienced larger price reductions than countries with non-competitive market structures between 1990 and 1994. On average, countries with competitive market structures experienced declines of 21.6 per cent for national and 31.4 per cent for the mobile services baskets, compared to declines of 12 per cent and 16.9 per cent for non-competitive countries, respectively.

Quality of service

Australia's local call failure rates continue to be above those of Japan, the United Kingdom and Canada, and long distance call failure rates are considerably higher than those of the United Kingdom and the United States. However, Austel estimates for call failure rates in Australia in 1993 and 1994 suggest that there has been some improvement in the reliability of the network since the introduction of competition. Australia's performance in respect of international call completion rates is also somewhat disappointing, being below that of the United States, Japan, the United Kingdom and Canada, but marginally better than that of New Zealand in 1992 (table 6.3). The evidence suggests that Australia's performance on call completion/call failure was some way below international best practice in 1992, but has improved somewhat since then.

Australia also performs relatively poorly on fault clearance, ranking 15th of the 19 countries for which 1992 data are available. In terms of cellular mobile call drop-out, Austel report a declining call drop-out rate of 3.8 per cent in 1994 at the national level. Austel note that mobile drop-out in Sydney occasionally exceeded the internationally accepted performance standard of 5 per cent during the first half of 1994, but has remained below that threshold since.

Table 6.3 Quality of Service & innovation: Australia, Best and Worst Observed

	Year	*Best Observed*	*Worst Observed*	*Australia Ranked*
Quality of service:				
IDD Completion Rates	1992	United States	Greece	15th of 24
Fault Clearance	1992	Netherlands	Taiwan	15th of 19
Innovation:				
Mobile Penetration	1994	Sweden	Turkey	8th of 30
Digitalisation	1993	Hong Kong	Austria	23rd of 30
Optical Fibre Deployment	1990-92	Sweden	Canada	6th of 12
Itemised Billing	1992	Canada/France	Denmark	5th of 13
Proportion Cardphones	1992	Japan	Norway	2nd of 25

Source: BIE 1995a.

Innovation

The penetration of cellular mobile telephones in Australia is above average, but Australia ranked well below most comparable countries in terms of the digitalisation of fixed network mainlines in 1993. Australia performs well in terms of optical fibre deployment, ranking 6th out of the 12 countries for which data are available for 1992. While great care must be taken in interpreting such a poor indicator, it seems apparent that Australia is among the leading countries in fibre deployment. Australia also performs relatively well in terms of the availability of itemised billing, and the proportion of public payphones that are cardphones, ranking 5th of 13 and 2nd among the 25 countries for which data are available for 1992, respectively.

The evidence suggests that Australia is performing reasonably well, but at below international best practice on most quality of service indicators. Attention to fulfilling proposed increases in network investment is required if Australia is to move towards international best practice on such indicators.

Operational efficiency

The traditional indicators of partial capital and labour productivity (revenue per employee, revenue per line and lines per employee) suggest that Australia fell some way below international best practice in 1993 (table 6.4). Labour productivity (as measured by revenue and lines per employee) was particularly low in Australia, while revenue per line (capital productivity) is buoyed somewhat by Australia's relatively high level of network usage.

Table 6.4 Operational Efficiency: Australia, Best and Worst Observed

	Year	*Best Observed*	*Worst Observed*	*Australia Ranked*
Revenue per Employee	1993	Switzerland	Turkey	19th of 27
Lines per Employee	1993	South Korea	Thailand	26th of 30
Revenue per Line	1993	Switzerland	Turkey	7th of 28
Partial Labour Productivity	1992	United States	Australia	11th of 11
Partial Capital Productivity	1992	United States	Switzerland	7th of 11
Multifactor Productivity	1992	United States	Switzerland	8th of 11

Source: BIE 1995a.

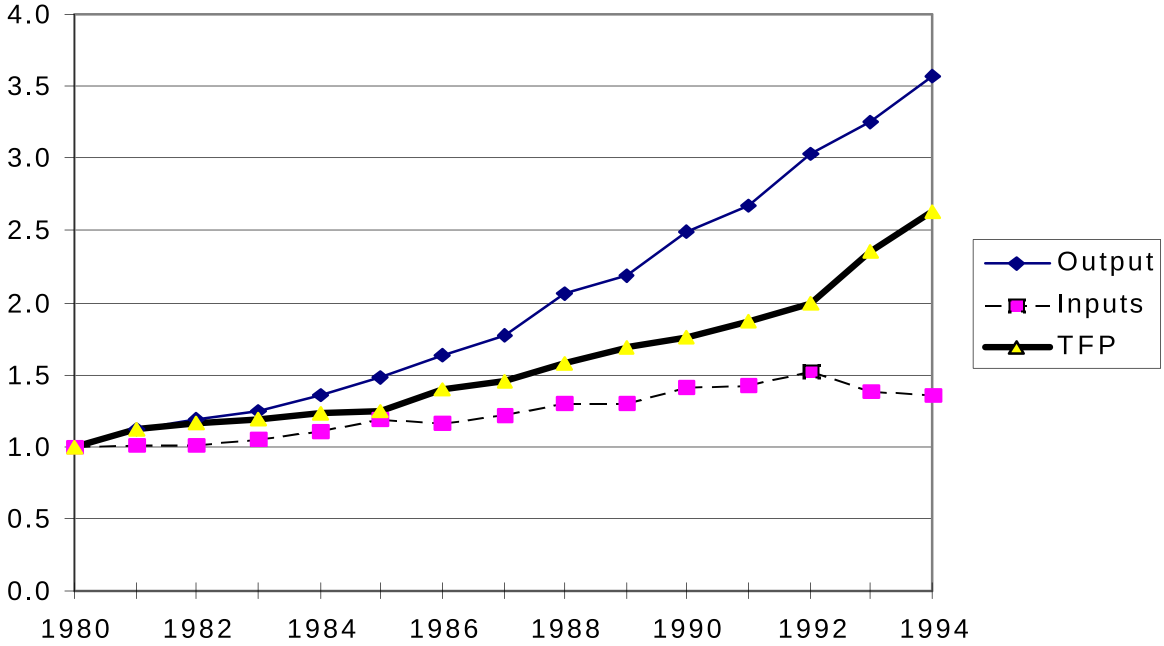
Increasing revenue per employee, price effects notwithstanding, is an encouraging sign that labour productivity in Australia is improving. This is supported by evidence of improvement in lines per employee, which is price independent. Australia performs significantly better in terms of capital productivity than labour productivity, as indicated by revenue per line, ranking 7th among the 30 countries in the sample.

International comparisons of multifactor productivity (MFP) indexes among the 11 countries for which data are available reveal a similar story. In terms of lines and calls per employee (the labour productivity index) Australia was the worst performing country in the sample in 1992. Australia ranked 7th of the 11 countries in terms of calls per dollar of network capital stock (the capital productivity index). In terms of the MFP index Australia ranked 8th out of the 11 countries in 1992. It is clear from these results that Australia's labour productivity has been low by international standards.

Encouragingly, the BIE's analysis reveals that Telstra's total factor productivity (TFP) grew at an annual average rate of 6.3 per cent over the period 1979-80 to 1993-94 (figure 6.1). Output increased on average by 9.2 per cent annually, while inputs grew on average by only 3 per cent annually. This reflects reductions in some inputs used, particularly labour. It is notable that Telstra has achieved its strongest growth in TFP since 1992, when competition was introduced. Telstra has also shown a marked improvement in its economic rate of return since the late 1980s.

The unequivocal message of an analysis of operating efficiency is that labour productivity in telecommunications in Australia remained low by international standards up to and including 1992-93. Notwithstanding considerable progress in reforming telecommunications, the analysis raises some concern as to the rate of change relative to international counterparts and competitors, and the distance between Australia's recent public telecommunications infrastructure operating performance and international best practice.

Figure 6.1 Total Factor Productivity, Output and Input Indexes for Telstra (1980-94)



Source: BIE 1995a. Chart based on data reproduced in appendix A, table A11.

6.4 Conclusions

Overall, Australia's performance is reasonably encouraging, but there is no room for complacency. Telecommunications prices are falling, but they have further to fall. Quality of service is improving, but again there is further to go. Operational efficiency is also improving, but further restructuring is required. Renewed investment in network development and renewed effort in respect to labour productivity appear to be the areas requiring most attention.

Since the introduction of competition in telecommunications, Australia has moved ahead with the leading pack, but it is at the back of the leading group rather than the front. Relaxing the pace of reform would see Australia fall back into the trailing group of also-rans. Renewed effort is required to lift Australia towards international best practice.

7 Waterfront

7.1 Introduction

This chapter compares the performance of Australian and overseas container, break bulk and coal ports. The performance indicators reported cover waterfront charges, the timeliness of services and productivity. The analysis draws on 1995 data for price comparisons and 1994 data for timeliness and productivity comparisons. The chapter summarises findings published in *International Benchmarking — Waterfront 1995* (BIE 1995d), published in August 1995.

7.2 The reform process

Waterfront reform has been a high priority for Commonwealth and State governments over the past decade. These reforms have comprised two distinct elements:

- labour market reforms, which seek to reduce costs and improve terminal productivity; and
- commercialisation and corporatisation, which seek to raise the performance of government owned port authorities.

The reform process has involved participants from government, port authorities, unions, terminal operators, ship owners and shippers. It has not been easy.

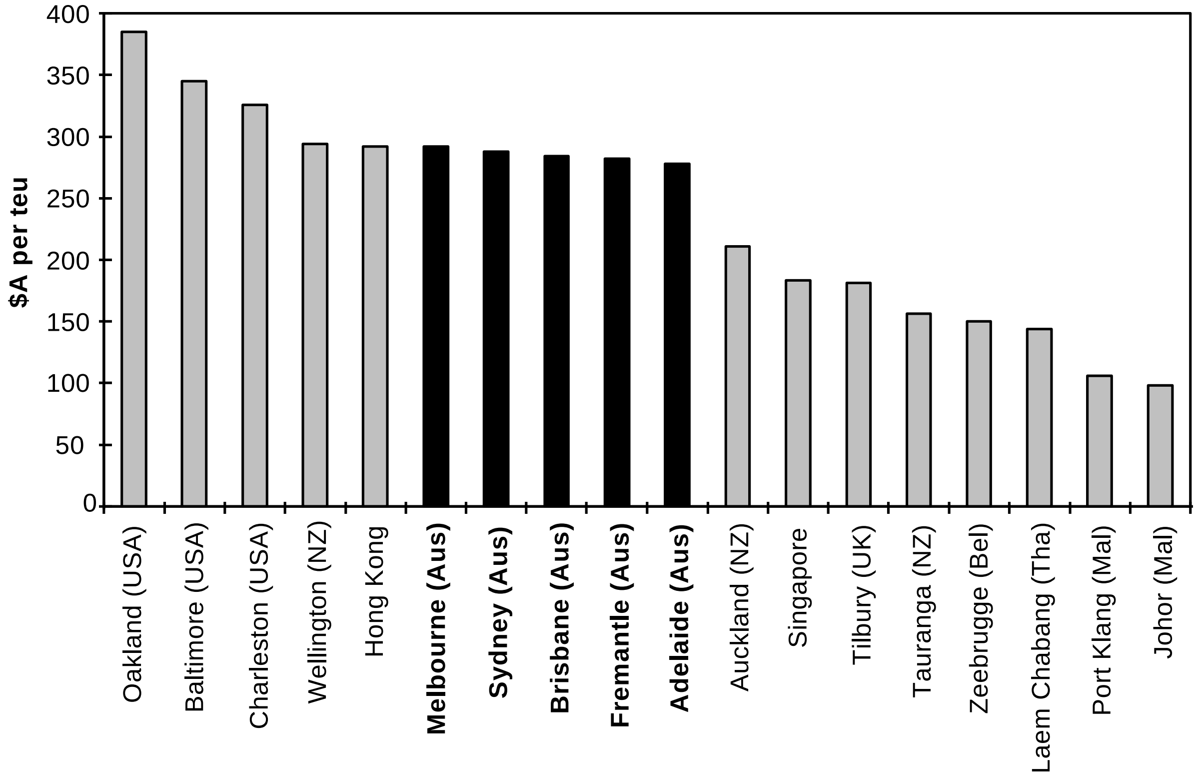
The reform has had some success. Port authorities have become profitable and their charges have fallen. Productivity in the terminals, particularly the container terminals, increased during the Waterfront Industry Reform Authority (WIRA) reform process of 1989 to 1992. This productivity improvement was subsequently reflected in reduced terminal charges. But the reform process has been costly — $420 million for the WIRA process alone. Moreover, productivity in the Australian container terminals either stagnated or went backwards in 1994 (figure 7.1), raising questions about the sustainability of the WIRA improvements.

7.3 Containers

Waterfront charges for containers in Australia are considerably higher than most ports in New Zealand, Asia and Europe (figure 7.1). On the positive side, Australia's container charges are on a par with the port of Hong Kong and lower than some of the more expensive North American ports. Accounting for around two thirds of waterfront charges, *terminal charges* are the main reason for Australia's high waterfront charges.

However, these high terminal charges are often compounded by relatively high port authority, tug and pilot charges.

Figure 7.1 Waterfront charges[(a)] by container port, 1995

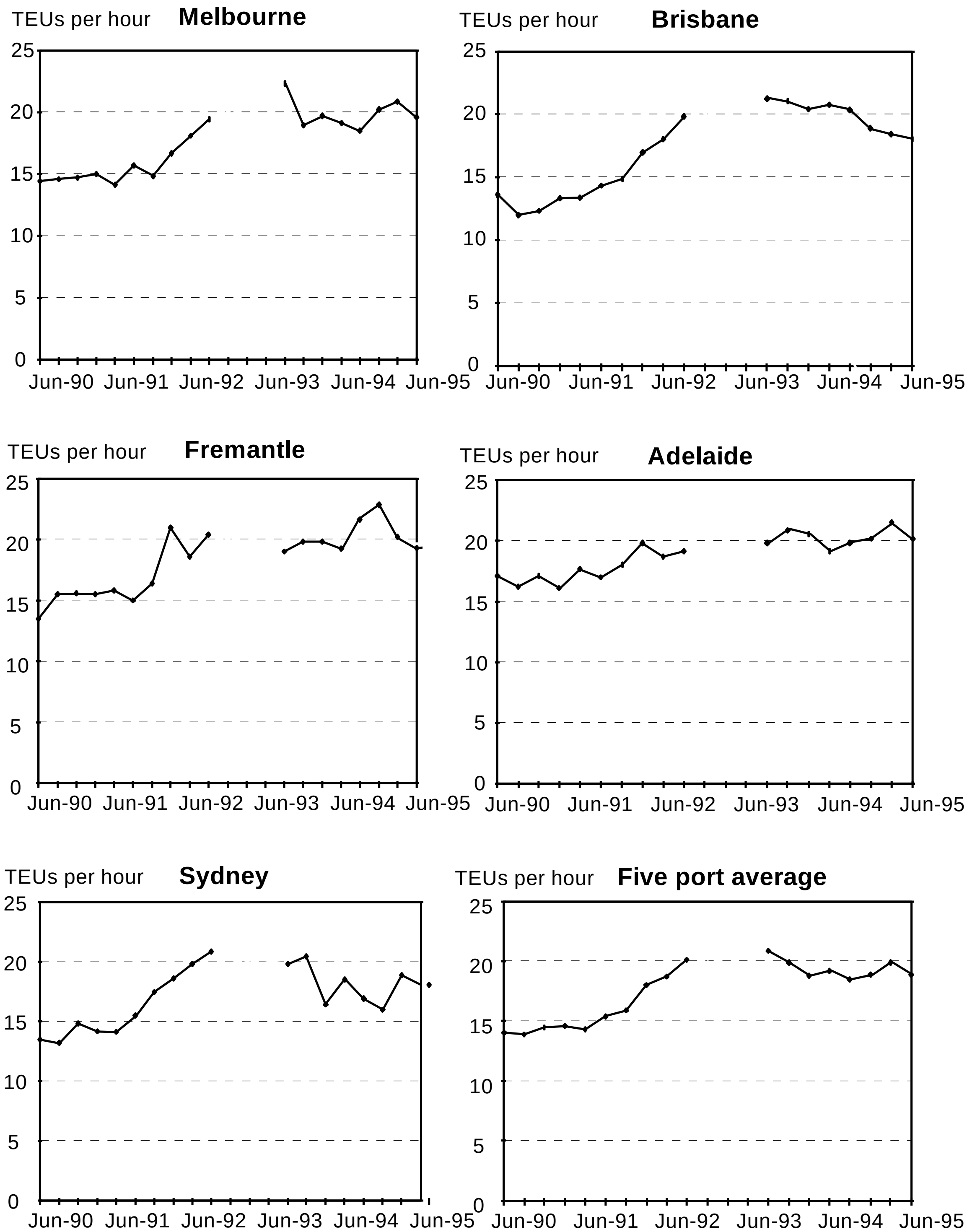


Notes: (a) Includes pilotage, towage, mooring, navigation, berthage, wharfage and stevedoring charges for a 17000 grt vessel with a container exchange averaged over 200, 400, 600, 800 and 1000 teus.
Source: BIE 1995d. Chart based on data reproduced in appendix A, table A12.

It is often argued that Australia's relatively high waterfront charges are due to a combination of the provision of subsidies to ports overseas and the requirement that Australian ports pay taxes and dividends. While removing these requirements might reduce port authority charges, it would not significantly alter Australia's overall ranking. This is because port authority charges account for only one quarter of waterfront charges. Moreover, charges at other ports overseas (eg Auckland and Tilbury) would also fall if tax and dividend requirements were removed.

The greatest concern with Australia's performance must lie with stevedoring productivity where crane rates (container moves per hour per crane) declined during 1994, and fell back to 1991-92 levels. The improvement in the five-port average in the March quarter of 1995 was reversed in the June quarter with set-backs occurring at Melbourne, Sydney, Brisbane, Adelaide and Fremantle (figure 7.2). This decline, combined with continued improvements in many ports overseas, means that Australian crane rates are no longer on a par with similarly sized ports overseas (BIE 1993).

Figure 7.2 Crane rates by major Australian ports, June 1990 to June 1995

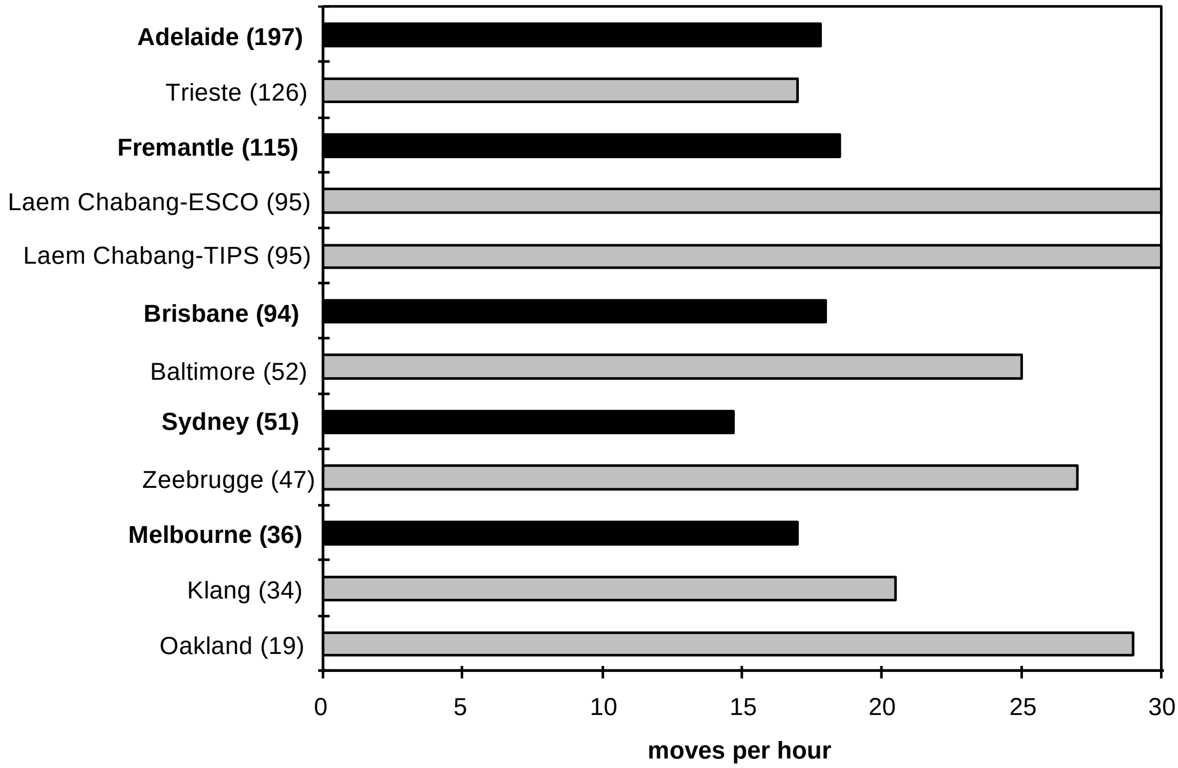


Notes: (a) Net rates measure the number of teus moved per net hour (the time the ship is at berth less time due to shift breaks or unforseen circumstances — eg bad weather and industrial disputes. Crane rate is the number of teus moved per crane per net hour. Neither the WIRA nor the BTCE monitored terminal performance between December 1992 and June 1993 hence the break in the series.
(b) Average of Melbourne, Sydney, Brisbane, Fremantle and Adelaide.

Source: BIE 1995d. Charts based on data reproduced in appendix A, table A13.

Crane rates at the best performing Australian container terminal (18.5 moves per hour at Fremantle) are equivalent to some of the poorest performances in Europe (eg 17 moves per hour at Trieste) (figure 7.3). More often, however, Australian crane rates are 25 to 50 per cent below the better performing ports (eg 30 moves per hour at Laem Chabang in Thailand and 29 at Oakland in the United States).

Figure 7.3 Crane rates[(a)] for comparable size container ports[(b)], 1994



Notes: (a) The average number of container moves achieved by a single crane in the time that vessels were actually being worked. These rates differ from those in figure 7.1 as they measure moves per hour and not teus per hour. (b) The numbers in the brackets represent the port's international ranking in terms of annual teus.

Source: BIE 1995d. Chart based on data reproduced in appendix A, table A14.

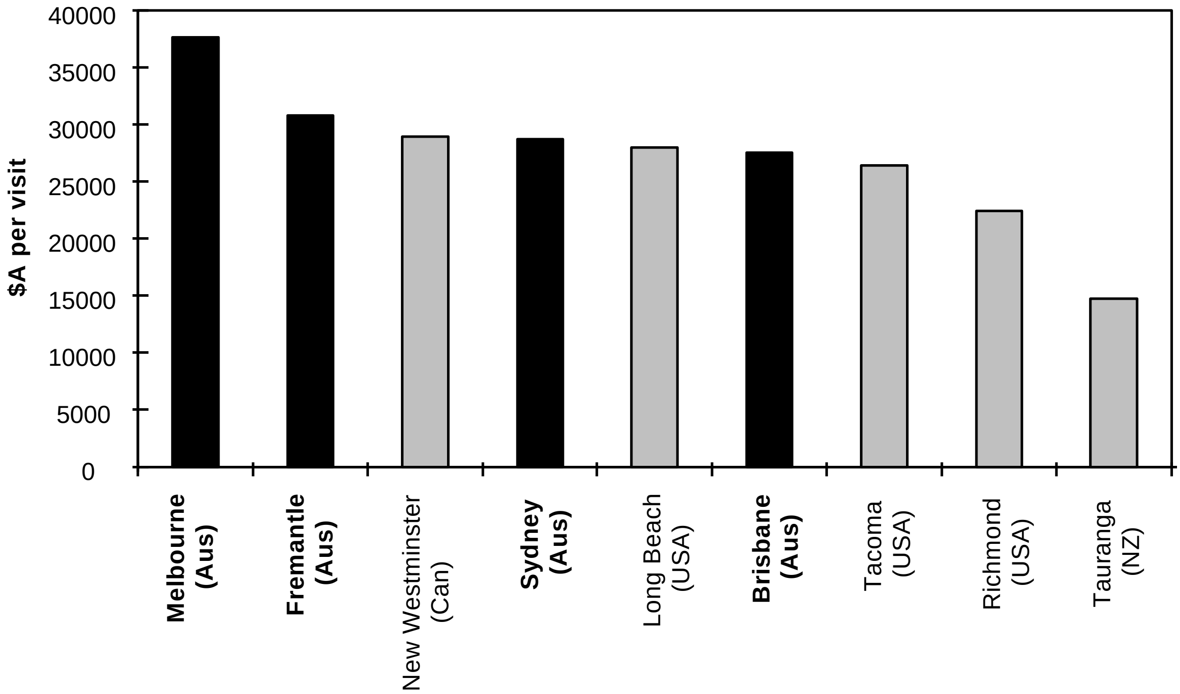
Further labour shedding may not be the answer, as an Australian stevedoring employee currently moves as many containers in a year as his/her overseas counterpart. The problem is that he/she cannot move containers as quickly. This suggests that there are continuing problems with equipment and work practices.

The impact of poor terminal performances in Australia is reflected in poor timeliness and reliability. A BIE survey of ship operators indicated that timeliness and reliability are more important than price. Moreover, the survey indicated that timeliness and reliability for waterfront services in the Australian ports lag well behind ports overseas. For example, poor crane rates and lower crane intensity (average number of cranes per ship), means it generally takes 50 to 100 per cent longer to unload and load a container ship in Australia than it does in comparable ports overseas. Of even more significance to shipping companies is that these already slow turnaround times are more variable in Australia than overseas and that a sizeable proportion of vessels experience delays of in excess of two days. The long turnaround times and higher uncertainty makes it difficult for shipping lines to take advantage of the reforms and pass benefits on to exporters and importers.

7.4 Break bulk

Break bulk covers traditional waterfront activities consisting of cargoes which generally defy containerisation; such as steel coil, timber, newsprint and motor vehicles. For its analysis of break bulk operations the BIE used detailed benchmarking work undertaken by BHP Transport's shipping operations. BHP Transports's analysis suggests that Australia's *non-terminal waterfront charges* for break bulk cargoes are high by international standards. Indeed, the lowest charges in Australia are comparable to the more expensive ports on the west coast of North America (figure 7.4).

Figure 7.4 Break bulk non-terminal charges, 1994



Notes: (a) These estimates are based on a 17 000 dwt vessel with a cargo exchange of 700 tonnes of steel, 25 teus, 400 tonnes of newsprint and 250 tonnes of timber. It does not include terminal and cargo handling charges which represent around 60 per cent of waterfront charges for containers

Source: BIE 1995d. Chart based on data reproduced in appendix A, table A15.

During 1995 some Australian port authorities have further reduced their charges. However, an even larger gap exists between waterfront charges in Australia and those applying to ports in the southern United States, Mexico and Panama. Port authority and ancillary charges are the main cause of the differences in waterfront charges between Australian and the southern American ports.

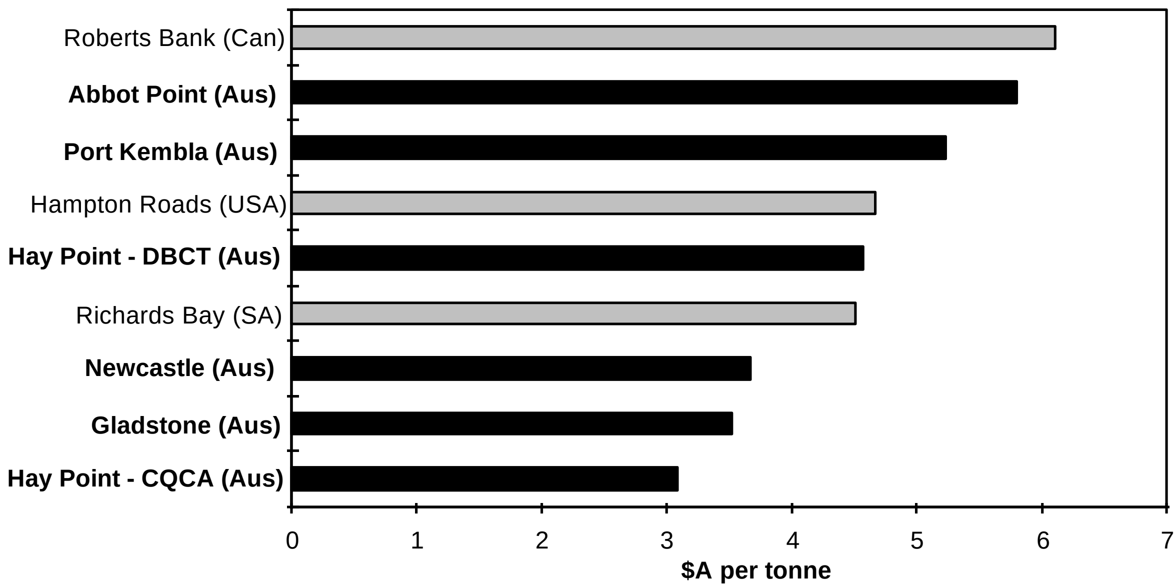
BHP Transport also compared the productivity of loading operations for a number of its steel products. *Stevedoring costs* in Australia are consistently higher than for a wide selection of ports in Asia, Europe, North and South America. These higher loading costs reflect a combination of low productivity and relatively high wages. It seems that reforms to work practices and modernisation of facilities should be high priorities.

7.5 Coal

Australia's port-based bulk commodity terminals are highly mechanised and efficient operations: the coal terminals examined are no exception. Worldwide, coal terminals are closely integrated with mining and land transport operations. This, along with the relatively small number of organisations involved in mining, handling and transporting coal, has ensured that close commercial partnerships have developed.

Waterfront charges for coal handling in Australia are amongst the lowest in the world (figure 7.5). Even the more expensive of the Australian coal ports are on a par with their international counterparts.

Figure 7.5 Waterfront charges by coal port, 1995



Notes: (a) Includes all waterfront based charges such as pilotage, towage, mooring, navigation, port authority and terminal charges calculated for a 120 000 dwt vessel with a load of 95% of its capacity.
Source: BIE 1995d. Chart based on data reproduced in appendix A, table A16.

Australia's low coal waterfront charges are generated in part by high capital utilisation in the coal terminals (table 7.1). *Capital utilisation* at Australia's three largest coal terminals at Newcastle, Hay Point and Dalrymple Bay are consistent with that achieved at the much larger terminal at Richards Bay in South Africa. The relatively high terminal charges at the smaller Abbot Point terminal (one fifth the size of the Port Waratah terminal in Newcastle) are consistent with the low observed terminal utilisation and pilot productivity. And *availability* of coal loaders at Australian terminals is on a par with overseas.

Table 7.1 Capital utilisation by coal terminal, per cent (1993-94)

Terminal	*Loader availability %*	*Average loader rate (t/hr) as a proportion of nominal rate (t/hr) %*	*Annual throughput as a proportion of annual capacity %*
Richards Bay	95	62	90
Newcastle — PWCT	**95**	**64**	**103**
Hay Point — CQCA	**95**	**72**	**101**
Hay Point — DBCT	**95**	**83**	**83**
Gladstone — RGT	**95**	**63**	**72**
Newcastle — KCT	**95**	**41**	**68**
Roberts Bank	-	-	77
Hampton Roads — Dominion	-	-	54
Port Kembla — PKCT	**99**	**64**	**70**
Kaltim Prima	95	64	75
Vancouver — Neptune	-	-	77
Abbot Point	**95**	**76**	**43**

Source: BIE 1995d.

The performance of Australia's coal ports appears to provide this important export industry with a slight edge over competitors, although there is scope for further improvement in some areas. Given the highly competitive nature of the world coal market, it is important to protect this advantage and improve upon Australia's good performance.

7.6 Conclusions

The major findings of this study are that:

- waterfront container charges are high in Australia, but not as expensive as some ports in the United States;
- recent declines in container stevedoring productivity has resulted in Australia falling well behind similarly sized overseas ports;
- Australia's performance in break bulk urgently needs improving; and
- low Australian waterfront charges for coal are supported by high capital utilisation in the coal handling terminals.

In regard to container productivity, most overseas ports have moved ahead while Australia has stepped backwards. This highlights the need for waterfront reform to be viewed as a continuous process, and not a one-off event. It is essential that reforms implemented provide in-built incentives to continuously improve performance. Unless reforms tackle the causes of poor performance head-on they are unlikely to lead to sustainable improvements.

The productivity gains achieved during the WIRA process need to be consistently maintained over long periods before they can be expected to be reflected in revised ship schedules and further reductions in freight rates. It will be difficult for Australia to develop a reputation as a reliable supplier of elaborately transformed manufactures if the timeliness and reliability deficiencies of container and break bulk operations are not urgently addressed.

8 Aviation

8.1 Introduction

The chapter compares the performance of Australia's airlines and airports against similar operations overseas. Performance comparisons are on the basis of price, timeliness and productivity. They draw on data for 1993-94, except where data limitations force comparisons to be made on the basis of 1992-93 data. The chapter summarises findings published in *International Performance Indicators — Aviation 1994* (BIE 1994d) in August 1994.

8.2 The reform process

Government involvement in aviation occurs through regulations controlling the entry of airlines into Australia's domestic and international routes and through the provision of aviation infrastructure and services (airports and air traffic services). During the 1980s a series of reviews mapped out a reform agenda. As a result:

- aviation infrastructure services were taken out of the hands of government departments and became the responsibility of corporatised agencies;
- operational restrictions have been relaxed enabling new airlines to operate over Australia's major domestic routes; and
- agreements covering Australia's international air services were renegotiated; increasing available capacity and ending Qantas' position as Australia's sole international carrier.

The full privatisation of Qantas Airlines and the sale of leases to operate the FAC's airports will significantly reduce the Commonwealth's involvement in aviation. It will, however, continue to play a major part in the provision of air services and the regulation of the entry of airlines, safety and airport charges.

8.3 Airports

The development of performance indicators for aviation infrastructure is in its embryonic stages internationally. Examination of airport performance has traditionally focussed on tracking the performance of a single airport over time. Lack of reliable data is a major barrier to performance assessment. Nevertheless, international performance comparisons are valuable.

The 14 airports covered by the study are: Sydney, Melbourne, Brisbane, Cairns, Christchurch, Copenhagen, London-Gatwick, Manchester, Stockholm, San Francisco, Toronto, Vancouver, Bangkok and Hong Kong.

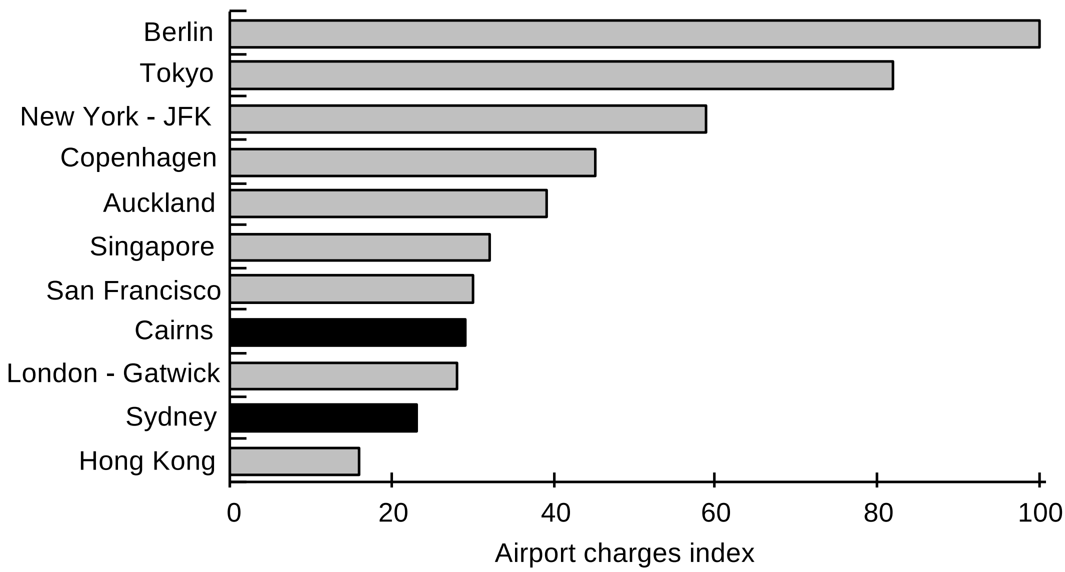
The picture which emerged from international comparisons of Australia's aviation infrastructure services was mixed, reflecting a trade-off between charges and service standards. Those airports that achieve high levels of customer service appear to do so at the cost of lower levels of capital utilisation. Consequently, unit costs tend to be higher in order to cover total operating costs.

It should be noted that the BIE's aviation benchmarking study pre-dated the opening of Sydney's third runway, and the major performance observations pre-date that development.

Airport prices

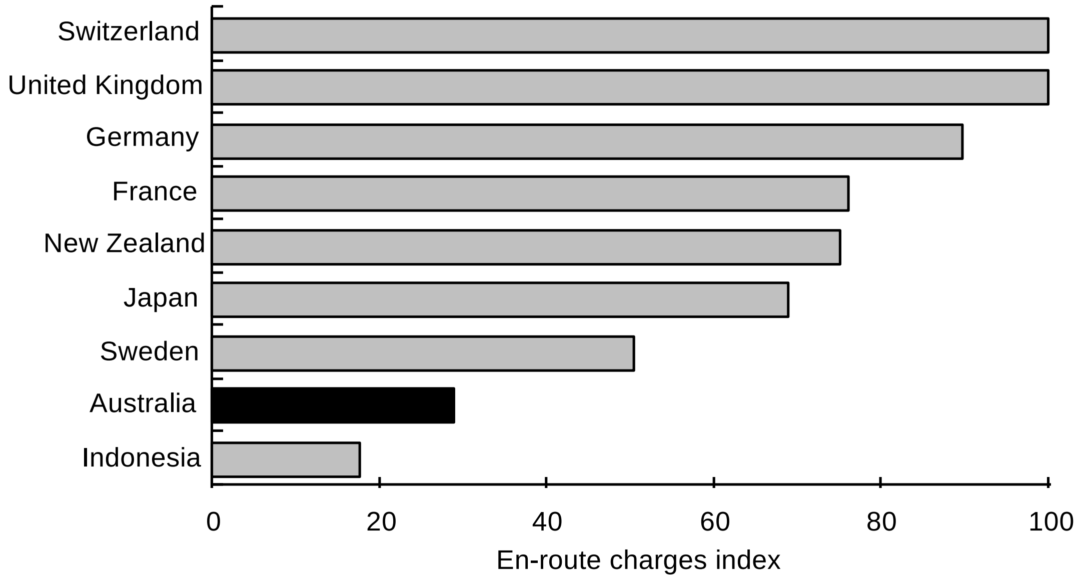
An index of charges for aviation infrastructure services reveals that airport landing charges and enroute charges in Australia are low by world standards (figures 8.1 and 8.2). However, since landing charges contribute of the order of 30 to 60 per cent of airport revenues they do not reveal the whole picture of infrastructure costs.

Figure 8.1 Airport landing charges, 1993



Source: BIE 1994d. Chart based on data reproduced in appendix A, table A17.

Figure 8.2 En-route charges, 1994



Source: BIE 1994d. Chart based on data reproduced in appendix A, table A18.

While commercial confidentiality concerns precluded an analysis of the remaining charges, some insight can be gained through a comparison of airline cost structures. Compared to other international carriers, the advantage Qantas possesses in terms of lower landing charges is offset by relatively higher terminal and other airport service costs. In addition, the inclusion of government taxes, such as the $27 departure tax, would see Australia's landing charges index rise to be on a par with that at Copenhagen's airport. For the passenger this tax was equivalent to all of the infrastructure charges levied by both the Federal Airports Commission and Civil Aviation Authority on the airlines for the use of airports such as Sydney, Melbourne and Brisbane.

Airport timeliness

Across a broad range of timeliness indicators Australia's airports in 1993 were on a par with some of the leading airports overseas, but behind the best observed practice (table 8.1). While travel time from the central business district to Australia's airports are far shorter than those at London's Heathrow airport, for example, they are behind those experienced at some of the other major city airports. The advantage that many Australian airports possess in terms of their proximity to the CBD is eroded by the lack of direct rail links. The importance of efficient airport transport links and competition from other modes is emphasised if aviation is viewed in the context of strong competition from alternative transport modes. For instance, the average travel time from the city of London to Heathrow airport is in the order of one hour. The addition of passenger processing and flight times makes the 3 hour journey on the London to Paris fast train very competitive.

Table 8.1 Airport customer performance indicators, 1992-93

	Best	*Observed*	*Best Australian*	*Worst Australian*
Passengers (mins):				
Travel time from CBD	Frankfurt	10	15	35
Check-in times:				
— domestic	Copenhagen	20	15-45	15-45
— international	Copenhagen	60	120	120
Time through immigration	Stockholm	10	18	20
Cargo processing (mins):				
— outwards	Copenhagen	110	180	180
— inwards	Stockholm	45	60	420
Reliability				
On-time performance:				
— departures	Copenhagen	95%	85%	78%
— arrivals	Christchurch	95%	88%	78%

Source: BIE 1994d.

Service standards for passenger check-in are influenced by the readiness of airlines to operate check-in desks. Hence there can be a great deal of variability in the times required for passengers to be processed. Nevertheless, check-in times at Australia's airports are on a par with the average of the other airports surveyed. While special desks are set aside for business and first class passengers, the emphasis on higher service standards at Australia's airports does not extend beyond the check-in desks. In contrast, at London's Gatwick airport, service standards for the higher paying passengers have been taken a step further with the airport authority arranging for a series of priority services through check-in, customs and bureau de change.

Processing times through customs and immigration at Australia's airports are better than average, although somewhat slower than the best observed airport (Stockholm). The extra time and relatively low rating of these procedures by international travellers may reflect Australia's stricter quarantine controls. In addition, Australia requires visas from a much wider range of foreign nationals than is common international practice.

In terms of cargo processing, freight forwarders indicated that processing times at airport freight terminals for outwards freight is equivalent to that experienced at overseas airports. However, processing times for inwards cargo is poor, with the survey evidence indicating that some of the longest processing times can be found at Australia's airports.

Airport productivity

Many of the activities performed at airports can be undertaken either by the airport authority, airline or on a contract basis by a third party. Since these arrangements differ between airports, the BIE saw little value in assessing the productivity of airport authorities *per se*. Rather, indicators of labour and capital productivity are reported for the key stages of aircraft and passenger handling which are common across airports, irrespective of who performs the functions. Even so, significant difficulties were encountered in collecting comparable data. Hence, only a relatively small range of indicators are reported.

Comparisons of labour productivity for air traffic control and fire and rescue services indicate that Australia's airports fall well below the best observed practice airports in North America (table 8.2). However, Australia's performance is slightly better than, or on a par with that observed at the surveyed European and Asian airports.

Table 8.2 Airport productivity indicators, 1992-93

	Best	*Observed*	*Best Australian*	*Worst Australian*
Labour productivity:				
Air traffic control[a]	San Francisco	8600	1700	1350
Fire and rescue[a]	Toronto	7200	3460	1100
Capital productivity:				
Movements per runway metre	Gatwick	57	34	18
Runway capacity utilisation[b]	San Francisco	4101	3411	1762
Passengers per terminal gate('000)	Hong Kong	900	300	290
Passengers per check-in desk('000)	Copenhagen	81	27	18

Notes: (a) Measured as aircraft movements per air traffic and fire and rescue employee. (b) Measured as annual aircraft movements per peak hour capacity.
Source: BIE 1994d

Comparisons of runway productivity reveal that in 1992-93 Sydney airport operated on a par with many of the larger airports surveyed, although well behind London's Gatwick Airport which is constrained to operate with a single runway. While San Francisco airport operates for long periods at close to capacity, at Sydney and Melbourne airports capacity utilisation is on a par with the average of the surveyed airports. As would be expected, however, high capacity utilisation has its costs as it can significantly delay aircraft arrivals and departures. This trade off is reflected in the survey evidence indicating that the leading airports in terms of on-time performance, were ranked relatively low in terms of capital productivity and utilisation.

Comparisons of terminal productivity (passengers per terminal gate) reveal that Hong Kong airport possesses a clear advantage over all of the other airports examined. However, this efficiency is gained by using buses to transfer many passengers between the aircraft and the terminal. The disadvantage of this practice is reflected in the relatively low ranking passengers place on check-in procedures at Hong Kong as well as the relatively long time it takes for passengers to be cleared through customs.

In general, Australia's passenger terminal performance is on a par with many of the integrated domestic and international terminals at overseas airports. However, these aggregated comparisons mask the considerably higher productivity achieved at Australia's domestic terminals compared to its international terminals. While this suggests a discrepancy between the relative performance of the terminals operated by the airlines and those operated by the FAC, it may also be explained by other factors. For instance, the lower productivity of the international terminals may be due to the capacity which has been installed to cater for the more 'lumpy' nature of international aircraft arrivals and departures in Australia. However, it also points to the benefits of using integrated domestic and international terminal facilities.

8.4 Airlines

While airlines may not be considered as infrastructure service providers they are the main users of aviation infrastructure services. Therefore it is through the airlines that any deficiencies in infrastructure will impact on the wider community.

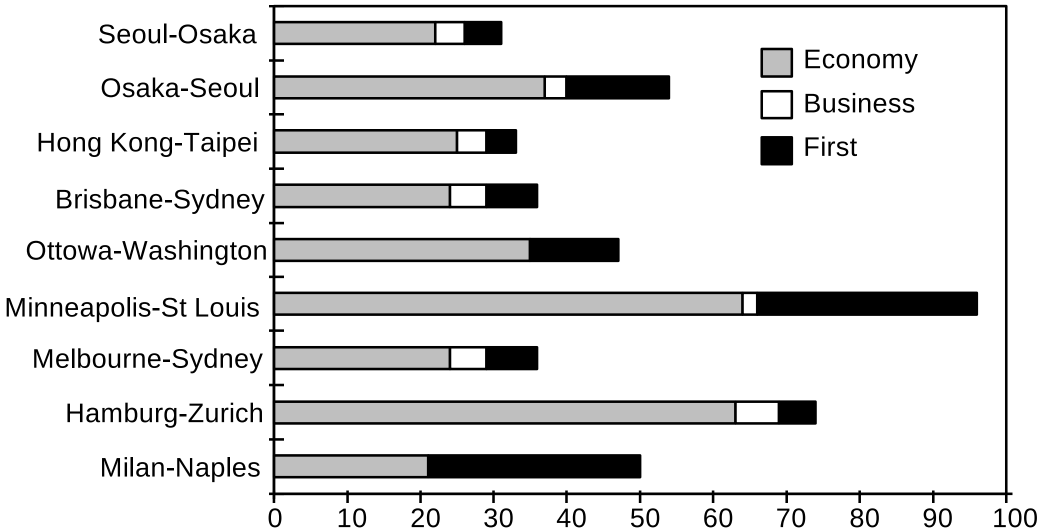
The performance of Australia's airlines is examined through an analysis of air fares and productivity. Price comparisons are based on 1994 data, while the productivity comparisons use published data from 1992. The productivity analysis compares Qantas' operations with a range of international carriers. Comparisons of the domestic airlines are based on both Ansett and the former Australian Airlines (now Qantas), and a small selection of overseas airlines.

Airline prices and service quality

The BIE's analysis of charges reveals that Australia's air fares and freight rates are amongst the lowest in the world. Australia's domestic air fares are well below those on similar length routes in Japan and within Europe and North America (figure 8.3). For example, the full economy fare from Melbourne to Sydney is sixty per cent lower than either Hamburg to Zurich or Minneapolis to St Louis. Despite the quite sizeable price advantage, which exists for the first, business and economy class fares, much of this advantage is eroded if economy discount fares are considered.

This finding extends to Australia's international routes, although the picture here is somewhat more complicated. On the shorter haul international routes (eg Sydney-Auckland), air fares to and from Australia are well below those experienced on comparable routes overseas. On medium haul routes (eg Melbourne-Singapore), the discount economy fares tend to be above those charged elsewhere; such as those over the heavily trafficked trans Atlantic routes (eg London-New York). But the Australian first class fares remain very competitive. Over the longer haul routes, no distinct trend is apparent. For example, the Sydney-London fares are competitive with the London-Singapore fares, but the Sydney-Los Angeles fares are well above the Hong Kong-Los Angeles fares.

Figure 8.3 Domestic air fare comparisons, March 1994 (670-820 km)



Source: BIE 1994d. Chart based on data reproduced in appendix A, table A19.

While Australia's air fares are generally below those that apply elsewhere this is not at the cost of service standards, which are consistent with many of the better performing airlines overseas. Areas where Qantas' and Ansett's performance are rated highly are safety, on-board comfort and in-cabin service.

Freight rates on Australia's domestic routes are, in general, below the international average and well below those charged in Europe and Japan. For example, the per kilometre rate for cargo under 45 kg between Sydney-Melbourne is less than half that charged between Barcelona-Milan and one fifth of that charged on the Osaka-Seoul route. The freight rates to Australia are consistent with the rates on similarly distanced routes overseas. The most striking feature of the rate comparisons is the competitiveness of the freight rates *from* Australia, which are consistently below those for cargo travelling *to* Australia over the same routes.

However, one facet of airline performance which is below best observed practice is on-time performance. This may be a reflection of airline performance, or it may be a result of deficiencies in the infrastructure services; such as congestion. Evidence indicates that the on-time performance of Australia's domestic airlines is on a par with many of the North American carriers, where it is recognised that congestion and bad winter weather conditions cause major disruptions. While a survey of international travellers rated Qantas' punctuality below that of a number of Asian and European airlines, it was nevertheless rated quite highly. However, recent developments have seen increasing delays at Sydney airport. Survey-based information from Orient Airlines Association (1995) suggests that the percentage of delays from Sydney airport has almost doubled during the last year.

Airline productivity

Differences in air fares are consistent with the observed differences in airline unit costs. Analysis shows that route structures explain a significant part, but not all, of the differences between the unit costs of the various airlines. For instance, the North American and European airlines have similar stage lengths, yet airline unit costs are consistently lower for the North American carriers. Part of this difference is due to a service quality and price trade-off. The difference in air fares may also be partly explained by differences in airline input costs (eg wages and infrastructure charges).

However, a more important explanation appears to lie in the relative productivity levels of airline employees. The Asian airlines possess a significant advantage over Qantas and the North American airlines which, in turn, possess an advantage over the European airlines (table 8.3). An analysis of the productivity of pilots and cabin crew reveals a different picture. High levels of labour productivity for flight personnel appear to accrue to airlines operating over long stage lengths with large aircraft.

Table 8.3 Airline productivity indicators, 1992

	Best Observed		*Best Australian*	
International airlines				
Labour Productivity:				
Tonne km per pilot ('000)	Singapore	7100	Qantas	4200
Passenger km per cabin crew ('000)	Continental	11000	Qantas	9200
Capital Utilisation:				
Aircraft hours flown per day	KLM	11.6	Qantas	10.2
Passenger load factor (%)	Cathay Pacific	73.5	Qantas	66.5
Domestic airlines				
Labour Productivity:				
Tonne km per pilot ('000)	Australian	2400	-	-
Passenger km per cabin crew ('000)	Ansett	7600	-	-
Capital Utilisation:				
Aircraft hours flown per day	VASP	12.7	Ansett	9.4
Passenger load factor (%)	Australian	80.6	-	-

Source: BIE 1994d.

Reflecting trade-offs between various aspects of airline operations, few of the airlines achieved a superior performance in both of the measured aspects of aircraft utilisation. For instance, relative to the other international airlines, Qantas operated its aircraft for longer periods of time but at load factors well below the best observed.

Productivity comparisons for the domestic airlines, indicate that the two Australian carriers were operating at best observed practice, or were very close to best practice during 1992.

8.5 Conclusions and recent developments

On the basis of a range of indicators, Australia appears to be relatively well served by its airlines. Air fares and cargo rates are either better than, or at least very competitive with some of the lowest fares and rates overseas. Service quality has not been compromised in providing these lower fares.

Indicators of the performance of Australia's aviation infrastructure services reveal a more mixed performance. Aviation infrastructure services in Australia are amongst the cheapest available. While service standards are, at times, below those observed overseas, it may be that this reflects the trade off between airport charges and service standards. As a result, it cannot be concluded that overall Australia's airports are either superior or inferior to their counterparts overseas.

Given past and, in some cases, continuing constraints on competitive forces overseas, it could be expected that even the best observed practices could fall some way short of that which is potentially achievable. Hence, the gap which exists between current practice at Australia's airports and that which could be achieved is likely to be greater than suggested by these indicators.

These comparisons suggests that a trade-off exists between infrastructure charges and service standards. However, it is unclear whether Australia's airports have chosen the most efficient trade-off. For example, investments which reduce aircraft delays may result in higher infrastructure charges, but they may also result in even greater savings to the airlines in the form of time savings and reduced fuel usage.

Moreover, the virtual monopoly status of the infrastructure service providers and the demise of the two new domestic airlines since deregulation also raises questions about future performance. In particular, whether the industry is likely to either generate or pass onto consumers the benefits of continued performance improvements. It has been in this context that the government has progressed efforts to fully privatise Qantas and separately sell long term leases for the operation of the FAC's airports.

In terms of the privatisation of the FAC's airports, indications at this stage are that the leases will be sold in two separate batches. The first batch will consist of Australia's four major airports of Sydney (including Kingsford Smith and Sydney West), Melbourne, Brisbane and Perth. It is anticipated that the tender process for these airports will commence in early 1996 and be completed later that year. The sale of leases for the remaining airports will take place during 1997-98.

In order to encourage competition between the airports, certain restrictions are to be placed on the ownership of airport leases. The operator of Sydney will not be able to operate any of the other three major airports. Leases must have a majority Australian ownership. The purchaser of the Sydney airport lease will operate both the existing Kingsford Smith airport and the Sydney west airport, which is currently under construction. The construction of the new airport will be partly funded by cross-subsidies generated by a $1.70 tax levied on passengers at Kingsford Smith.

While arrangements have yet to be finalised, the abuse of monopoly power will be limited through price monitoring and a CPI-*X* price cap. Price monitoring will be applied to non-aeronautical services at the four largest airports, and to aeronautical services at the remaining airports. Service timeliness and quality will also be monitored as part of this regulatory regime.

9 Gas Supply

9.1 Introduction

This chapter compares the performance of Australia's gas supply utilities with their overseas counterparts. International comparisons of performance in the provision of natural gas supply services cover price and operational efficiency indicators. The chapter summarises findings published in *International Performance Indicators — Gas Supply* (BIE 1994e) in December 1994.

9.2 The reform process

Each state and territory has constitutional jurisdiction over the exploration for, production, distribution and pricing of gas within its borders. Regulation of the industry has been extensive, particularly in the transmission and distribution segments of the market. However, there have been significant regulatory and policy changes in the natural gas industry since the early 1990s. In cooperation the commonwealth, states and territories are engaged in the process of reforming Australia's gas industry. These reforms aim to reduce restrictions on competition and trade, and to enable free and fair trade in natural gas by 1 July 1996.

The reforms include:

- the removal of any legislative or regulatory barriers to trade in gas within and between jurisdictions;
- the implementation of a uniform framework for third party access rights to both inter- and intra-jurisdictional gas supply networks;
- the implementation of uniform national pipeline construction standards;
- the corporatisation of publicly-owned gas utilities;
- the removal of any restrictions on the use of natural gas;
- the requirement that gas franchise arrangements be consistent with free and fair competition in gas markets; and
- the vertical separation of transmission and distribution activities, and the implementation of legislation to 'ring fence' these activities.

As part of this process, each of the relevant state and territory governments are developing appropriate regulations to operate in tandem with the Commonwealth legislation.

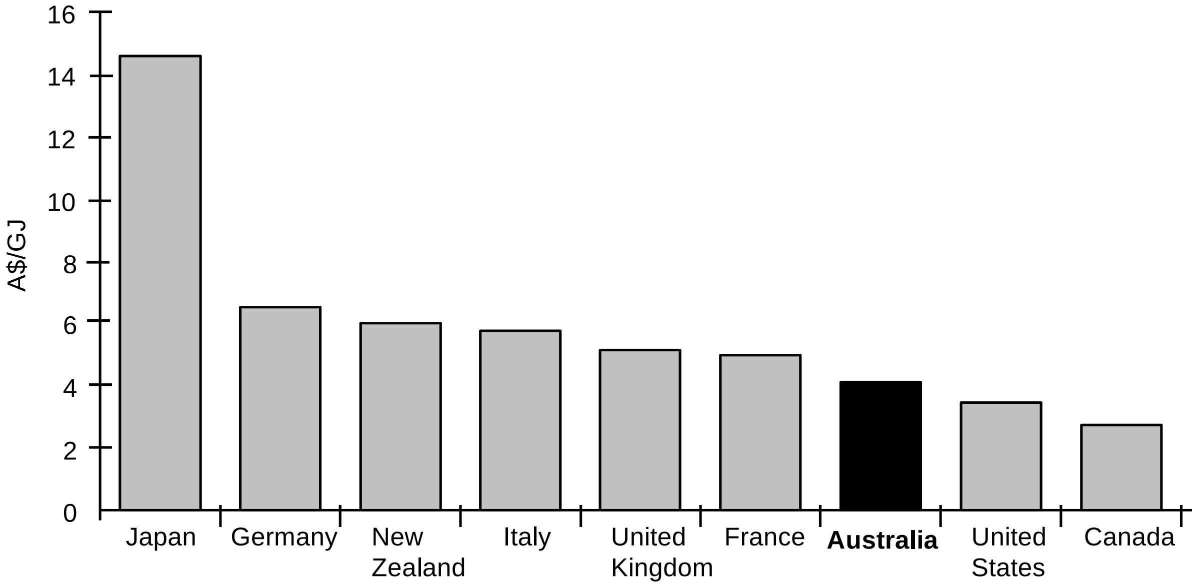
9.3 Performance indicators

Performance is considered at the individual operator level for the major Australian gas utilities in New South Wales (AGL), Victoria (GFCV), South Australia (SAGASCO), Western Australia (SECWA), and Queensland (Allgas/GCQ). Prices are compared to prices paid in European countries, Japan, the United States, Canada and New Zealand, while efficiency performance is compared across a sample of gas utilities.

Prices

Australian industrial, commercial and residential prices of natural gas compare favourably with those paid in most industrialised countries. In 1992, the average *industrial* price of natural gas was lower in Australia than in Japan, Europe and New Zealand, but higher than in North American (figure 9.1 and table 9.1).

Figure 0.1 Natural gas prices to industry, 1992



Source: BIE 1994e. Chart based on data reproduced in appendix A, table A20.

The average industrial gas price in Japan was more than three times the average Australian price. Japan imports a large quantity of liquid natural gas and converts it back to a gaseous state for transmission and distribution. This is a very expensive process, and Japanese prices reflect this additional cost burden.

Table 9.1 Natural gas prices, 1991 (AUD per GJ)

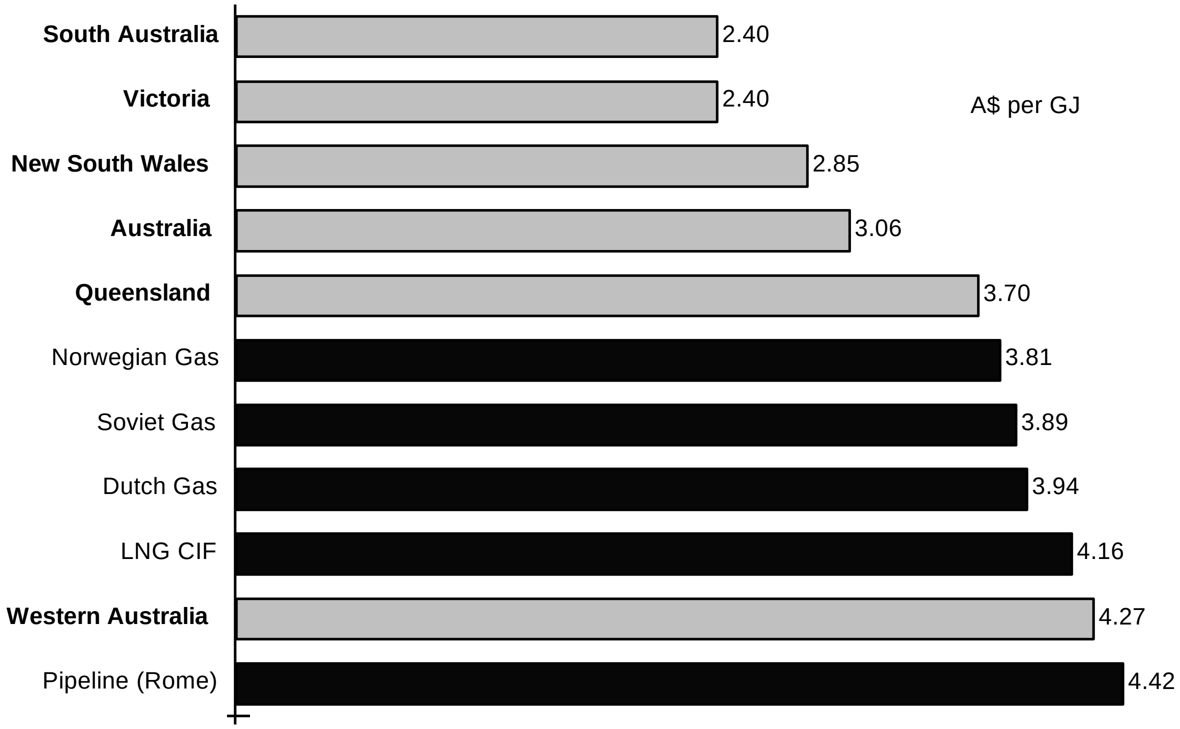
State	*City Gate*	*Residential*	*Commercial*	*Industrial*
Alabama	3.66	8.29	6.75	3.55
Alaska	0.38	4.92	3.40	1.39
Arizona	2.88	8.22	5.96	4.13
Arkansas	2.88	5.86	5.12	3.60
California	3.29	7.37	6.47	4.66
Colorado	3.35	5.40	4.75	2.75
Connecticut	4.12	10.28	8.11	5.69
Delaware	2.99	6.89	5.66	3.63
Florida	2.95	10.56	5.79	3.66
Georgia	3.97	7.88	6.67	3.93
Idaho	2.52	6.10	5.20	3.46
Illinios	3.42	5.82	5.36	4.43
Indiana	3.59	6.42	5.42	4.15
Iowa	3.21	5.66	4.69	3.12
Kansas	3.08	5.15	3.90	3.14
Kentucky	3.33	5.73	5.22	3.80
Louisiana	3.01	6.79	5.76	2.05
Maine	3.53	8.07	7.08	5.75
Maryland	3.59	7.24	5.93	4.13
Massachusetts	3.96	9.54	7.26	4.69
Michigan	3.62	5.96	5.53	4.70
Minnesota	3.09	5.32	4.48	3.27
Mississippi	3.00	6.13	5.03	2.76
Missouri	3.43	6.04	5.29	4.80
Montana	4.34	5.32	5.12	3.79
Nebraska	3.23	5.46	4.55	3.25
Nevada	2.74	6.60	5.10	4.95
New Hampshire	4.00	8.40	7.47	5.07
New Jersey	3.69	7.91	6.13	4.29
Oregon	2.81	6.35	5.59	4.01
New Mexico	2.93	8.64	4.88	4.15
New York	3.43	7.34	6.43	5.55
North Carolina	3.16	5.67	5.33	3.81
North Dakota	4.10	6.21	5.10	3.75
Ohio	3.59	5.55	5.60	4.81
Okalahoma	2.40	7.21	4.60	1.99
Pennsylvania	3.85	7.95	7.06	4.73
Rhode Island	4.33	8.97	7.08	6.35
South Carolina	3.47	8.18	6.54	3.47
South Dakota	3.66	5.81	4.75	3.89
Tennessee	3.21	6.10	5.60	3.79
Texas	3.39	6.71	4.72	2.27
Utah	4.57	6.40	5.29	4.34
Vermont	3.37	7.33	6.16	3.52
Virginia	3.25	8.00	5.70	4.48
Washington	2.25	5.50	4.77	3.28
West Virginia	4.21	7.64	7.19	3.47
Wisconsin	3.73	6.60	5.43	3.72
Wyoming	3.57	5.57	5.07	3.56
US. Average	*3.41*	*6.84*	*5.66*	*3.16*
NSW	2.85	12.13	9.36	4.99
Victoria	2.40	7.40	5.95	3.39
Queensland	3.70	16.57	12.36	6.37
WA	4.27	14.51	14.00	4.27
SA	2.40	11.15	6.17	3.25
Australia	*2.58*	*8.81*	*7.65*	*4.16*

Source: BIE 1994e.

European prices for natural gas to industry are also higher than the average Australian price. The average German price, for example, is over 50 per cent higher than the Australian price. Italy, Germany and France import much of their natural gas and their gas prices are affected by border prices, which reflect the cost of bringing supplies into the country. City-gate and border prices reflect the cost of production plus the cost of transporting the gas from the production site or well-head to the city-gate or border. Comparison of these prices suggest that, apart from Western Australia, Australian distributors of natural gas have a cost advantage relative to their European counterparts (figure 9.2).

Australia also had a cost advantage over North America in terms of production from the well-head and transmission to the city-gate, and yet the average United States price to industry is only 83 per cent of the average Australian price and the average Canadian price two-thirds the Australian price. Many industrial users in the United States purchase their natural gas on contract at prices below the average city-gate price. By accepting periodic interruptions to their supply businesses are able to purchase gas at a significant discount — avoiding the reservation fee normally charged for non-interruptable supply.

Figure 0.2 European border and Australian city-gate natural gas prices, 1991



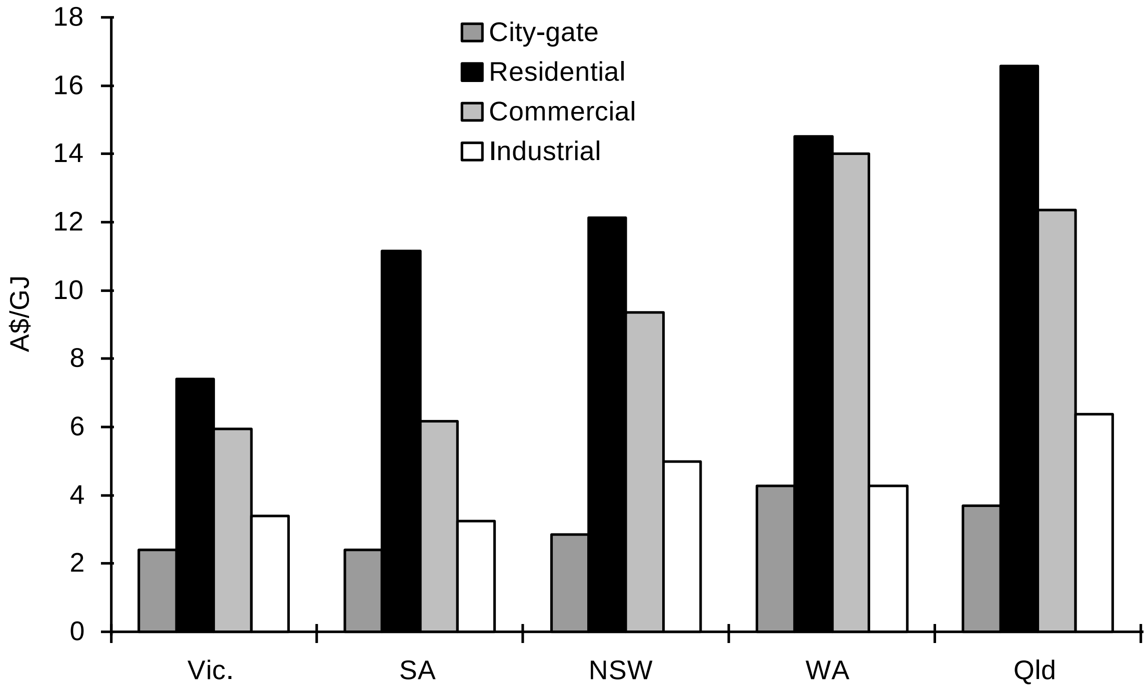
Source: BIE 1994e. Chart based on data reproduced in appendix A, table A21.

Most *commercial and residential* customers obtain natural gas via the city-gate and the price they pay reflects the city-gate price. Prices for commercial gas in the United States are, on average, 26 per cent lower than the average Australian price for commercial gas. The average price for residential gas in the United States is approximately 22 per cent lower than the average Australian price.

The difference between Australian and United States commercial and residential prices may be due to differences in natural gas consumption per head. Fixed costs, including reticulation, retail and other overheads, per unit of gas delivered tend to fall as natural gas consumption per head rises. Using regression analysis, the BIE found that higher average consumption of natural gas per customer in the United States largely explained the observed difference in prices between the two countries.

Within Australia there is considerable variation in price (figure 9.3). For example, in the commercial segment of the market Western Australia's charges are almost two-and-a-half times those of the lowest price supplier, Victoria. Victoria's prices are, typically, 50 per cent lower than those in Queensland. External factors appear to play an important role. Victoria has a significant advantage over other states in that it is situated close to a cheap supply of natural gas. It serves a large, densely populated market and the relatively cool climate contributes to Victoria having the highest residential consumption in Australia.

Figure 0.3 Australian natural gas prices, by State and market segment, 1992



Source: BIE 1994e. Chart based on data reproduced in appendix A, table A22.

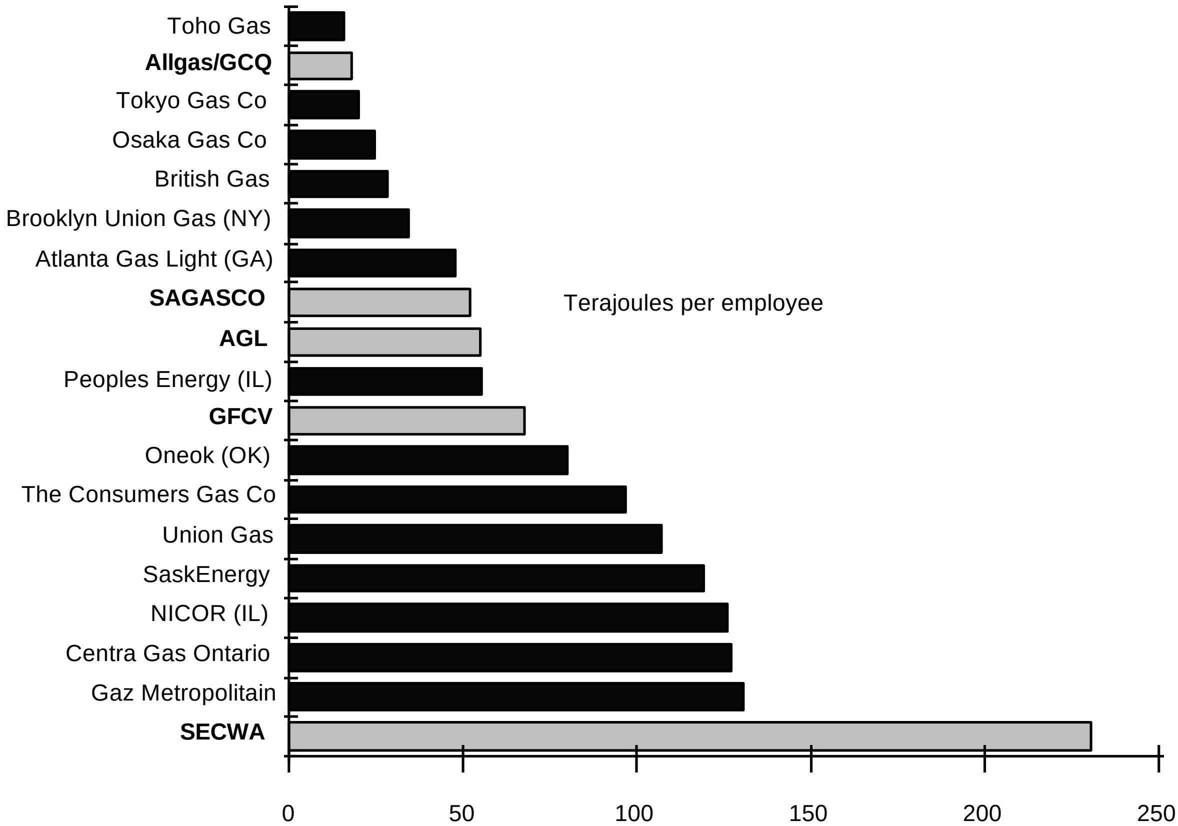
Operating efficiency

In this section the efficiency performance of 42 gas utilities located in Australia, United States, United Kingdom, Canada and Japan is compared. Partial measures of labour and capital productivity are presented, and then combined to compare the overall performance of the utilities.

Labour productivity

Labour productivity, measured as throughput of natural gas per employee, varies considerably. Allgas/GCQ has the lowest labour productivity in Australia and was one of the poorest performers in the world, ranking 40th of 42. SECWA, on the other hand, was found to be operating at best observed international practise, while the performance of the other States was around the international average.

Figure 0.4 Natural gas throughput per employee, selected utilities/states (1994 or latest available data)



Source: BIE 1994e. Chart based on data reproduced in appendix A, table A23.

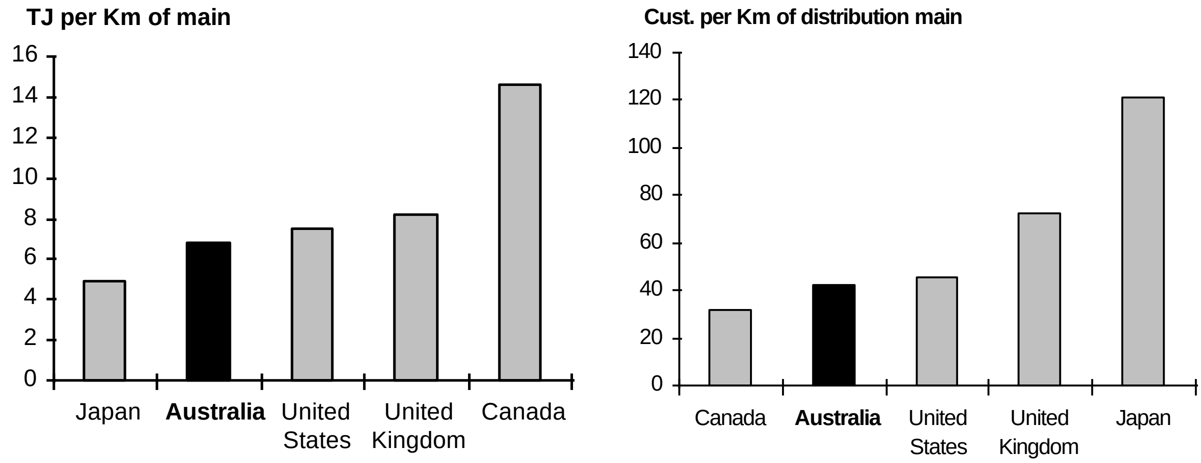
The results indicate that those utilities serving large industrial customers and few small commercial and residential customers tend to have relatively high throughput per employee. Industrial sales are less labour intensive than residential and small commercial sales. While industrial sales dominate Allgas/GCQ's supplies, it is the second smallest supplier in the sample of utilities and has difficulty achieving the same level of efficiency as other producers. Other small suppliers, such as Providence Energy in the United States, also rate poorly in terms of this indicator of labour productivity (figure 9.4).

Allgas/GCQ also rates poorly when labour productivity is measured as customers per employee, although its ranking improves slightly to 38th. The other Australian utilities perform well using this measure, ranking well above average. SECWA was found to be the best Australian supplier, ranking 5th in the sample. The United States gas utility Northern Illinios Gas (NICOR) was best observed practice in terms of customers per employee. NICOR is one of the largest gas distributors in the United States and sells about twice as much natural gas as GFCV — Australia's largest gas utility.

Capital productivity

Australia tends to have relatively low capital productivity compared to the other countries in the sample, both in terms of throughput per kilometre of main and customers per kilometre of distribution main (figure 9.5 and table 9.2).

Figure 0.5 Natural gas capital productivity, by country (1994 or latest available data)



Note: Country values are calculated as a simple average across the utilities in the sample.
Source: BIE 1994e. Chart based on data reproduced in appendix A, table A24.

In terms of throughput per kilometre of main, Japan and Australia perform poorly. Japan tends to operate relatively low capacity pipelines for safety reasons — because the region is prone to earthquake activity. In Australia, the major utilities Allgas/GCQ, AGL and SAGASCO have relatively low pipeline utilisation. This reflects the warmer climate in their states and the consequent reduced demand for natural gas. It may also reflect relatively lower capacity, as their networks are older. Victoria ranked slightly above average using this measure. Western Australia's was the best performing Australian utility and outperformed some of the larger utilities, such as NICOR in the United States and British Gas in the United Kingdom. The observed best practice utility, Peoples Energy of Illinios, has a pipeline capacity 130 per cent greater than SECWA's.

In terms of customers per kilometre of distribution main, Canada and Australia performed relatively poorly. This probably reflects their relatively low population density and greater concentration in the industrial market. Japan and the United Kingdom, which have relatively high population densities, performed well using this measure of capital productivity. Within Australia, GFCV and SAGASCO were the best performing utilities, reflecting a higher proportion of residential sales.

Table 0.2 Capital productivity (1994 or latest available data)

	Throughput per km of main	*Rank*	*Customers per km of dist'b main*	*Rank*
AGL (NSW)	4.3	33	31.2	29
GFCV (Vic.)	8	17	58.2	8
Allgas/GCQ (Qld)	3.3	40	40.4	19
SECWA (WA)	12.9	9	33.3	25
SAGASCO (SA)	5.7	27	47.9	13
Worst observed	1.1	Saskatchewan Energy	5.0	Saskatchewan Energy
Best observed	29.4	Peoples Energy	176.9	Tokyo Gas

Source: BIE 1994e.

Technical efficiency

Using data envelopment analysis (DEA) the partial productivity measures were combined to obtain an overall technical efficiency score for each utility. A score of 100 per cent suggests a utility is operating at best practice.

The Australian gas supply industry scores an average technical efficiency rating of 81 per cent (table 9.3). This is well above an estimated 71 per cent for selected United States utilities, but slightly below the average 85 per cent score attained by the Canadian utilities. The most efficient Australian utility was SECWA, which was estimated to be operating at best practice levels. AGL and Allgas/GCQ are below the United States average, while GFCV and SAGASCO are above.

Adjusting DEA results to standardise for differences in climate and customer density suggests that Australian, United States and Canadian utilities are all disadvantaged to some extent by environmental factors. Standardisation increased the average technical efficiency of the Australian utilities to 90 per cent, the United States utilities to 80 per cent and the Canadian utilities to 92 per cent. Standardisation for climate and customer density raises the technical efficiency of AGL from 61 to 96 per cent, and that of GFCV from 79 to 84 per cent. Despite the warm climate and low population density in Western Australia, SECWA was not disadvantaged by these factors as it concentrates on the industrial segment of the market.

Table 0.3 Natural gas industry technical efficiency measures

	Unadjusted technical efficiency	*Standardised technical efficiency*	*Scale efficiency*	*Congestion efficiency*	*Residual technical efficiency*
Australia	0.81	0.90	0.96	0.94	1.00
AGL	0.61	0.96	0.96	1.00	1.00
Allgas/GCQ	0.42	0.42	0.42	1.00	1.00
GFCV	0.79	0.84	1.00	0.84	1.00
SAGASCO	0.76	0.76	0.76	1.00	1.00
SECWA	1.00	1.00	1.00	1.00	1.00
US	0.71	0.80	0.85	0.95	0.99
Canada	0.85	0.92	0.94	0.98	1.00
Japan	0.96	0.96	0.98	0.98	1.00
UK (British Gas)	0.57	1.00	1.00	1.00	1.00

Source: BIE 1994e.

To explore the reasons for differing standardised technical efficiency performance, the standardised technical efficiency scores were decomposed into measures of scale efficiency, congestion efficiency and residual or ‘pure’ technical efficiency. Scale efficiency indicates how close to optimum scale a utility is operating. Only 15 natural gas utilities in the sample of 42 were found to be operating at optimum scale. These included Australia’s largest utilities, SECWA and GFCV.

Congestion efficiency measures the extent to which excessive amounts of a particular input are being used. Inefficiency due to input congestion may come from either restrictive work practices or the presence of excess capital. The only Australian utility to exhibit input congestion is GFCV, which the analysis suggests may have over-invested in distribution mains.

The residual or ‘pure’ technical efficiency score represents differences in technical efficiency which cannot be explained by standardisation for climate and customer density, and allowance for scale and input congestion inefficiencies. A few United States utilities scored below 100 per cent bringing the United States average to 99 per cent. All the Australian, Japanese, Canadian and United Kingdom natural gas utilities obtained a score of 100 per cent. So, according to the analysis, most of the observed inefficiencies in the Australian industry can be attributed to differences in climate, customer density and, in particular, the relatively small scale of operation.

9.4 Conclusions

The Australian natural gas industry is performing relatively well in terms of operating efficiency, given its operating environment. Natural gas prices in Australia compare favourably with most countries. Within Australia, GFCV has the lowest prices and performs relatively well in terms of labour, capital and overall technical efficiency. SECWA, although it has relatively high prices, is the best practice gas utility in Australia in terms of labour, capital and overall technical efficiency.

However, there is no room for complacency. Recent reforms have highlighted the need to integrate the state-based gas utilities and create a more competitive gas industry. The ongoing reform process should bring benefits through lower prices, and growth in the industry may help Australian gas utilities attain the scale economies available to the leading gas utilities overseas.

10 Coastal Shipping

10.1 Introduction

This chapter summarises findings published in *International Performance Indicators — Coastal Shipping 1995* (1995b). It compares the performance of Australia's coastal shipping industry with corresponding industries in other countries. It begins with a summary of recent reforms to coastal shipping, then reports on customer oriented performance indicators (covering freight rates and quality of service), operating efficiency performance indicators (covering labour and capital productivity and fuel efficiency) and vessel cost structures. The chapter concludes with a summary of the major findings.

10.2 The reform process

In April 1993, the Government extended the Shipping Industry Reform Authority's (SIRA's) reform program to September 1995. Its principal objectives were to:

- reduce average crew levels to 16.25;
- accelerate the retraining of ratings to an integrated rating standard;
- make real progress towards the introduction of company employment of ratings; and
- reduce the crew to berth ratio by about 10 per cent.

The government also undertook to contribute up to $25.3 million towards voluntary retirement packages and retraining.

The principal achievement of this extended program was the completion of the program of accelerated retraining of ratings to an integrated rating standard. The objective of reducing average crew levels to 16.25 was not considered feasible given safety considerations, but minimum average crew levels of around 18 were achieved. However, little progress was made in reducing the crewing factor, and agreement was not reached on company employment.

A Maritime Industry Restructuring Agreement (MIRA) was signed in September 1994. The MIRA process is industry funded, and involves negotiations between ship owners and maritime unions in pursuit of further shipping reforms.

The May 1995 federal budget contained a new shipping reform package, which included the introduction of a grant, equal to the cost of PAYE tax payments, to ship operators for vessels operating more than 50 per cent in international trades, and the extension of the taxable grant and accelerated depreciation regime for new vessels until 2002. The 1995 federal budget also increased the excise rate on light fuel oil, and excluded shipping claimants from receiving a diesel fuel rebate.

10.3 Service and efficiency indicators

A BIE survey of independent shippers found that they rated the level of service they received, such as reliability of delivery time, care of goods and equipment suitability, quite highly. However, bulk and non-bulk shippers were concerned that freight rates were too high and perceived problems with the wharfside interface, where this interface is controlled by third parties. A comparison with the previous year's survey results reveals that both bulk and non-bulk users report a general trend of improvement in service.

In the case of non-bulk users, monitoring work by the Prices Surveillance Authority reveals that implicit freight rates for Bass Strait trades increased marginally between 1991-92 and 1993-94.

The number of sailing days lost due to industrial disputes declined markedly between 1982 and 1993, although there were sizeable variations between years. Unfortunately, industry disputation days lost for 1994 were the highest for six years.

Labour productivity (cargo carried per crew member) continued to improve during 1993-94, reaching a new record, while vessel productivity (cargo carried per vessel) increased slightly. Fuel efficiency for the fleet as a whole has remained unchanged over the last 12 months.

Reform initiatives since the early 1980s have substantially improved the operating efficiency of Australia's coastal shipping industry. Major achievements have been reductions in crew complements, from an average of around 35 in the early 1980s to around 18 in 1994, and the upgrading of the coastal fleet. The *Ships (Capital Grants) Act, 1987*, together with the availability of five year depreciation for taxation purposes, has provided a strong incentive to ship operators to purchase new vessels. These new vessels have usually been larger, required smaller crews, and been more fuel efficient. As a result, measures of labour and capital productivity, and of fuel efficiency, have improved markedly over the past decade.

10.4 Vessel cost comparisons

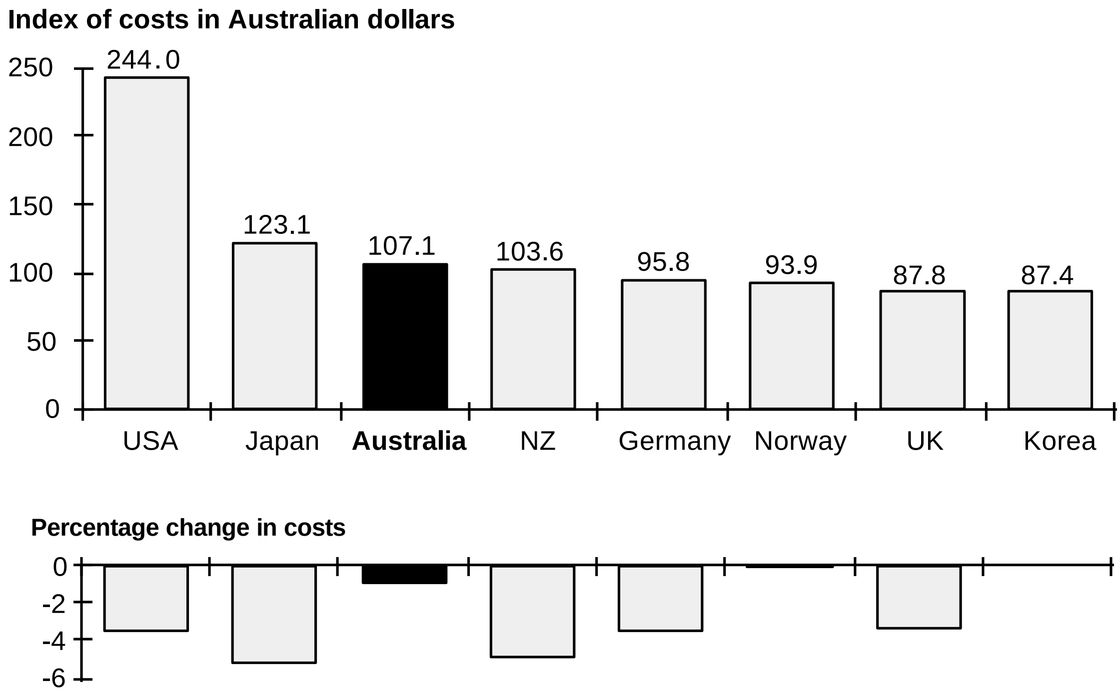
Vessel cost structures are the equivalent of price for vertically integrated operators, and are a good proxy for freight rates for independent users.

The BIE's comparative analysis of vessel costs covered three distinct vessel types (a dry bulk vessel, product carrier and a roll-on/roll-off vessel) for Australia, the United States, Japan, South Korea, New Zealand, Norway, the United Kingdom and Germany. These vessel types, and their assumed sailing patterns, are representative of Australia's key coastal trades. The comparisons are standardised across countries so that differences in cost primarily reflect differences in input prices, operating practices and institutional environments.

Overall vessel costs

Based on data for June 1994, Australian vessel costs for the three representative coastal vessels are higher than the corresponding costs for vessels registered in five of the seven countries sampled. Only the United States and Japan have higher costs than Australia. Australian vessel costs are around 22 per cent higher than the United Kingdom. Of those countries not allowing foreign or mixed crews, Australian vessel costs are some 14 per cent higher than Norway's and 3 per cent higher than New Zealand's for the dry bulk vessel (see figure 10.1). Product carrier and roll-on/roll-off vessel overall cost structures are similar to those of dry bulk vessels.

Figure 10.1 Dry bulk vessel costs[(a)] for selected countries June 1994, and percentage change[(b)] since June 1992



Notes: (a) Index Australia 1992 = 100. Size = 35 000 dwt.Vessel costs relate to the sailing segments of sea voyages and comprise capital, operating and voyage costs. (b) Percentage change not calculated for South Korea as it was not included in the set of selected countries in 1992.
Source: BIE 1995b. Chart based on data reproduced in appendix A, table A25.

Low vessel costs are achieved in those countries that have low average wage rates or utilise mixed crewing systems to achieve effective low average rates. South Korea is a relatively low wage country, while the United Kingdom and Germany employ ratings from such countries as the Philippines to achieve a low effective rate. Costs in Norway are relatively low due to low costs across most cost categories. Costs are high in the United States because the cost of purchasing vessels is high and crew complements are relatively large.

Variations in vessel costs

The main components of vessel costs are capital, labour and fuel. Together these cost categories accounted for some 83 per cent of total vessel costs across the selected countries and vessel types in 1994. Capital accounted for 60 per cent of vessel costs, labour for 16 per cent and fuel for 7 per cent. Analysis of these components helps to identify the factors that cause the variation in vessel costs.

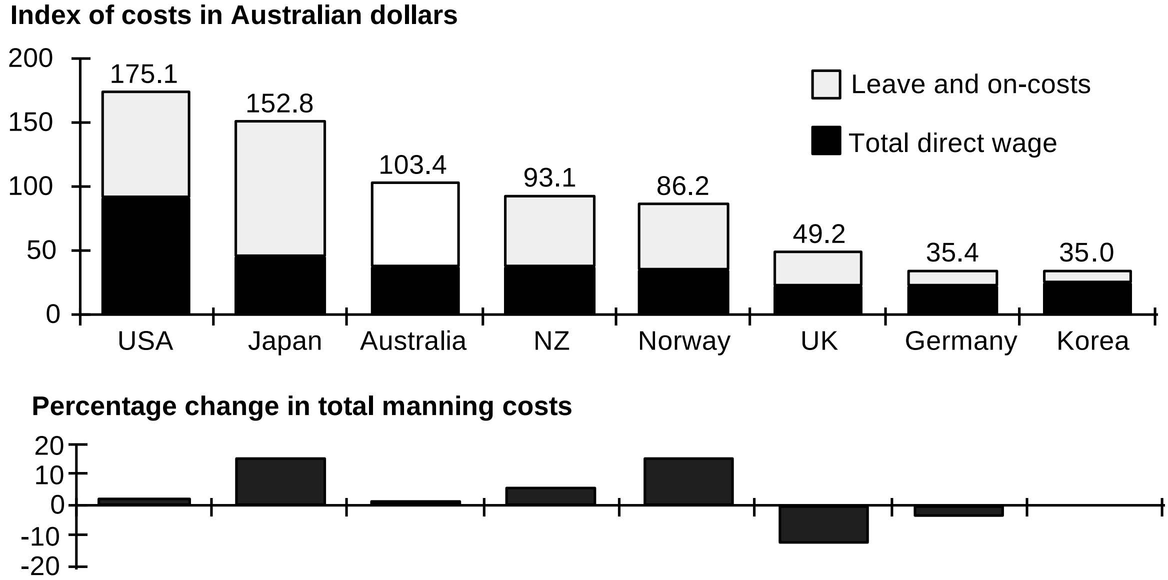
Capital costs for Australian vessels are the lowest observed. For the dry bulk vessel they were 5 per cent below the next cheapest country (the United Kingdom), 12 to 20 per cent less than Norway, South Korea, New Zealand, Japan and Germany and nearly 70 per cent below the United States in 1994. The availability of generous accelerated depreciation benefits and the taxable capital grant contribute to the relatively low capital cost of Australian coastal vessels.

Manning Australian coastal vessels is more expensive than manning vessels from all selected countries except the United States and Japan. Manning (labour) costs for Australian coastal vessels were 5 to 17 per cent greater than the average costs of coastal vessels operating in the selected countries, and nearly three times greater than the lowest observed manning costs (for the German vessels). Figure 10.2 shows manning cost comparisons for the dry bulk vessel in 1994, and the percentage change since 1992.

The main factors accounting for our higher manning costs are high leave and wage on-costs. Australia has the second highest ratio of leave and on-costs to total manning costs in the sample. The cost of ratings is particularly high in Australia.

Australia’s high manning costs are not caused by high crew complements. Indeed, Australian crew complements are relatively low by international standards. Moreover, direct wages paid to Australian crew are equivalent or less than direct wages paid to crew in comparable countries with national crews.

Figure 10.2 Dry bulk vessel manning costs for selected countries, June 1994[a] and percentage change[b] since June 1992



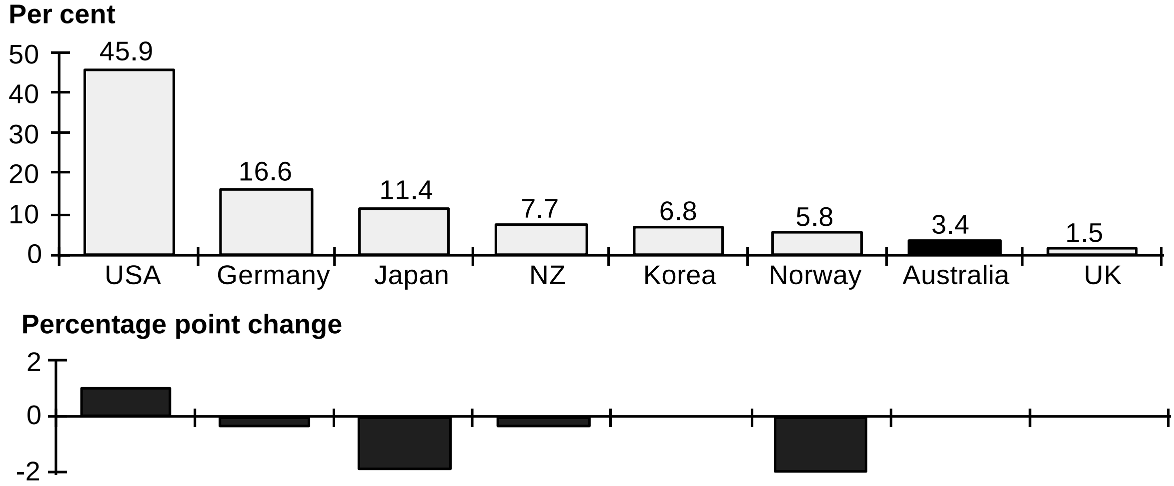
Notes: (a) Index Australia 1992 = 100. Size =35 000 dwt. (b) Percentage change not calculated for South Korea as it was not included in the set of selected countries in 1992.
Source: BIE 1995b. Chart based on data reproduced in appendix A, table A26.

The cost of fuel for Australian vessels is the highest among the selected countries, some 70 per cent higher than the average for the other countries. This cost differential is due in large part to the high excise tax in Australia, which represented about 35 per cent of annual bunker costs in 1994.

The remaining areas of cost, repairs and maintenance and other operating costs, account for an average of about 17 per cent of overall vessel costs. Repair and maintenance costs in Australia for the three selected vessel types were the highest of all selected countries in 1994. Other operating costs, such as insurance, administration and stores, are also relatively high in Australia. However, their overall impact on vessel cost differentials is not substantial, because these cost components typically account for less than 13 per cent of total vessel costs.

Government taxes, assistance, charges and regulations in Australia combined to raise total vessel costs by about 3 per cent in 1994. Significant imposts on fuel costs, and to a lesser extent labour costs, are offset by generous taxation provisions in relation to the purchase of vessels. Only in the United Kingdom are the net imposts arising from government measures smaller than in Australia (figure 10.3).

Figure 10.3 Taxes, charges, other fiscal measures and regulations as a proportion of vessel costs[(a)] in 1994, and percentage point change since June 1992[(b)]



Notes: (a) Dry bulk vessel (35 000 dwt). (b) Percentage point change not calculated for South Korea as it was not included in the set of selected countries in 1992.
Source: BIE 1995b. Chart based on data reproduced in appendix A, table A27.

While the net impost from government on Australia's coastal shipping industry is small, the mix of government measures applying to the industry is unusual. The capital cost of vessels receives highly preferential tax treatment, while taxes on fuel inputs are extremely high by international standards. Overall, a potentially better mix of measures, from the viewpoint of user industries and the economy at large, could be achieved by applying a more neutral overall set of fiscal measures to the industry.

Changes in vessel costs between June 1992 and June 1994

Over the period June 1992 to June 1994, overall vessel costs fell for nearly all selected countries and vessels, when calculated on the basis of real domestic currency. In general, across the selected countries, the cost of operating the product carrier reduced by 5 to 10 per cent, while the dry bulk and roll-on/roll-off vessels experienced reductions of 1 to 5 per cent. Across the three vessel types, costs declined most in Japan. Total vessel costs in Australia fell by less than in all other selected countries except Norway. So, despite the existence of a shipping reform process Australia's international cost standing has not improved.

The main reason for the observed reduction in total vessel costs (measured in real terms) across the selected countries and vessels was a reduction in capital costs. Capital costs declined because of reductions in the cost of purchasing new vessels in 1994, compared to 1992. Major reductions in manning costs were recorded for the United Kingdom dry bulk and product carriers (of 12 and 34 per cent respectively) due to the greater use of foreign ratings.

The major causes of changes in Australian vessel costs over the period included the reduction in capital costs, increases in repair and maintenance costs for the dry bulk vessel and product carrier and a reduction in repair and maintenance costs for the roll-on/roll-off vessel. Bunker costs increased due to an increase in fuel excise. Manning costs declined slightly, representing a good performance compared to most other countries.

10.5 Conclusions

There were no major changes to the operating environment in Australia between June 1994 and May 1995 likely to have affected cost structures for coastal vessels. The achievement of cost savings proposed under the Maritime Industry Restructuring Agreement (MIRA) may reduce Australian vessel costs by a further 2 to 3 per cent over the next year or so. But this will not change the relative vessel cost ranking of the countries sampled. On this basis, Australia's coastal shipping industry is likely to remain a relatively high cost industry in the years to come.

Clearly, on the basis of the BIE's analysis, and the Shipping Industry Reform Authority report to the Minister for Transport in August 1994, more substantial reforms are required if Australia's coastal shipping industry is to achieve best practice cost levels.

Australia could aim to achieve the cost levels for repair and maintenance and other operating costs achieved in New Zealand, and the manning levels achieved in Norway. Norway represents a best practice manning cost for countries using a national crewing system. Achieving these targets would reduce total vessel costs by 8 per cent, placing Australia well ahead of New Zealand and only marginally behind Norway and Germany in the ranking of relative vessel costs.

An alternative approach might combine the same savings in repair and maintenance and other operating costs (of 4 per cent of total costs) with the introduction of mixed crewing (saving 11 per cent of total vessel costs). Achieving savings in these cost elements would reduce Australia's dry bulk vessel costs by 15 per cent. At this level, costs would be the third lowest of the selected countries, and only 4 per cent higher than observed in the United Kingdom and South Korea in 1994. Clearly the national crewing system represents a significant cost impost.

11 State infrastructure scorecard

Business consumes a package of infrastructure services including telecommunications, transport and energy. Performance in the provision of a single infrastructure service can vary greatly between states. Similarly, the performance of a state in providing a range of different infrastructure services can vary widely across those services. One state can have a competitive waterfront, yet an uncompetitive electricity industry. Hence, in this chapter we attempt to assess how each state performs in providing a basket of state-based infrastructure services. This complements the preceding chapters that looked at each infrastructure industry in isolation.

The national competition policy has the potential to significantly change the provision of state-based infrastructure. Monitoring the success of these reforms at the state level is an important part of the process. Compensation payments to the states are supposed to be dependent on good progress being made. In addition many of the states have adopted different infrastructure reform strategies. Looking at how well each state performs in providing a basket of infrastructure services will provide information about the success of the different reform strategies the states are now adopting. It also provides useful information to infrastructure users about the costs of doing business in each state.

In this chapter we examine the price, reliability, labour and capital productivity for four state-based infrastructure industries. We then construct indexes to rank the states for their overall infrastructure performance.

11.1 State based infrastructure and reforms

Many infrastructure services are currently provided on a state basis. The provision of electricity, waterfront services, gas supply, rail freight and aviation differs between states, while telecommunications, road freight and coastal shipping are provided nationally. Although, current reforms are establishing multi-state or national networks to provide electricity, gas and rail services, these industries still differ by state.

National competition policy

Australian governments are in the process of facilitating competition in infrastructure industries traditionally owned by governments. The national competition policy, outlined in the 'Hilmer Report', comprises three main elements: extending both the content and coverage of the competitive conduct rules of the Commonwealth *Trade*

Practices Act, 1974; reviewing and reducing regulatory restrictions on competition; and increasing the impact of competitive forces on public sector monopolies (see chapter 3). The national competition policy reforms will affect the running, ownership and regulation of infrastructure industries, including state provided infrastructure.

State-based analysis is now of particular interest due to the mechanisms being put in place with the national competition policy. Compensation payments to the states for implementing the specified competition policy reforms are dependent on the states being able to demonstrate they have made progress in the nominated areas. The BIE (1995c) noted that the states have an incentive to do just enough to claim they have complied with reforms. Others have noted that it is unlikely that the Commonwealth government will withhold any compensation payments. Given the cost of these national reforms and the state control of most of the relevant infrastructure industries, it is important that developments in the reform process are closely monitored to ensure that benefits are delivered. This is particularly important given that, while the Commonwealth and states have reached agreement on the distribution of benefits, the majority of reforms are yet to occur. It will be many years before the Australian economy reaps the benefits of reform, but the associated costs and risks will accrue more immediately. Monitoring of the reform process will help keep attention focused on the long run objectives and on the need to match international best practice.

State approaches to reform

To date the states have focused on different aspects of infrastructure reform and implemented reforms in different ways. While it is difficult to generalise, Queensland has concentrated on corporatising its GBEs with continued public ownership. The sale of the Gladstone power station was, however, an exception to this rule. In contrast, Victoria has adopted the most radical approach to reform with the separation of natural monopoly and potentially competitive activities. The competitive sections of the electricity industry have been further disaggregated and prepared for privatisation. Other states, such as New South Wales, have adopted a more mixed approach with an emphasis on corporatisation and a more equivocal approach to disaggregating potentially competitive parts of the electricity industry. The following paragraphs briefly review recent reform initiatives in each of the five mainland states.

New South Wales

The State Rail Authority of NSW was restructured in 1994-95. Most significantly, an access management unit ('Rail Net') will oversee the process of allowing third parties to access the state's rail network. A Railway Services Group has been introduced to manage non-core assets of individual business units. In electricity, Pacific Power, which was restructured into five semi-autonomous business units in 1991, undertook generation and transmission functions in NSW. The transmission function was allocated to a separate authority which was corporatised earlier this year. After some debate about whether Pacific Power would be further disaggregated the Industry Commission was asked to conduct a review of Pacific Power's market power. The commission suggested that Pacific Power should be disaggregated into at least 3 separate entities. A decision will be made on this shortly. Following another review a decision was made to integrate the 25 mostly local council distributor businesses to form 6 competing corporations. The NSW government is not considering privatisation of the electricity distributors.

In the gas industry, the Moomba-Sydney pipeline was privatised in June 1994. The Gas Council of New South Wales is currently working on access arrangements to the New South Wales distribution (reticulation) system and assessing necessary changes that are needed to comply with the COAG agreements. In ports the Maritime Services Board of New South Wales was split into three ports corporations: Sydney, Newcastle and Wollongong, and the Waterways Authority on 1 July 1995. An Office of Marine Safety and Port Strategy was also established to advise the ports minister and manage the minor ports of Eden, Lord Howe Island and Yamba.

Victoria

The Public Transport Corporation of Victoria (PTC) commenced a comprehensive reform program in January 1993. One of its major objectives was to reduce deficit funding by $245 million by 1995-96. The State Electricity Commission of Victoria underwent a series of reorganisations through 1993-94. Generation Victoria, the generation business, was disaggregated into 5 separate businesses. The distribution business, Electricity Services Victoria, was disaggregated to form 3 metropolitan and 2 rural distributors. One of the metropolitan distributors, United Energy, was privatised earlier this year and further privatisations are planned. National Electricity, responsible for electricity transmission, was split into 2 business units — a transmission provider and a trading business.

In the gas industry, the Gas and Fuel Corporation of Victoria (GFCV) has been separated into a transmission business (Gas Transmission Corporation) and a distribution business (Gascor), and its technical and regulatory functions have been removed. The Gas Transmission Corporation now operates the high pressure distribution system. The exploration and production subsidiary is also up for sale. The state has assumed ownership of GFE Resources Ltd, GFCV's exploration and production subsidiary, pending privatisation.

In ports, by the end of 1995, the Port of Melbourne Authority will be replaced by two new public sector organisations: the Melbourne Port Corporation (the port landlord) and the Victorian Channels Authority, which is responsible for channels in the ports of Melbourne, Geelong and the Port Phillip Channels. The Port of Melbourne has recently advertised waterfront land for parties wishing to conduct port-related activities.

Queensland

In July 1995, Queensland Rail was corporatised. Some of the main immediate changes include separate reporting for individual business units, fully costing and reporting community service obligations and developing policies for competitive neutrality. Queensland Rail is phasing in commercial pricing principles for coal and other minerals. By the year 2000 all coal haulage contracts will be on a commercial basis with no royalty element in them. In the electricity industry, the Queensland Electricity Commission (QEC), the state's main electricity supplier, was separated into 2 statutory corporations in January 1995. One of these, Austa Electric, is responsible for electricity generation. The other, the Queensland Transmission and Supply Corporation, is responsible for electricity transmission and distribution. It comprises 8 subsidiary corporations — a transmission corporation and 7 electricity distributors. Similarly, while the government has not finalised the exact structure, it has indicated that it will not privatise the water industry.

In contrast, in the gas industry, private companies own the two major distributors in Queensland, Allgas Energy and GCQ. Queensland has recently implemented a new pipeline access regime in which there is a maximum charge for haulage by pipeline. Individuals wishing to access the pipelines may negotiate with the pipeline operators for haulage rates lower than the maximum. Ports in Queensland were corporatised on 1 July 1994.

South Australia

The Commonwealth government is responsible for the Australian National Railways Commission (AN), which operates South Australian non-urban rail services. AN has transferred 65 per cent of its business to the National Rail Corporation. This required significant restructuring. The Rail Transport Division, which ran the interstate business, has been renamed Rail Industry Services and will focus on providing services to the other AN divisions and NRC. These divisions are AN Tasrail, AN Passenger and Travel, and AN Freight (its South Australian freight business).

In the electricity industry, the Electricity Trust of South Australia (ETSA) was corporatised in July 1995. Separate (ring fenced) subsidiaries for generation, transmission, distribution and 'new business' were established at that time. The Electricity Sector Reform Unit was established in May 1995 to oversee and coordinate electricity reform in South Australia. In the gas industry, the South Australian government sold its transmission utility on 30 June 1995. Under the terms of the sale the new operators agreed to an access regime. In March 1995 South Australia adopted a 'CPI-X' pricing formula for the tariff market. In ports, the Port of Adelaide is now managed by the Ports Corporation of South Australia, which was established under the *South Australian Ports Corporation Act 1994.*

Western Australia

In the rail freight industry, following a decision to corporatise Westrail, the government restructured the organisation in mid 1992. In July 1995, Westrail abandoned plans to be corporatised in favour of implementing financial reforms under the banner of the ‘Right Track’ initiative. Westrail has implemented a wide-ranging reform program in the last few years aimed at improving efficiency and service to its customers. Efforts to cut loss-making ventures include Westrail withdrawing from the transport of fertiliser and the network moving out of less-than-car-load traffic.

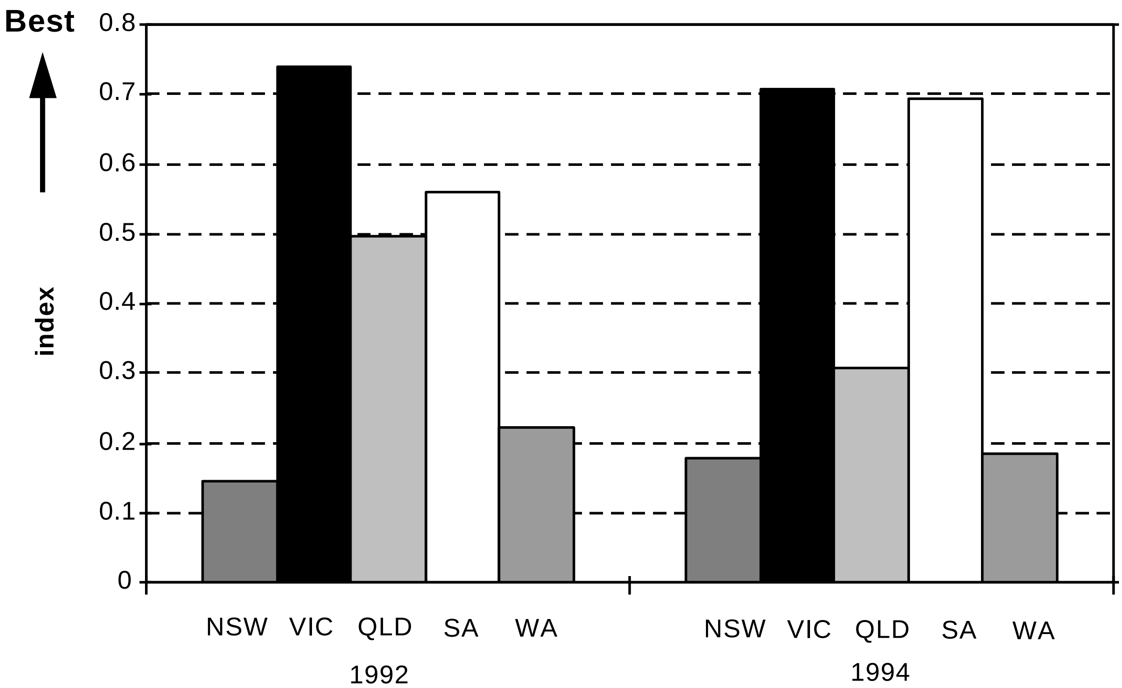
In the electricity industry SECWA, the principal supplier of electricity in Western Australia, was corporatised and split into separate electricity and gas utilities in 1995. The government-owned business, Western Power, will become subject to income and sales tax equivalent payments by July 1995 and July 1996, respectively. In the gas industry, the publicly owned AlintaGas corporation now operates the Western Australian gas transmission and distribution systems. There are now 5 firms purchasing gas directly form the North-West shelf producers. Additionally, the government has implemented access regimes for each pipeline operating in Western Australia. In port-related matters, a committee has recently been established to examine the possibility of corporatising the Fremantle Port Authority.

11.2 State performance in infrastructure provision

This section looks at the performance of each state in providing a basket of infrastructure services. We present state-based indicators for price, reliability, and labour and capital productivity for each of the state-based infrastructure industries examined earlier in this report (table 11.1). We then construct price performance and productivity indexes to measure how each state performs in the provision of a basket of infrastructure services (figures 11.1 and 11.2).

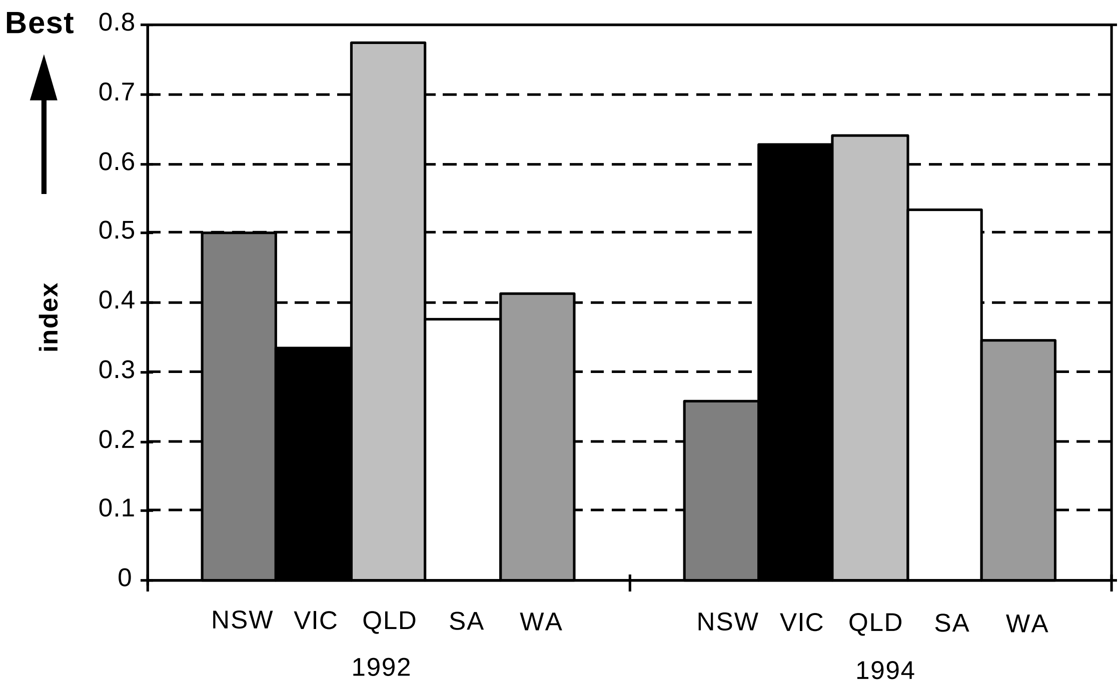
The performance of the Australian states relative to international best practice is illustrated in table 11.1. Queensland represents world best practice for capital productivity in the electricity industry and offers the lowest waterfront charges for coal. New South Wales offers world best practice capital productivity for waterfront coal handling and rail freight reliability. Western Australia’s labour productivity in the gas supply industry is world’s best. No single state offers world best practice for all of its infrastructure services. Hence, even the best performing Australian states have considerable scope for further improvement before they approach overall best practice.

Figure 11.1 Index of the price performance in the provision of infrastructure by state



Note: A high bar indicates a lower infrastructure prices.
Source: BIE estimates. Chart based on data reproduced in appendix A, table A28.

Figure 11.2 Index of the productivity performance in the provision of infrastructure by state



Note: A high bar indicates higher productivity.
Source: BIE Estimates. Chart based on data reproduced in appendix A, table A28.

Table 11.1 State and best practice infrastructure performance, 1994 or latest data

	Indicator	*NSW*	*VIC*	*QLD*	*SA*	*WA*	*TAS*	*NT*	*Best practice*
PRICE									
Electricity	cents per kWh, demand(kW)=10000, load factor(%)=80	6.95	4.89	6.48	6.1(a)	7.21	na	na	Transalta 3.79
Rail freight	av revenue c/ntkm	4.59	4.19	4.73	3.08	4.91	-	na	United States 2
Waterfront (containers)	waterfront charges ($A/TEU)	Sydney 288	Melbourne 292	Brisbane 284	Adelaide 278	Fremantle 282			Johor (Malaysia) 98
Waterfront (coal)	waterfront charges ($A per tonne)	Newcastle 3.67 Port Kembla 5.23		Hay PT CQCA 3.08 Gladstone 3.52 Hay Pt DBCT 4.56 Abbot Pt 5.8					Hay Pt CQCA 3.08
Aviation	airport landing charges (Index worst = 100)	Sydney 23	Melbourne 23	Brisbane 23 Cairns 29					Toronto 15
Gas supply	industrial price($A per Gj)	4.99	3.39	6.37	3.25	4.27			Oklahoma 1.99
RELIABILITY									
Electricity	av outage (min/cust/yr)	201	126	230	118	472	166	331	Tokyo Electric 3.0
Rail (timeliness)	% late arrivals (after 30 minutes)l	15	22	-	-	39	-	na	SRA 15
Rail (loss and damage)	claims (c/$100 revenue)	2	27	6	2.6	na	-	na	NSW 2
Aviation	on-time departures (%)	Sydney 84	Melbourne 78	Brisbane 83 Cairns 85					Copenhagen 95
LABOUR PRODUCTIVITY									
Electricity	gWh/employee	2.84	4.43	3.69	3.36	2.37	4.45	2.3	Transalta Can 12.95
Waterfront (coal)	tonnes ('000)/employee	Newcastle 158 Port Kembla 65		Hay Pt DB 128 Hay Pt CQ 133 Abbot Pt 106 Gladstone RGT 99					Kaltim Prima 245
Waterfront (containers)	boxes per terminal employee	Sydney 843	Melbourne 677	Brisbane 627	Adelaide 542	Fremantle 581			Rotterdam 1194
Aviation	aircraft movements/fire & rescue employee	Sydney 3460	Melbourne 2000	Brisbane 1800 Cairns 1100					Toronto 7200
Gas supply	tj/employee	55	68	18	52	230			WA 230
Rail	ntk/employee (mill)	1.67	1.53	2.12	3.19	1.91	3.19	3.19	United States 11.36
CAPITAL PRODUCTIVITY									
Electricity	capacity factor (%)	44.8	55.4	63.6	44.5	48.5	40.6	41.2	Queensland 63.6
	reserve plant margin	48.2	24.6	27.5	19.7	36.7		54.2	SERC - USA 10.0
Rail (wagons)	mill ntk/wagon	2.24	1.23	2	2.24	2.04	2.24	2.24	United States 5.58
Rail (locomotives)	mill ntk/loco	46.12	57.21	72.14	76.74	76.53	na	na	
Waterfront (coal)	annual throughput/annual capacity (%)	Port Kembla 70 Newcastle PWCT 103		Hay Pt DB 83 Hay Pt CQ 101 Abbot Pt 43 Gladstone RGT 72					Newcastle 103
Waterfront (containers)	crane rate (moves per hour)	Sydney 14.7	Melbourne 17	Brisbane 18	Adelaide 17.8	Fremantle 18.5			Rotterdam 30.3
Aviation	passengers per gate	Sydney 291.8	Melbourne 293.2	Brisbane 265 Cairns 295.3					Hong Kong 629
Gas supply	tj/total main (km)	4	8	3	6	13			Illinios 29

Notes: (a) Estimated - the BIE notes that as at August 1995 ETSA's published 10/80 tariff was 5.52 cents per kWh — around 8 per cent *less* than the January 1993 price.

State-based indexes

The indexes of overall state infrastructure performance presented in figure 11.1 include the four state-based industries for which a full data set is available — electricity, rail, waterfront (containers) and gas supply. We calculate the indexes for the five mainland states. We do not have complete data for the two territories, but they are not large industrial users. Tasmania uses hydro technology in its electricity industry, which renders it non-comparable with the mainland thermal systems.

The indexes are a summary measure only and are sensitive to the choice of indicators and indexing method used. They should be interpreted with caution and are simply intended to illustrate the overall situation. It should also be noted that the price performance index reflects the infrastructure prices faced by business users and will be influenced by the strategies adopted to allocate fixed costs.

The price index includes: cents per kilowatt hour for electricity, average revenue per net tonne kilometre for rail, whole-of-port waterfront charges per container, and cost per gigajoule for industrial gas supply. For both price performance and productivity, the higher the index the better the performance — a high price performance index indicates that a state performs well with a cheaper infrastructure basket and a high productivity index indicates superior overall productivity performance.

The productivity index combines both capital and labour productivity. The productivity index includes the labour productivity indicators: gigawatt hours per employee for electricity, boxes per terminal employee for the waterfront, gas through-put per employee and net tonne kilometres per employee for rail freight. Capital productivity measures in the index include: capacity factors and reserve plant margins for electricity, net tonne kilometres per wagon for rail freight, crane moves per hour for the waterfront and gas throughput per main kilometre.

We weight the components of the index by the relative share of each infrastructure service in business costs (including transport margins) to take account of how much businesses use each infrastructure service in the basket. Electricity has the largest percentage of basic values at 1.74 per cent, followed by the waterfront at 0.58 per cent, then rail at 0.45 per cent and gas at 0.19 per cent. We also take account of the relativities between scores for each indicator by allocating the best state result a value of one and the worst state result a value of zero. The other states are allocated a score between zero and one to reflect their position in this performance gap.

While still being relatively simplistic, this indexing method has the advantage over forming a composite ranking across the four industries of allowing for relation ties. Hence, if one state offers a service at a price a great deal cheaper than any other state, the index reflects that difference. Conversely, if two states have very similar price levels for infrastructure they will receive similar price performance index outcomes.

It should be noted that this indexing method magnifies the differences between states. While this makes it easier to identify differences the indexes do not directly reflect differences in the levels of the relevant indicators. In the case of prices, for instance, the composite price for the basket of infrastructure services is 30 per cent dearer in the most expensive state relative to the cheapest rate.

Price performance

State-by-state analysis indicates that Victoria currently offers the cheapest basket of infrastructure services. This is mainly due to its cheap electricity, which has the largest weight of the industries included. Victoria also has competitive rail freight and gas supply by Australian standards (rating second in both). However, Melbourne has the highest Australian waterfront charges examined.

South Australia offers the next cheapest basket of infrastructure services, offering the cheapest gas supply and waterfront charges in Australia. It also offers the cheapest rail freight, although this is due to Australian National being included as the South Australian figure.

New South Wales has the most expensive basket of goods, although Western Australia is close behind. Both these states have relatively expensive electricity supply. New South Wales offers mid-range rail charges, although their gas supply and waterfront charges are nearing the most expensive. Western Australia has the most expensive rail freight but the Port of Fremantle offers the second lowest waterfront charges in Australia. Queensland rank mid-range for all their infrastructure service prices, resulting in a mid-range price index.

To assess the changes in state price performance over the last few years we reconstructed the index using the data contained in the BIE’s original benchmarking overview, which primarily used 1992 data (BIE 1994a). The ‘1992’ state index also uses data from the BIE’s original waterfront report and first update reports for electricity and rail.

In Victoria the price performance index has remained relatively constant over the period. At the same time, prices in South Australia have fallen significantly relative to other states (resulting in a rise in the price performance index). Prices in Queensland have increased relative to other states over this period. New South Wales and Western Australia, the lowest ranking states, maintained their relativity over the period.

Productivity performance

Based on the latest information, Queensland has the most productive infrastructure services, closely followed by Victoria. Although Queensland does not offer the most productive labour or capital in any industry, it provides mid to high productivity across all industries, except labour productivity in gas supply, which is low.

Victoria has the highest labour and capital productivity for the electricity industry, although its capital productivity is only marginally ahead of Queensland's. It rates well on the other indicators, except for rail, where both its labour and capital productivity are poor.

Continuing high levels of excess capacity in the electricity industry marr New South Wales' productivity performance. Western Australia rates lowest on the productivity index, due mainly to its poor productivity in the electricity industry. Western Australia does, however, have high labour productivity for the gas supply industry and high capital productivity in moving containers across the waterfront. However, the electricity industry's high weighting adversely impacts the state's overall performance.

Productivity in Victoria has improved substantially since the original overview, pointing to the success of reforms aimed at increasing productivity in Victoria. Indeed, in 1992 Victoria had the worst productivity performance of the mainland states, but by 1994 had turned this around and Victoria was running a close second (to Queensland). Productivity significantly improved in South Australia over this period. Queensland was the clear productivity leader in 1992. While it still leads the current productivity index its lead has been substantially reduced. Western Australia's productivity performance has remained largely unchanged while New South Wales has slipped relative to other states.

Overall, high productivity has accompanied low infrastructure prices in Victoria. South Australia has also had high productivity and the second lowest infrastructure prices. Both New South Wales and Western Australia have had low productivity and high infrastructure prices. Only Queensland, which has the highest productivity but mid-range prices, provided an exception to the inverse relationship between productivity and prices. This may reflect a higher level of cost recovery in Queensland contributing to its superior government sector financial performance.

11.3 Conclusions

In conclusion, the reforms in Victoria appear to have had considerable success, with Victoria continuing to offer the cheapest basket of infrastructure services, and now achieving high productivity. South Australia also offers cheap infrastructure with reasonably high productivity, while Queensland has high productivity and mid-range prices. New South Wales and Western Australia have some way to go to meet Australian best practice for both price and productivity in the basket of infrastructure services.

It should be noted, however, that even the better performing states have some way to go to match international best practice overall. Australian best practice may be a useful interim target for those states that are currently lagging the leaders. Victoria has demonstrated that with a serious and well targeted reform program significant progress can be made quickly.

12 Performance gaps - the key results

This chapter summarises the major findings of the benchmarking project. It focuses on infrastructure performance gaps on an industry-by-industry basis.

12.1 Infrastructure performance — key results

Table 12.1 summarises the major findings of the benchmarking project. We present key performance indicators relating to price, quality, reliability and timeliness of service, labour productivity and capital productivity. Four key performance levels are identified. These are worst observed international practice, worst observed Australian practice, best observed Australian practice and best observed international practice.

In the subsequent figures and sections we analyse infrastructure services performance gaps for each of the four main indicator categories using the latest available information. *Australian best practice is set equal to 100 and all performance gaps are expressed as a percentage of it*. The performance gap between Australian best practice and best observed practice is represented by the bar appearing above the horizontal line marked 100. A higher bar above this line indicates that we are further behind best observed practice. The total length of the bar below the horizontal line marked 100 represents the gap between worst observed practice and Australian best practice. Where there are two boxes in the bar below the horizontal line marked 100, that closest to the horizontal line represents the gap between Australian worst practice and Australian best practice. The lower box represents the gap between Australian worst practice and worst observed practice.

Prices

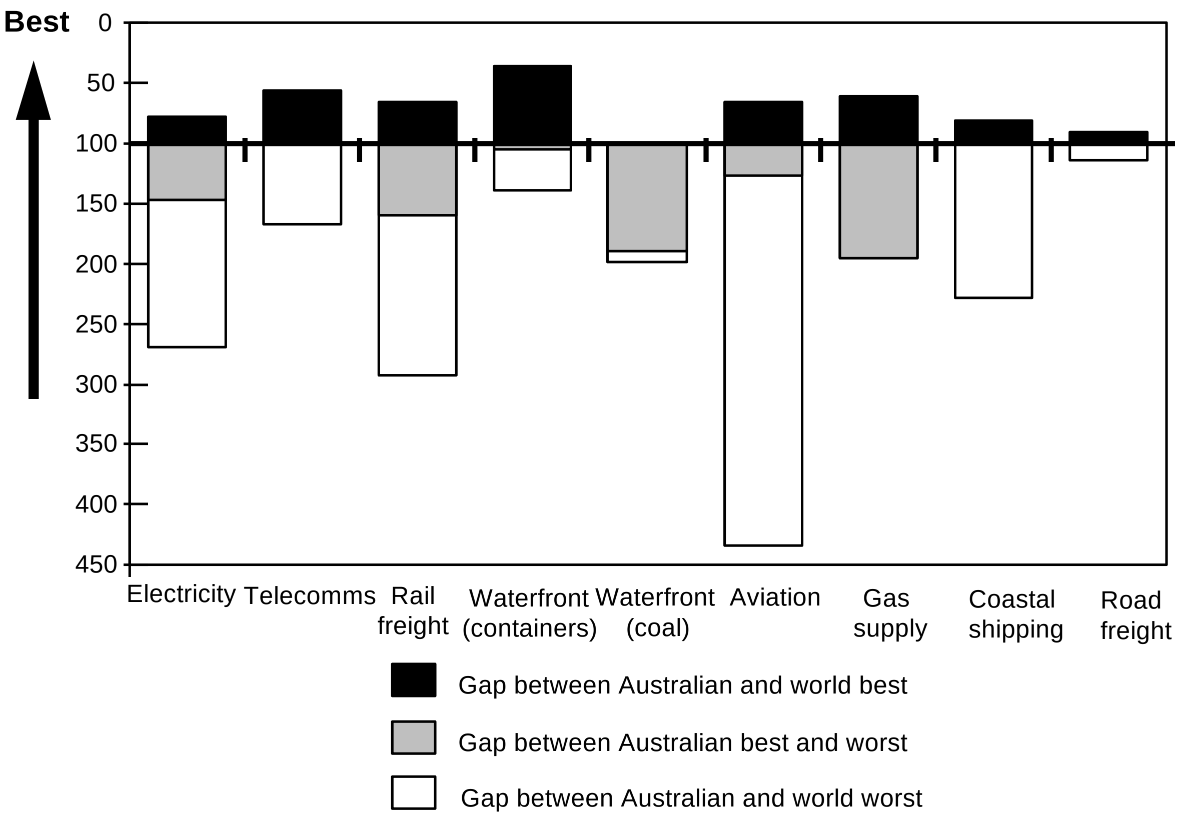
Australia’s best observed price performance is in waterfront coal handling. Australia also performs relatively well in respect to charges for road freight, dry bulk vessel coastal shipping and electricity. More significant price performance gaps are observed in waterfront container handling, telecommunications, rail freight, aviation (airport charges) and gas supply (figure 12.1).

Table 12.1 Australian, Worst and Best observed practice infrastructure performance, 1995 or latest data

	Indicator	*Worst practice* Utility/State	Value	*Worst Australian* Utility/State	Value	*Best Australian* Utility/State	Value	*Best practice* Utility/State	Value
PRICE									
Electricity	C/kWh, (kW)=10000, load 80%, 1994	Con Edison (US)	13.08	SECWA	7.21	ESV (VIC)	4.89	Transalta (CAN)	3.79
Telecommunications	Composite business basket, 1994	Japan	158.70	-	-	AUST	95.10	Finland	53.52
Rail freight	Ave revenue cents/ntkm, 1994	NZR[a]	9.00	WestRail	4.91	AN	3.08	BN (US)	2.00
Waterfront (containers)	Waterfront charges ($A/TEU), 1995	Oakland (US)	385	Melbourne	292	Adelaide	278	Johor (Mal)	98
Waterfront (coal)	Waterfront charges ($A/ tonne), 1995	Roberts Bank (CAN)	6.10	Abbot Pt (QLD)	5.80	Hay Pt (QLD)	3.08	Hay Pt (QLD)	3.08
Aviation	Airport landing charges (index), 1993	Berlin	100	Cairns	29	Syd, Bris, & Melb	23	Toronto	15
Gas supply	Industrial price($A per Gj), 1991	QLD	6.37	QLD	6.37	SA	3.25	Oneok (US)[b]	1.99
Coastal shipping	Standard dry bulk vessel op costs, 1994	USA	244.00	-	-	AUST	107.10	Korea	87.40
Road freight	Long haul c/tkm (op cost incl tax),1992	UK	146.00	-	-	AUST	128.00	US	116.00
SERVICE									
Electricity	Ave outage (min/cust), 1994	SECWA	472	SECWA	472	Ophir	55	Tokyo Electric	3.0
Telecommunications	Faults cleared within 24 hours, 1992	Belgium	58.00	-	-	AUST	78.90	Denmark	95.10
Rail Freight	Claims (c/$100 revenue), 1994	SP (US)	65	PTC	27	SRA	2	SRA	2
Waterfront	Time to move 600 boxes (hrs), 1995	Oakland (US)	44	Fremantle	44	Adelaide	27	Zeebrugge	12
Aviation	On-time departures (%), 1993	Hong Kong	66	Melbourne	78	Cairns	85	Copenhagen	95
Road freight	Late delivery (%), 1992	UK	8.00	-	-	AUST	4.00	US	3.00
Road freight	Loss & damage (%), 1992	US	0.90	-	-	AUST	0.40	AUST, CAN, UK	0.40
LABOUR PRODUCTIVITY									
Electricity	Gwh/employee[c], 1994	ESB (IRE)	1.34	SECWA	2.37	VIC	4.43	Transalta (CAN)	12.95
Telecommunications	Partial labour productivity index, 1992	AUST	1.00	-	-	AUST	1.00	USA	2.38
Rail Freight	Ntk/employee (mill), 1994	NZR[a]	0.25	PTC	1.53	AN	3.19	BN (US)	11.36
Waterfront (containers)	TEU per employee, 1994	Wellington	350	Adelaide	605	Sydney	1033	Laem Chabang	1298
Waterfront (coal)	Tonnes ('000)/employee, 1994	Port Kembla	65	Port Kembla	65	Newcastle	158	Kaltim Prima	245
Aviation	Aircraft moves/fire & rescue employee, 1993	Bangkok	850	Cairns	1100	Sydney	3460	Toronto	7200
Gas supply	Tj/employee, 1994	Toho Gas	15	Allgas/GCQ	18	SECWA	230	SECWA	230
Coastal shipping	Manning small dry bulk vessel, 1994	USA	28	-	-	AUST	18	Norway	15
CAPITAL PRODUCTIVITY									
Electricity	Capacity factor (%), 1994[d]	NEPC (US)	39.75	ETSA	44.50	QEC	63.6	QEC	63.6
	Reserve plant margin, 1994	Pacific Power	48.20	Pacific Power	48.20	ETSA	19.7	SERC (US)	10.03
Telecommunications	Partial capital productivity index, 1992	Germany	0.58	-	-	AUST	1.00	USA	1.76
Rail (wagons)	Mill ntk/wagon, 1994	NZR*	0.5	PTC	1.23	AN, SRA	2.24	BN (US)	5.58
Rail (locomotives)	Mill ntk/loco, 1994	CPR	7	SRA	46	AN	77	BN (US)	169
Waterfront (coal)	Throughput/capacity (%), 1994	Abbot Pt (Qld))	43	Abbot Pt (Qld)	43	Newcastle	103	Newcastle	103
Waterfront (containers)	Crane rate — moves per hour, 1994	Sydney	14.7	Sydney	14.7	Fremantle	18.5	HK, Singapore, etc	30
Aviation	Passengers/terminal gate, 1993	Copenhagen	144	Brisbane	265	Cairns	295	Hong Kong	629
Gas supply	Tj/total main (Km), 1994	SaskEnergy	1.4	Allgas/GCQ	3.0	SECWA	13.0	Peoples Energy	29.0
Road freight	Tonne (000)/km/veh/yr, 1992	UK	281	-	-	AUST	1020	US	1283

Notes: (a) Based on 1990-91 data, (b) Alaska excluded as an incomparable outlier, (c) Includes construction personnel, (d) Victoria based on 1992-93 data.
Source: BIE benchmarking studies.

Figure 12.1 Price performance gaps, Australian, Best and Worst observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap between Australian best and international best practice. Chart based on data reproduced in appendix A, table A29.

The largest of the performance gaps between Australian best practice and world best practice occurs in waterfront charges for containers. Waterfront container charges in Australia are higher than most ports in New Zealand, Asia and Europe, but not as high as some ports in the United States. Charges at Johor in Malaysia in 1995, at $98, are $180 or 65 per cent lower than Adelaide, which is Australia's lowest price container port. Charges at Klang (Malaysia), a port viewed within industry as more comparable, are only slightly higher than those at Johor. The range of container waterfront charges in Australia is quite small. Charges in Melbourne, Australia's most expensive container port, are only 5 per cent higher than in Adelaide. Container charges in the worst performing port sampled, Oakland in the United States, at $385, are only 39 per cent higher than Australian best practice.

In contrast, waterfront charges for coal handling in Australia are amongst the lowest in the world. Even the more expensive of the Australian coal ports are on a par with international counterparts. The best observed Australian coal handling port, Hay Point, was the best observed practice in the world. Australia's highest cost coal handling port was Abbot Point, where charges are 88 per cent higher than those at Hay Point. Charges at the highest cost coal handling port observed in the world, Roberts Bank in Canada, are 98 per cent higher than Hay Point's. So, in terms of coal handling Australia performs very well, but the performance range within Australia is almost as great as the range observed in the world as a whole.

Australian vessel costs are higher than the corresponding costs for vessels registered in five of the seven countries sampled. Only the United States and Japan have higher vessel costs than Australia. The lowest observed operating costs in coastal shipping for a standardised dry bulk vessel in 1994 occur in Korea. They were some 18 per cent lower than in Australia's. The highest observed cost of operating the same vessel in 1994 was in the United States, where costs were 128 per cent higher than in Australia.

Capital costs for Australian vessels are the lowest observed, while manning Australian coastal vessels is more expensive than manning vessels from all selected countries except the United States and Japan. The main factors accounting for higher manning costs are high leave and wage on-costs. The cost of fuel for Australian vessels is the highest among the selected countries, some 70 per cent higher than the average for the other countries.

The second largest price performance gap between Australian and world best observed practice occurs in telecommunications, where the price of a composite basket of business services in Finland in 1994 was 44 per cent lower than in Australia. Charges for the same basket of services in Japan, the highest price country sampled, were 59 per cent higher than in Australia. The overall picture from telecommunications price comparisons is one of having to run to keep pace with international counterparts, and barely managing to keep up. Australia's relative international ranking in terms of the price of the composite basket of business services has remained unchanged since 1989. And prices for some categories of service are falling more slowly in Australia than in other comparable countries.

Best observed Australian practice for rail freight charges (average revenue per net tonne kilometre in 1994) was Australian National (AN), with charges 35 per cent higher than the world (sampled) best, Burlington Northern in the United States. Australia's highest observed rail freight charges, Westrail, were 59 per cent higher than AN's.

Average freight charges are much higher in Australian rail systems than in most North American systems. For most haul lengths, coal rates in Queensland exceed corresponding rates in the United States by around 40 per cent. And rail freight rates paid by grain producers in Australia are typically three times higher than those paid in North America

Australia appears to be relatively well served by its airlines. Air fares and cargo rates are either better than, or at least very competitive with some of the lowest fares and rates overseas. And it seems that service quality has not been compromised in providing these lower fares. Indicators of the performance of Australia's aviation infrastructure services reveal a more mixed performance. Aviation infrastructure services in Australia are amongst the cheapest available. While service standards are, at times, below those observed overseas. It may be that this reflects the trade off between airport charges and service standards.

Lowest observed airport landing charges in 1993, those for Toronto in Canada, were 35 per cent lower than the best observed in Australia, those for Sydney, Brisbane and Melbourne. Highest observed airport landing charges in Australia, those for Cairns, were 26 per cent higher than Australia's lowest charges. While landing charges at the worst observed airport, Berlin, were 335 per cent higher than Australia's lowest.

Australian industrial, commercial and residential prices of natural gas compare favourably with those paid in most industrialised countries. In 1992, the average industrial price of natural gas was lower in Australia than in Japan, Europe and New Zealand, but higher than in North America. Prices for the supply of gas to industrial users (dollars per gigajoule) in 1991 were 39 per cent lower in Okalahoma than in South Australia, which was Australia's lowest priced state. The highest prices for gas to industrial users observed in 1991 were in Queensland — almost double those in South Australia — due in part to the favourable climate and small size of the Queensland market.

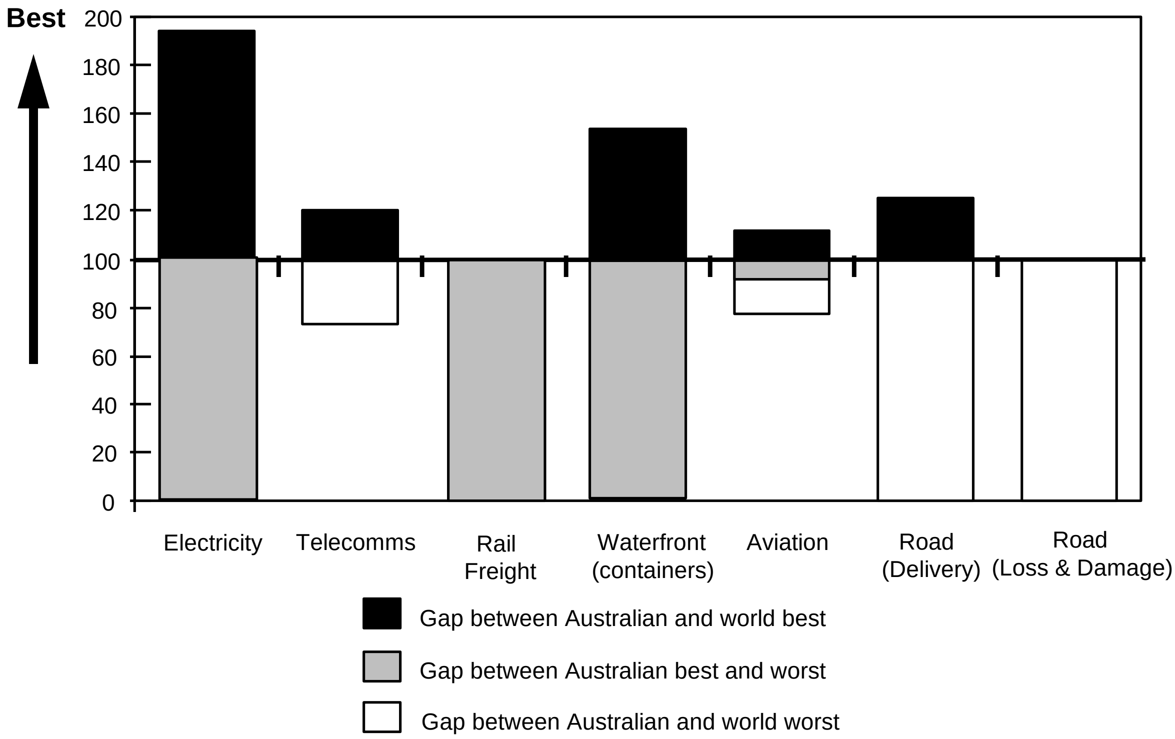
The world's lowest observed electricity charges (cents per kWh with demand set at 10,000 KW and a load factor of 80 per cent) in 1995, those of Transalta in Canada, were 22 per cent lower than Australia's lowest charges, those for Victoria (ESV). Western Australia (SECWA) had the highest observed charges in Australia, 48 per cent higher than those of Victoria.

Australia was close to best practice in respect to road freight charges in 1992, when long haul charges (cents/tkm) in Australia were only 9 per cent higher than in the United States. Charges in the United Kingdom were 14 per cent higher than Australia's at that time.

Service quality

Figure 12.2 summarises observed performance gaps in respect to the reliability of service. Australia's good performance on road freight pricing carries over to reliability. Australian road freight delivery time and loss and damage rates are both relatively close to best practice. Percentage late delivery in Australia, at 4 per cent in 1992, was only 1 percentage point lower than the United States. Percentage late delivery in the United Kingdom in 1992 was double that of Australia. In terms of loss and damage, Australia is equal best practice with Canada and the United Kingdom, and performs better than the United States.

Figure 12.2 Service quality performance gaps, Australian, Best and Worst observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap between Australian best and international best practice. Chart based on data reproduced in appendix A, table A30.

In terms of the rail freight loss and damage indicator, the value of claims in cents per $100 revenue in 1994, the State Rail Authority of New South Wales was the world best observed practice at 2 cents per $100 revenue. The Public Transport Corporation of Victoria, at 27 cents per $100 revenue, was the worst observed Australian practice, while the Southern Pacific Transportation Company of the United States was the worst observed overall, at 65 cents per $100 revenue.

A relatively small overall performance range was observed in telecommunications. Best observed practice in terms of faults cleared within 24 hours in 1992, 95 per cent, occurred in Denmark. In Australia, 79 per cent of faults were cleared within 24 hours in 1992. Worst observed practice occurred in Belgium, where only 58 per cent of faults were cleared within 24 hours.

In aviation, Australian best practice was recorded by Cairns airport, from which 85 per cent of departures were on time in 1993. World best observed practice was Copenhagen, where 95 per cent of departures were on time. A similar performance gap existed between Australia’s best performing airport and the worst observed Australian performance. Seventy-eight per cent of departures from Melbourne were on time in 1993, compared to 66 per cent from Hong Kong. However, it should be noted that the BIE’s aviation benchmarking study pre-dated the opening of Sydney’s third runway. Evidence is emerging to suggest that the percentage of delays from Sydney has almost doubled in the last year (OAA 1995).

Electricity supply reliability performance, in terms of average outage in minutes per customer per year, varies considerably. World best observed practice was 3 minutes for Tokyo Electric. Best aggregate Australian practice, 55 minutes, occurred for Ophir (NSW). Worst observed Australian practice occurred in Western Australia (SECWA), which at 472 minutes had an average outage rate more than eight-and-a-half times that of Ophir (NSW) — although it should be noted that this was due in large part to a major cyclone.

Reliability of waterfront services in the Australian ports lags well behind world's best practice. Australia performs particularly poorly on timeliness variability with a high proportion of delays to ships in excess of 40 hours. Short delays can usually be made up in subsequent sailing time, but delays of this length necessitate the omission of subsequent port calls or the hiring of charter vessels. Both options are very costly to ship operators.

Operational efficiency

This section summarises operational efficiency performance gaps relating to labour and capital productivity.

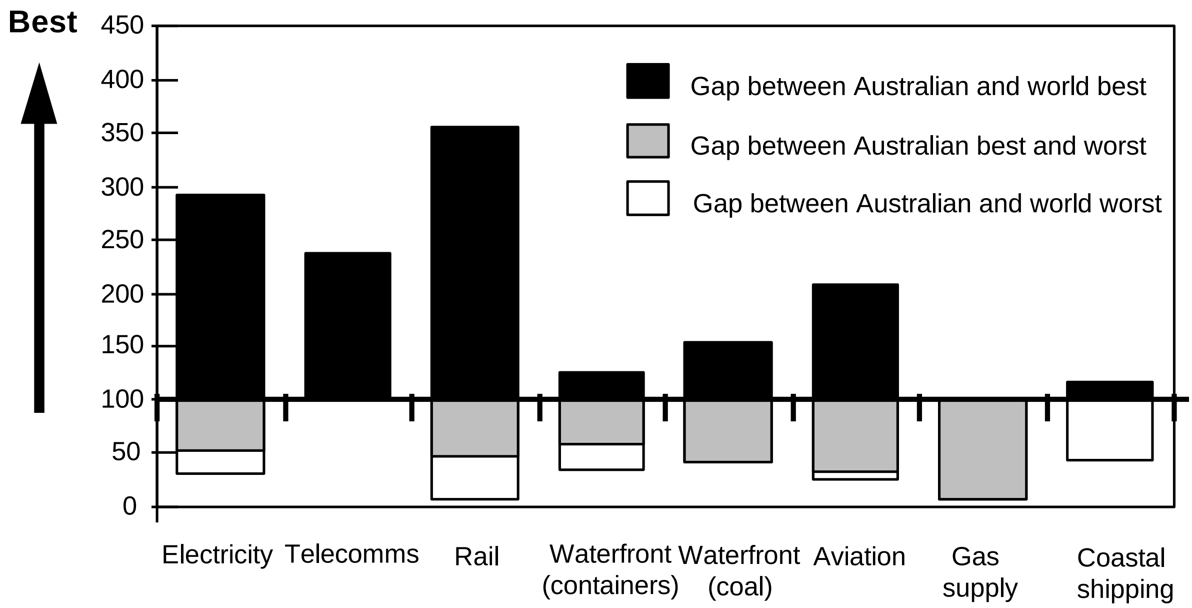
Labour productivity

Australia's best labour productivity performance occurred in the gas supply industry, in which SECWA (Western Australia) was the world best observed practice in terms of throughput per employee in 1994 (figure 12.3). Unfortunately, the performance range observed in the Australian gas supply industry was almost as great as that observed in the world as a whole. Allgas/GCQ of Queensland achieved a throughput 92 per cent lower than SECWA's and only marginally better than the worst observed performance, that of Toho Gas of Japan.

Australia also performs relatively well in terms of coastal shipping labour productivity, measured as the manning level for a small dry bulk vessel in 1994. At 18 Australia's manning level performance was only 3, or 17 per cent, below the world best observed practice, that of Norway. The worst observed practice, that of the United States, was 56 per cent below Australia's. However, while Australia performs well in terms of manning levels, we have a high crew to berth ratio due to generous leave provisions which inflates our operating costs.

A 25 per cent performance gap existed between Australia's best observed container handling port, Sydney, and the best observed port, Laem Chabang 4 (TIPS), in terms of teu per employee in 1994. Although Australia was best observed practice for comparable sized ports in terms of boxes per employee. Adelaide's performance in terms of teu per employee was 40 per cent below that of Sydney while that of Wellington, the worst observed port, was 66 per cent below. This result suggests that the problem with Australia's poor waterfront performance lies in the area of work practices and equipment rather than overstaffing.

Figure 12.3 Labour productivity performance gaps, Australian, Best and Worst observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap between Australian best and international best practice. Chart based on data reproduced in appendix A, table A31.

The world's best waterfront coal handling rate (tonnes per employee) occurred in Kaltim Prima, with a handling rate 55 per cent greater than Newcastle, the best observed in Australia. Newcastle's coal handling rate was more than double that of Port Kembla, which was the worst observed performance.

On one indicator of airport labour productivity, aircraft movements per fire and rescue employee in 1994, world best observed practice, Toronto, achieved a movement per employee rate double that of the best observed Australian airport, Sydney. Australia's worst observed practice occurred in Cairns with a rate 68 per cent lower than Sydney's, while the worst observed practice occurred in Bangkok with a rate 75 per cent lower than Sydney's.

The labour productivity performance gap between Australian best practice and world best practice was somewhat greater than this in telecommunications in 1992. In terms of a partial labour productivity index based on telecommunications lines and calls per employee, Australia was the worst performed of the 11 countries sampled. World best observed labour productivity practice, that of the United States, was more than double that of Telstra.

The greatest labour productivity performance gaps are in electricity and rail freight. Labour productivity in electricity, measured as gigawatt hours per employee, was more than 4 times greater at Transalta in Canada than in Victoria, Australia's best observed practice. Victoria's performance was 65 per cent higher than that of Western Australia (SECWA), Australia's worst observed practice. World best observed rail labour productivity, measured as net tonne kilometres per employee, was Burlington Northern in the United States which out performed AN, Australia's best observed, by a factor of 3.6. AN’s performance was in turn double that of PTC (Victoria), based on unadjusted operating costs.

Capital productivity

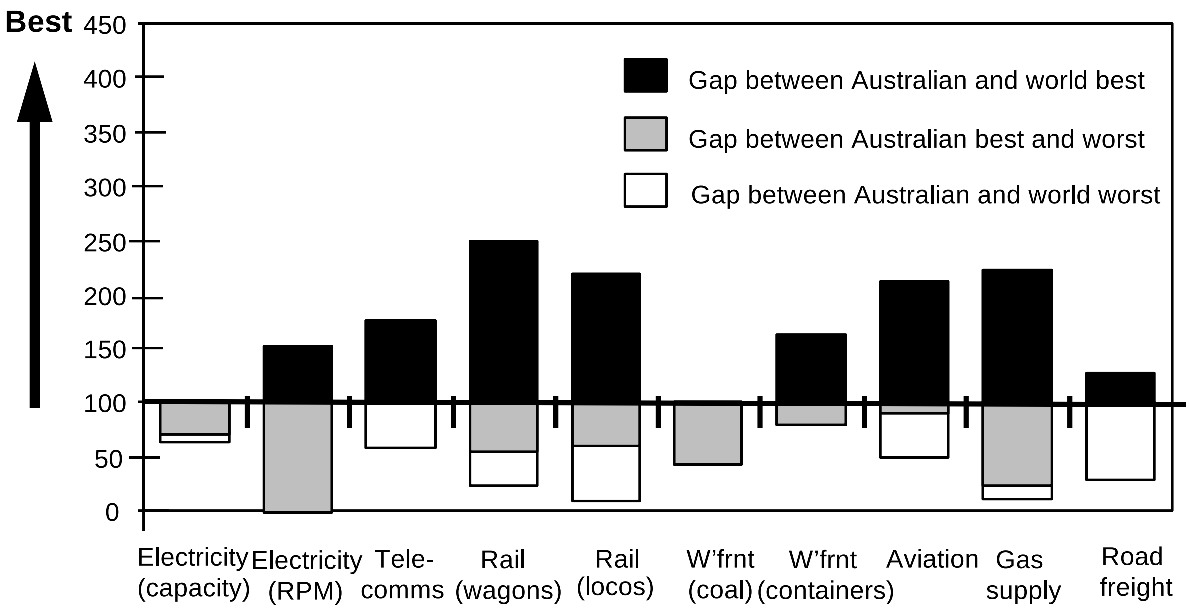
Based on unadjusted costs, the greatest capital productivity performance gap occurs in the use of rail rolling stock (figure 12.4). In terms of millions of net tonne kilometres per locomotive in 1994, world best practice performance, that of Burlington Northern in the United States, was double that of Australia’s best observed practice, AN. The capital productivity performance of SRA (New South Wales) was 45 per cent lower than that of AN. In terms of millions of net tonne kilometres per wagon in 1994, Burlington Northern’s performance was 2.5 times that of the best Australian performance, AN and SRA. PTC’s performance, Australia’s worst observed, was 45 per cent below that of AN and SRA.

However, somewhat smaller performance gaps are generally observed between the United States and Australian rail operations when a standardised cost model is used to account for operating environment factors, such as scale of operations and traffic density. Such an analysis will form an integral part of the BIE’s forthcoming rail freight benchmarking study, but has not yet been completed.

The gas supply and aviation industries also exhibit significant capital productivity performance gaps. World best observed capital productivity in the gas supply network, measured as terajoules per total main kilometres in 1994, occurred at Peoples Energy in Illinios (United States). Its performance was more than double that observed in Western Australia (SECWA), Australia’s best observed practice. Capital productivity performance in Queensland (Allgas/GCQ), Australia’s worst observed performance, was only 23 per cent of SECWA’s, while that of SaskEnergy in Canada was only 11 per cent of WA’s.

A similar performance gap between Australia’s best and best observed capital productivity practice existed in aviation. Passengers per terminal gate through Hong Kong airport in 1993 was double that of Cairns airport, Australia’s best observed. In this case, however, Australia’s worst observed airport capital productivity, Brisbane, was only 10 per cent below that of the best observed. The worst observed, Copenhagen, was more than 50 per cent below Cairns.

Figure 12.4 Capital productivity performance gaps, Australian, Best and Worst observed (index relative to Australian best = 100)



Note: A larger bar above the 100 line indicates a larger gap between Australian best and international best practice. Chart based on data reproduced in appendix A, table A32.

A significant capital productivity performance gap also exists in telecommunications. Capital productivity, measured as calls per line, was 75 per cent higher in the United States in 1992 than it was in Australia. Capital productivity in German telecommunications in 1992 was little more than half that in Australia.

Again the waterfront produced the most mixed performance results. Recent declines in container stevedoring productivity have resulted in Australia falling well behind similarly sized ports overseas. Container handling crane rates were around 60 per cent higher in Laem Chabang, Oakland and other comparable ports in 1994 than in Fremantle, Australia's best performing port. The worst observed crane rate was in Sydney, although the rate was only 20 per cent below that of Fremantle. In the June quarter of 1995 crane rates fell further at all five mainland capital city container ports, increasing the gap between Australia and best practice. On the other hand, Newcastle achieved the best observed coal handling capital productivity, while Abbot Point in Queensland had a throughput to capacity ratio less than half that of Newcastle.

A relatively small capital productivity performance gap was observed in road freight. Australia's capital productivity performance (tonnes/km/vehicle/year) was only 26 per cent lower than the best observed, the United States, in 1992. Capital productivity in the United Kingdom road freight industry was 72 per cent lower than in Australia.

The electricity industry presents a mixed picture in terms of capital productivity. Australia performs well in terms of capacity factors, with Queensland (QEC) achieving the best observed value. However, excess capacity remains a significant problem in some states, with Pacific Power (NSW) having the worst observed performance on reserve plant margins and the best Australian state, South Australia (ETSA), having a reserve margin almost twice that of the best performing United States utility. The higher degree of interconnection in the United States will account for some of this difference but significant scope for improvement remains in Australia, particularly with the move towards a national grid.

12.2 Infrastructure performance — are we closing the gap?

The key result emerging from the BIE's international benchmarking of Australian infrastructure is that while progress has been made in some areas of microeconomic reform, much remains to be done. Recent reform initiatives have tended to narrow performance gaps between some Australian infrastructure industries and observed international best practice. However, international best practice is a moving target and we have to run fast to keep pace with the world leaders. The fact that we have actually slipped backwards in waterfront container handling and aviation, while the rest of the world has been moving ahead, must be a cause for concern.

This analysis of the performance gaps suggests that there is a marked difference in performance between the various categories of indicators. The largest price performance gap between Australia's best and best observed practice is 65 per cent for waterfront container handling. Labour and capital productivity gaps are both larger and more varied. The largest capital productivity performance gap between Australia's best and best observed practice is 150 per cent for wagon utilisation in rail freight. The largest labour productivity performance gap is also found in rail freight at more than 250 per cent. Four industries (rail freight, electricity, telecommunications and aviation) have labour productivity gaps in excess of 100 per cent while three industries (rail freight, gas supply and aviation) have capital productivity gaps in excess of 100 per cent. So, it would appear that it is in the area of operational efficiency, especially labour productivity, that Australia falls furthest behind world best practice.

To see whether or not Australia is gaining ground on world best practice we need to examine relative performance gaps over time. The BIE has now completed second or subsequent benchmarking studies for five industries — electricity, rail freight, telecommunications, the waterfront and coastal shipping. Sampling variations and improved data coverage and analysis mean that the summary indicators used for these industries in this paper are not always the same as those used in the BIE's initial reports. This applies particularly to the waterfront where the latest study reports whole of port costs whereas the initial study included only a subset of port authority, government and ancillary charges. Nevertheless, while a number of caveats apply and caution should be exercised in interpretation, it is possible to analyse performance gaps over time for most of these industries.

In respect to price indicators, Australia has moved closer to best practice in the electricity, rail freight, telecommunications and coastal shipping industries. Comparable reliability data are sparse, but it appears that electricity reliability has improved in Australia in recent years. Australia also continues to lead the field in achieving low loss and damage rates on rail freight.

The major problem area in terms of reliability remains waterfront container handling. Australian ports are not only among the slowest to move a specified number of containers, but are also among the most variable. In particular, we have a high proportion of delays in excess of 40 hours, which are very costly to ship operators as they usually necessitate missing subsequent ports on the route to maintain overall sailing schedules.

There are larger changes in relativities, but more mixed results, in respect to labour and capital productivity indicators. Australia has moved closer to best practice in telecommunications and rail freight labour productivity, although the gaps remain very wide. Comparisons of capital productivity indicators suggest that Australia has closed the performance gaps in respect to rail wagon utilisation and electricity capacity factors. However, excess capacity remains a significant problem in some states' electricity systems, with NSW having one of the worst reserve plant margins observed. The worst productivity change result is again reserved for waterfront container handling. Australia was achieving crane rates close to those of comparable sized ports overseas at the end of the WIRA process in 1992. However, subsequent setbacks in Australia and continuing improvements overseas saw our crane rates fall back to 25 to 50 per cent below those of the better comparably sized ports overseas in 1994. In the June quarter of 1995 crane rates again fell at all five mainland capital city container ports, widening this gap even further.

The analysis of performance gaps suggests that it is in the area of operational efficiency, especially labour productivity, that the largest performance gaps remain. Otherwise relatively good performances in such industries as coastal shipping and telecommunications are compromised by poor labour related performance. Further reform of the labour market and work practices are required to consolidate gains made in the reform process so far.

Since the late 1980s, Australia has embarked on an increasingly focused reform agenda. However, international best practice is a moving target and we must continually be striving to improve our performance simply to maintain our relative position. Now is certainly not the time for reform fatigue. Relaxing the pace of reform or letting the process falter would see Australia fall back into the trailing group of international also-rans.

Appendix A Statistics

This appendix presents the data behind the charts that appear throughout this report. Data tables are organised on a chapter-by-chapter basis.

Executive summary

Table A1 Price performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity	C/kWh ((kW)=10000 load 80%), 1994	147.44	100.00	77.66
Telecommunications	Composite business basket, 1994	100.00	100.00	56.28
Rail freight	Ave revenue cents/ntkm, 1994	159.42	100.00	64.94
Waterfront (containers)	Waterfront charges ($A/TEU), 1995	105.04	100.00	35.25
Waterfront (coal)	Waterfront charges ($A/ tonne), 1995	188.31	100.00	100.00
Aviation	Airport landing charges (index), 1993	126.09	100.00	65.22
Gas supply	Industrial price($A per Gj), 1991	196.00	100.00	61.23
Coastal shipping	Standard dry bulk vessel op costs, 1994	100.00	100.00	81.61
Road freight	Long haul c/tkm (op cost incl tax), 1992	100.00	100.00	90.63

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A2 Service quality performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity	Ave outage (min/cust), 1994	- 758.18	100.00	194.55
Telecommunications	Faults cleared within 24 hrs, 1992	100.00	100.00	120.53
Rail Freight	Claims (c/$100 revenue), 1994	-1 250.00	100.00	100.00
Waterfront (containers)	Time to move 600 boxes (hrs), 1995	- 67.17	100.00	153.96
Aviation	On-time departures (%), 1993	91.76	100.00	111.76
Road (Delivery)	Late delivery (%), 1992	100.00	100.00	125.00
Road (Loss & Damage)	Loss & damage (%), 1992	100.00	100.00	100.00

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A3 Labour productivity performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity	Gwh/employee(c), 1994	53.50	100.00	292.33
Telecommunications	Partial labour productivity index, 1992	100.00	100.00	238.00
Rail	Ntk/employee (mill), 1994	47.96	100.00	356.11
Waterfront (containers)	TEU per employee, 1994	58.57	100.00	125.65
Waterfront (coal)	Tonnes ('000)/employee, 1994	41.14	100.00	155.06
Aviation	Aircraft moves/fire&res employee, 1993	31.79	100.00	208.09
Gas supply	Tj/employee, 1994	7.83	100.00	100.00
Coastal shipping	Manning small dry bulk vessel, 1994	100.00	100.00	116.67

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A4 Capital productivity performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity (capacity)	Capacity factor (%), 1994(d)	69.97	100.00	100.00
Electricity (RPM)	Reserve plant margin, 1994	- 144.67	100.00	150.91
Telecommunications	Partial capital productivity index, 1992	100.00	100.00	176.00
Rail (wagons)	Mill ntk/wagon, 1994	54.91	100.00	249.11
Rail (locomotives)	Mill ntk/loco, 1994	60.10	100.00	220.43
Waterfront (coal)	Throughput/capacity (%), 1994	41.75	100.00	100.00
Waterfront (containers)	Crane rate — moves per hour, 1994	79.46	100.00	162.16
Aviation	Passengers/terminal gate, 1993	89.74	100.00	213.00
Gas supply	Tj/total main (Km), 1994	23.08	100.00	223.08
Road freight	Tonne (000)/km/veh/yr, 1992	100.00	100.00	125.78

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A5 Index of infrastructure performance by state, 1994 or latest data

	Price performance index	*Productivity index*
NSW	0.18	0.26
VIC	0.71	0.63
QLD	0.31	0.64
SA	0.69	0.53
WA	0.18	0.35

Note: BIE indexes derived as described and based on data presented in table 11.1.

Chapter 2 - Australia's infrastructure service industries

Table A6 Infrastructure required to produce $100 of final output, by sector 1993-94

	Agriculture	*Mining*	*Manufacturing*	*Non-infrastructure services*	*Total*
Energy and water	3.04	5.67	6.11	3.81	4.97
Transport	2.99	6.30	7.64	3.29	4.36
Communications	0.93	2.04	2.14	2.64	2.31
Total	6.97	14.02	15.89	9.74	11.63

Source: BIE estimates based on COPS 1995.

Chapter 4 - Electricity

Table A7 Industrial electricity prices, January 1994 (Australian cents per kWh)

Utility	*Average industrial*(a)	*Utility*	*10/80 industrial*
ESKOM, South Africa	5.67	TransAlta, Canada	3.79
BC Hydro, Canada	6.04	ESKOM, South Africa	3.82
South Power, New Zealand	7.10	BC Hydro, Canada	4.03
TransAlta, Canada	7.32	ESV	4.88
Duke Power, USA	7.77	South Power, New Zealand	5.36
SEAS, Denmark	8.15	Duke Power, USA	5.76
Mercury Energy, New Zealand	8.35	Mercury Energy, New Zealand	5.80
ESV	8.35	Ontario Hydro, Canada	6.02
Ontario Hydro, Canada	8.40	ETSA	6.10
ETSA	8.84	SEQEB	6.47
SEQEB	8.94	Comm. Edison, USA	6.80
PPC, Greece	8.99	PPC, Greece	6.91
Israel	9.35	Sydney Electricity	6.95
Comm. Edison, USA	9.75	SECWA	7.22
Carolina South, USA	9.79	Israel	7.26
EdF, France	9.85	Belgium	7.30
Carolina North, USA	10.00	EdF, France	7.39
Sydney Electricity	10.13	SEAS, Denmark	7.41
ESB, Ireland	10.56	CEGEDEL, Luxembourg	7.59
SECWA	11.04	Carolina South, USA	7.63
CEGEDEL, Luxembourg	11.36	ESB, Ireland	7.67
England & Wales South	11.59	ENEL, Italy	8.02
England & Wales North	11.87	Carolina North, USA	8.04
Spain	11.91	Spain	9.26
Belgium	12.03	England & Wales South	9.85
Scotland	12.51	Scotland	9.88
Northern Ireland	13.17	England & Wales North	10.05
ENEL, Italy	13.55	Northern Ireland	10.40
EDP, Portugal	13.58	EVN, Austria	10.70
EVN, Austria	13.73	EDP, Portugal	10.86
Central Germany	16.30	Tokyo Electric	11.01
Tokyo Electric	17.16	Central Germany	12.45
North Germany	18.93	North Germany	13.36
Consol. Edison, USA	19.64	Consol. Edison, USA	14.30

Notes: (a) Averaged across 16 demand/load factor categories. kWh = kilwatt hour. Source: BIE (forthcoming).

Table A8 Service reliability of selected states/utilities, 1993-94

	Outage duration (minutes per customer)	*Outage time (minutes)*
NSW[a]	201	103
VIC	252	69
QLD[a]	230	83
SA	118	94
WA	472	160
TAS	166	70
UK[a]	89	108
JAP[a]	22	62

Note: (a) average of selected utilities
Sources: ESAA 1995, OFFER 1994, and information provided by FEPC, Japan. BIE (forthcoming).

Table A9 Electricity sales per employee for selected international utilities, 1994 (GWh)

Utility/State	*Sales per employee (GWh)*
NT	2.30
WA	2.43
NSW	2.84
ACT	2.90
Australia	2.96
SA	2.99
Queensland	3.13
Victoria	3.37
Southern Electric, UK	3.55
ESKOM, South Africa	3.75
Kyushu, Japan	4.27
Tasmania	4.45
Kansai, Japan	4.71
Chubu, Japan	4.99
Ontario Hydro, Canada	5.24
Tokyo, Japan	5.52
Nuclear Electric, UK	5.70
BC Hydro, Canada	6.43
TransAlta, Canada	13.92

Note: GWh = Gigawatt hour.
Sources: ESAA 1995 and information provided by individual utilities. BIE (forthcoming).

Chapter 5 - Rail freight

Table A10 Labour productivity per freight employee, 1993-94[a]

Utility	Ntk per employee	Percentage change[b]
SATS	1.32	56.77
PTC	1.53	103.71
SRA	1.47	46.00
Wrail	1.91	53.11
QR	2.13	28.78
AN	3.19	84.70
CR	5.13	5.70
CP	5.52	10.48
NS	6.38	14.98
CSX	7.25	12.3
CNW	7.77	31.25
SP	8.13	31.44
ATSF	9.45	18.94
UP	10.87	16.07
BN	11.36	6.32

Notes: (a) financial year 1993-84 for Australia and South Africa (end March), calender year 1993 for North America. (b) percentage change measured from 1991-92 to 1993-94. Ntk = net tonne kilotemeters.

Source: BIE (forthcoming).

Chapter 6 - Telecommunications

Table A11 Telstra output, input and total factor productivity (TFP) indexes, 1980-94

Year ending 30 June	Output	Input	TFP
1980	1.0	1.0	1.0
1981	1.1	1.0	1.1
1982	1.2	1.0	1.2
1983	1.2	1.0	1.2
1984	1.4	1.1	1.2
1985	1.5	1.2	1.3
1986	1.6	1.2	1.4
1987	1.8	1.2	1.5
1988	2.1	1.3	1.6
1989	2.2	1.3	1.7
1990	2.5	1.4	1.8
1991	2.7	1.4	1.9
1992	3.0	1.5	2.0
1993	3.3	1.4	2.4
1994	3.6	1.4	2.6

Source: BIE 1995a.

Chapter 7 - Waterfront

Table A12 Waterfront charges[a] by container port, 1995

Port	*$A per teu*
Oakland (USA)	385
Baltimore (USA)	345
Charleston (USA)	326
Wellington (NZ)	294
Melbourne (Aus)	292
Hong Kong	292
Sydney (Aus)	288
Brisbane (Aus)	284
Fremantle (Aus)	282
Adelaide (Aus)	278
Auckland (NZ)	211
Singapore	183
Tilbury (UK)	181
Zeebrugge (Bel)	150
Laem Chabang (Tha)	144
Tauranga (NZ)	134
Port Klang (Mal)	106
Johor (Mal)	98

Notes: (a) Includes pilotage, towage, mooring, navigation, berthage, wharfage and stevedoring charges for a 17 000 grt vessel with a container exchange averaged over 200, 400, 600, 800 and 1000 teus.
Source: BIE 1995d.

Table A13 Terminal productivity[a], five port average[b], June 1990 to March 1995

	Crane rate	*Net rate*
Jun-90	14.0	17.7
Sep-90	13.9	17.3
Dec-90	14.5	18.0
Mar-91	14.6	18.2
Jun-91	14.3	17.7
Sep-91	15.4	18.9
Dec-91	15.9	20.6
Mar-92	18.0	23.3
Jun-92	18.7	24.7
Sep-92	20.1	26.5
Dec-92	na	na
Mar-93	na	na
Jun-93	na	na
Sep-93	20.9	28.2
Dec-93	19.9	25.4
Mar-94	18.8	25.0
Jun-94	19.2	25.0
Sep-94	18.5	23.4
Dec-94	18.9	25.4
Mar-95	19.9	26.1

Notes: (a) Net rates measure the number of teus moved per net hour (the time that the ship is at berth less time due to shift breaks or unforseen circumstances - eg bad weather or industrial disputes. Crane rate is the number of teus moved per crane per net hour. Neither the WIRA nor the BTCE monitored terminal performance between December 1992 and June 1993, hence the break in the series. (b) Average of Melbourne, Sydney, Brisbane, Fremantle and Adelaide.
Source: BIE 1995d.

Table A14 Crane rates[a] for comparable size container ports, 1994

Port	*Moves per hour*
Oakland (19)	29.0
Klang (34)	20.5
Melbourne (36)	17.0
Zeebrugge (47)	27.0
Sydney (51)	14.7
Baltimore (52)	25.0
Brisbane (94)	18.0
Laem Chabang-TIPS (95)	30.0
Laem Chabang-ESCO (95)	30.0
Fremantle (115)	18.5
Trieste (126)	17.0
Adelaide (197)	17.8
Wellington (198)	16.3

Notes: (a) The average number of container moves achieved by a single crane in the time that vessels were actually being worked. The number in brackets represents the port's international ranking in terms of annual teus.

Source: BIE 1995d.

Table A15 Break bulk non-terminal charges[a], 1994

Port	*$A per visit*
Melbourne (Aus)	37640
Fremantle (Aus)	30773
New Westminster (Can)	28893
Sydney (Aus)	28747
Long Beach (USA)	27926
Brisbane (Aus)	27502
Tacoma (USA)	26405
Richmond (USA)	22478
Tauranga (NZ)	14667

Notes: (a) The estimates are based on a 17 000 dwt vessel with a cargo exchange of 700 tonnes of steel, 25 teus, 400 tones of newsprint and 250 tonnes of timber. They do not include terminal and cargo handling charges which represent around 60 per cent of waterfront charges for containers.

Source: BIE 1995d.

Table A16 Waterfront charges by coal port[a], 1995

Port	*$A per tonne*
Hay Point - CQCA (Aus)	3.09
Gladstone (Aus)	3.52
Newcastle (Aus)	3.67
Richards Bay (SA)	4.51
Hay Point - DBCT (Aus)	4.57
Hampton Roads (USA)	4.67
Port Kembla (Aus)	5.23
Abbot Point (Aus)	5.80
Roberts Bank (Can)	6.11

Notes: (a) Includes all waterfront based charges such as pilotage, towage, mooring, navigation, port authority and terminal charges calculated for a 120 000 dwt vessel with a load of 95 per cent of its capacity.

Source: BIE 1995d.

Chapter 8 - Aviation

Table A17 Index of airport landing charges[a], 1993

Airport	Airport charges index
Hong Kong	16
Sydney	23
London - Gatwick	28
Cairns	29
San Francisco	30
Singapore	32
Auckland	39
Copenhagen	45
New York - JFK	59
Tokyo	82
Berlin	100

Note: (a) Berlin = 100
Source: BIE 1994d.

Table A18 Index of en-route charges[a], 1993

Country	En-route charges index
Indonesia	17.6
Australia	28.9
Sweden	50.5
Japan	68.8
New Zealand	75.0
France	76.1
Germany	89.6
United Kingdom	99.9
Switzerland	100.0

Note: (a) Switzerland = 100
Source: BIE 1994d.

Table A19 Domestic air fare comparisons, March 1994

Route	Economy	Business	First
Milan-Naples	21	0	29
Hamburg-Zurich	63	6	5
Melbourne-Sydney	24	5	7
Minneapolis-St Louis	64	2	30
Ottowa-Washington	35	0	12
Brisbane-Sydney	24	5	7
Hong Kong-Taipei	25	4	4
Osaka-Seoul	37	3	14
Seoul-Osaka	22	4	5

Source: BIE 1994d.

Chapter 9 - Gas supply

Table A20 Natural gas prices to industry, 1992

Country	*A$ per GJ*
Japan	14.17
Germany	6.51
New Zealand	6.01
Italy	5.75
United Kingdom	5.12
France	4.96
Australia	4.12
United States	3.45
Canada	2.72

Note: GJ = gigajoules.
Source: BIE 1994e.

Table A21 European border and Australian city-gate prices, 1991

Country	*A$ per GJ*
Australia	3.06
Dutch Gas	3.94
LNG CIF	4.16
Norwegian Gas	3.81
NSW	2.85
Pipeline Rome	4.42
Queensland	3.70
SA	2.40
Soviet Gas	3.89
Victoria	2.40
WA	4.27

Note: GJ = gigajoules.
Source: BIE 1994e.

Table A22 Australian natural gas prices, by State and market segment, 1992 (A$ per GJ)

State	*City-gate*	*Residential*	*Commercial*	*Industrial*
Vic.	2.40	7.40	5.95	3.39
SA	2.40	11.15	6.17	3.25
NSW	2.85	12.13	9.36	4.99
WA	4.27	14.51	14.00	4.27
Qld	3.70	16.57	12.36	6.37

Note: GJ = gigajoules.
Source: BIE 1994e.

Table A23 Labour productivity of selected natural gas utilities[a]

Utility	*TJ per employee*
Toho Gas	16
Allgas/GCQ	18
Tokyo Gas	20
Osaka Gas	25
British Gas	28
Brooklyn Union Gas	34
Atlanta Gas & Light	48
SAGASCO	52
AGL	55
Peoples Energy (IL)	55
GFCV	68
Oneok (OK)	80
The Consumers Gas Company	97
Union Gas	107
SaskEnergy	119
NICOR (IL)	126
Centra Gas Ontario	127
Gaz Metropolitan	131
SECWA	230

Notes: (a) Australian utility data based on 1994 data, OFGAS, American, Canadian and Japanese Gas Association data for various years. TJ = terrajoules.
Source: BIE 1994e.

Table A24 Natural gas capital productivity, by country[a]

Country	*Throughput per km of main*	*Customers per km of distribution main*
Canada	14.56	32.07
Australia	6.83	42.19
United States	7.49	45.68
United Kingdom	8.22	72.39
Japan	4.89	120.89

Notes: (a) Australian utility data based on 1994 data, OFGAS, American, Canadian and Japanese Gas Association data for various years. TJ = terrajoules.
Source: BIE 1994e.

Chapter 10 - Coastal shipping

Table A25 Dry bulk vessel costs for selected countries, June 1994

	Index of costs[a]	*Percentage change*[b]
USA	244.0	-3.5
Japan	123.1	-5.3
Australia	107.1	-0.1
NZ	103.6	-4.9
Germany	95.8	-3.6
Norway	93.9	-0.1
UK	87.8	-3.4
Korea	87.4	na

Notes: (a) Australia 1992 = 100. Size = 35 000 dwt. Vessel costs in Australian dollars and relate to the sailing segments of sea voyages and comprise capital, operating and voyage costs.
(b) Percentage change from June 1992 to June 1994. Not calculated for South Korea as it was not included in the set of selected countries in 1992.

Source: BIE 1995b.

Table A26 Dry bulk vessel manning costs[a] for selected countries, June 1994

	Direct wage	*Leave*	*Total*	*Percentage change*[b]
USA	91.0	84.1	175.1	2.7
Japan	46.6	106.2	152.8	15.4
Australia	38.4	65.0	103.4	1.5
NZ	38.2	54.8	93.1	5.7
Norway	35.4	51.1	86.2	15.8
UK	23.3	25.9	49.2	-12.6
Germany	22.7	12.6	35.4	-4.0
Korea	24.6	10.4	35.0	na

Notes: (a) Australia 1992 = 100. Size = 35 000 dwt. Manning costs in Australian dollars.
(b) Percentage change from June 1992 to June 1994. Not calculated for South Korea as it was not included in the set of selected countries in 1992.

Source: BIE 1995b.

Table A27 Taxes, charges and other fiscal measures and regulations as a proportion of vessel costs[a], 1994

	Percentage	*Percentage change*[b]
USA	45.9	1.0
Germany	16.6	-0.4
Japan	11.4	-1.9
NZ	7.7	-0.4
Korea	6.8	na
Norway	5.8	-2.0
Australia	3.4	0.0
UK	1.5	na

Notes: (a) Size = 35 000 dwt. (b) Percentage change from June 1992 to June 1994. Not calculated for South Korea and the UK as they were not included in the set of selected countries in 1992.

Source: BIE 1995b.

Chapter 11 - State performance

Table A28 Index of infrastructure performance by state

	Price Performance	1994 Productivity	Price Performance	1992 Productivity
NSW	0.18	0.26	0.15	0.50
VIC	0.71	0.63	0.74	0.34
QLD	0.31	0.64	0.50	0.77
SA	0.69	0.53	0.56	0.38
WA	0.18	0.35	0.22	0.41

Notes: BIE indexes based on data presented in table 11.1 for 1994 and derived from previous benchmarking overview report (BIE 1994a) for 1992 and earlier.

Chapter 12 - Infrastructure performance gaps

Table A29 Price performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Practice*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity	C/kWh ((kW)=10000 load 80%) 1994	147.44	147.44	100.00	77.66
Telecomms	Composite business basket 1994	100.00	100.00	100.00	56.28
Rail freight	Ave revenue cents/ntkm 1994	159.42	159.42	100.00	64.94
Waterfront (conts)	Waterfront charges ($A/TEU) 1995	105.04	105.04	100.00	35.25
Waterfront (coal)	Waterfront charges ($A/ tonne) 1995	188.31	188.31	100.00	100.00
Aviation	Airport landing charges (index) 1993	126.09	126.09	100.00	65.22
Gas supply	Industrial price($A per Gj) 1991	196.00	196.00	100.00	61.23
Coastal shipping	Standard dry bulk vsl op costs 1994	100.00	100.00	100.00	81.61
Road freight	Long haul c/tkm (incl tax) 1992	100.00	100.00	100.00	90.63

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A30 Service quality performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Practice*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity	Ave outage (min/cust) 1994	- 758.18	- 758.18	100.00	194.55
Telecomms	Faults cleared within 24 hrs 1992	100.00	100.00	100.00	120.53
Rail Freight	Claims (c/$100 revenue) 1994	-1 250.00	-1 250.00	100.00	100.00
Waterfront (containers)	Time to move 600 boxes (hrs) 1995	- 67.17	- 67.17	100.00	153.96
Aviation	On-time departures (%) 1993	91.76	91.76	100.00	111.76
Road (Delivery)	Late delivery (%) 1992	100.00	100.00	100.00	125.00
Road (L & D)	Loss & damage (%) 1992	100.00	100.00	100.00	100.00

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A31 Labour productivity performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Practice*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity	Gwh/employee(c) 1994	53.50	53.50	100.00	292.33
Telecomms	Partial labour productivity index 1992	100.00	100.00	100.00	238.00
Rail	Ntk/employee (mill) 1994	47.96	47.96	100.00	356.11
Waterfront (conts)	TEU per employee 1994	59.57	58.57	100.00	125.65
Waterfront (coal)	Tonnes ('000)/employee 1994	41.14	41.14	100.00	155.06
Aviation	Craft moves/fire&res employee 1993	31.79	31.79	100.00	208.09
Gas supply	Tj/employee 1994	7.83	7.83	100.00	100.00
Coastal shipping	Manning small dry bulk vessel 1994	100.00	100.00	100.00	116.67

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

Table A32 Capital productivity performance gaps (Index relative to Australian best=100)

Industry	*Indicator*	*Worst Practice*	*Worst Australian*	*Best Australian*	*Best Practice*
Electricity (capacity)	Capacity factor (%) 1994(d)	69.97	69.97	100.00	100.00
Electricity (RPM)	Reserve plant margin 1994	- 144.67	- 144.67	100.00	150.91
Telecomms	Partial capital prod index 1992	100.00	100.00	100.00	176.00
Rail (wagons)	Mill ntk/wagon 1994	54.91	54.91	100.00	249.11
Rail (locomotives)	Mill ntk/loco 1994	60.10	60.10	100.00	220.43
Waterfront (coal)	Throughput/capacity (%) 1994	41.75	41.75	100.00	100.00
Waterfront (conts)	Crane rate — moves per hour 1994	79.46	79.46	100.00	162.16
Aviation	Passengers/terminal gate 1993	89.74	89.74	100.00	213.00
Gas supply	Tj/total main (Km) 1994	23.08	23.08	100.00	223.08
Road freight	Tonne (000)/km/veh/yr 1992	100.00	100.00	100.00	125.78

Note: BIE indexes based on data presented in table 12.1.
Sources: BIE Benchmarking studies.

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