

2001

Australian Infrastructure Report Card

Alliance Partners:

Association of Australian Ports and Marine Authorities
Australasian Railway Association
Australian Automobile Association
Australian Business Foundation
Australian Business Limited
Australian Council for Infrastructure Development
Australian Council of Social Service
Australian Electrical and Electronic Manufacturers' Association
Australian Gas Association
Australian Local Government Association
Australian Pipeline Industry Association
Australian Telecommunications Users Group
Australian Trucking Association
Australian Water Association
Business Council of Australia
Electricity Supply Association of Australia
Institute of Public Works Engineering Australia
The Institution of Engineers Australia
National Infrastructure & Engineering Forum
Tourism Task Force

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Communiqué

from the Members of the Australian Infrastructure Report Card Alliance

The Australian Infrastructure *Report Card* Alliance comprises the major infrastructure users, owners, operators, investors, industry groups and other stakeholders within Australia. The Alliance formed to oversee an independent review of the state of Australia's infrastructure from economic, social and environmental perspectives.

Infrastructure is vital to the Australian economy. It underpins the delivery of essential services and drives economic growth. Given that Australia's infrastructure affects every Australian every day, it is of paramount importance that it meets today's needs and through careful planning, maintenance and construction, tomorrow's needs as well.

The *Report Card* analysis of Australia's infrastructure based on fitness for purpose gave the following ratings:

Electricity	B-	Airports	B
Gas	C	Roads (National)	C
Telecommunications	B	Roads (State)	C-
Rail	D-	Roads (Local)	D
Ports	B	Potable Water	C
Irrigation	D-	Stormwater	D
Wastewater	C-		

For those sectors that have scored low ratings (D, D-), the infrastructure is in a disturbing state. While some sectors improved on their ratings from 2000 IEAust Infrastructure *Report Card*, all show there is significant room for improvement in Australia's infrastructure. Our infrastructure needs significant enhancement before it can be said to meet Australia's current and future needs.

The only way that this will occur is if infrastructure planning, maintenance and development become a priority for Federal, State, Territory and Local Government. The major impediments to this are a lack of co-ordination between levels of Government, a failure to plan for infrastructure which has a life of up to 100 years or more, and the low priority given to infrastructure provision, except when failures occur. All levels of government should also work co-operatively and closely with the private sector, to encourage and facilitate private sector investment and development of infrastructure.

After assessing the outcomes of the 2001 *Report Card*, the Alliance members recommend the following to ensure that Australia's infrastructure meets the requirements of the community and business.

- The establishment of a National Infrastructure Advisory Council to advise COAG. The Council should facilitate efficient and equitable provision of nationally significant infrastructure by both public and private sector stakeholders, and encourage longer-term planning for its sustainable development and operation.
- The creation of an integrated National Transport Strategy. This strategy must plan for Australia's transport infrastructure needs in the near future, taking into account the needs of both urban and rural areas as well as considering equally the needs of road, rail, ports, shipping and air transport.
- Noting COAG's endorsement of a National Energy Strategy, ensure that the Strategy deals effectively with issues faced by the gas, electricity, and renewable energy sectors. The Strategy should aim to complete national gas and electricity networks as well as provide genuine facilitation of new investment and reinvestment in the energy sector.
- Substantial improvement of the significant regulatory and taxation barriers to additional investment in infrastructure. It is essential that regulators not only consider any short-term consumer benefits accruing from infrastructure regulation but also fully reflect in regulatory decisions the long-term consumer benefits that accrue from the enhancement and development of national infrastructure.

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1. Overview

1.1 Background

In 2000, the Institution of Engineers, Australia (IE Aust) published the *2000 Report Card* on the nation's infrastructure, examining roads, bridges, railways, water and sewerage.

It was well received and its success confirmed IE Aust's commitment to undertake a second review. This *2001 Report Card* has been expanded and:

- Includes ten infrastructure sectors – roads, railways, airports, ports, wastewater, potable water, stormwater, irrigation, electricity and gas; and
- Has been supported by the formation of the Australian Infrastructure *Report Card* Alliance.

Members of the Alliance are major infrastructure users, owners, operators, investors and industry groups. They are listed in the Communiqué.

Following the formation of the Alliance, Gutteridge Haskins & Davey Pty Ltd was commissioned to undertake the research and to produce the report.

The *Report Card* seeks to:

- Be a point of reference;
- Be seen as a credible, independent assessment;
- Raise awareness and generate debate on the level of infrastructure provision; and
- Recommend actions to be implemented which lead to best practice.

1.2 The Process

The general objective of the *Report Card* is to rate the quality of energy, transport, water and telecommunications infrastructure at a national level.

Ratings have been based on the consideration of asset condition, asset availability and reliability, asset management and sustainability (including economic, environmental, and social issues).

Ratings used are:

A	Very Good	Infrastructure is fit for its current and anticipated purpose in terms of infrastructure condition, committed investment, regulatory appropriateness and compliance, and planning processes.
B	Good	Minor changes required in one or more of the above areas to enable infrastructure to be fit for its current and anticipated purpose.
C	Adequate	Major changes required in one or more of the above areas to enable infrastructure to be fit for its current and anticipated purpose.
D	Poor	Critical changes required in one or more of the above areas to be fit for its current and anticipated purpose.
F	Inadequate	Inadequate for current and future needs.

The assessment was carried out through research and consultation. Generally, interviews were held with relevant stakeholders, various documents were researched and analysed,

and a summary report was written. Each section was then assessed using the methodology contained in the Appendices.

The written report is one part of an overall publication which includes a website (www.infrastructurereportcard.org.au). The website provides electronic copies of the 2000 and 2001 *Report Cards*, all references, as well as links to the Alliance Partners, relevant agencies and related sites. It will be regularly updated to include current information, data and relevant publications.

1.3 The Major Issues

A number of significant issues have emerged which are common across all infrastructure sectors.

1.3.1 Regulation

During the research undertaken for this *Report Card* a number of significant regulatory impediments were identified that retard the management, maintenance and development of Australia's infrastructure. Major concerns are inconsistencies between States in the application of their regulatory frameworks, and difficulties with competition reform.

Where infrastructure regulation is under State legislation, each State has a slightly different view and approach, which increases compliance costs, reduces interconnectability, and results in differing objectives and legal frameworks.

The Victorian Premier has also recently highlighted the lack of coordination between levels of Government. He has appealed to the States to move away from competing for investment and to create a single regulatory climate for business in the rail, gas and transport industries (Australian Financial Review 21 June 2001).

An example of the lack of a consistent approach by States can be seen with train radio systems. Even with a national standard gauge network, there are incompatibilities. For example, a train crossing the country from Brisbane to Perth, via Sydney, Melbourne and Adelaide, would require eleven different radio systems.

Similarly, all three tiers of Government are currently defining environmental requirements for infrastructure. This involves infrastructure developers in excessive, overlapping and sometimes-contradictory approvals processes. Various mechanisms have been introduced to overcome these hurdles, including Federal Government intervention through COAG, and National Competition Policy.

Regulations and processes should support infrastructure investment, whilst protecting consumers and others from anti-competitive behaviour. Unfortunately, overall, there are numerous examples of problems with national reforms hindering investment and competition.

At the Federal level, problems have arisen through application of the *Prices Surveillance Act (PS Act)*, and the *Trade Practices Act, (TP Act)*, notably *Section IIIA*, covering access to services, difficulties with privatisation models adopted, delays and uncertainty over pricing decisions, and differing views as to what can be considered "Declared Services", and so fall under the control of both *Acts*.

For example, in the telecommunications sector, disputes about access prices are reported to have carried on for years. With airports, there has been considerable dispute and uncertainty as to which services provided by the airport are regulated, and which are not, which in turn has affected airport owner's capacity to set prices.

Another example of a regulation adversely affecting infrastructure investment is the recent Australian Taxation Office's considerations to extend effective life regimes. This would increase the depreciation period for some new infrastructure, particularly gas pipelines, from 15-20 years to 50 years. (Australian Financial Review 8 June 2001).

The next major issue is the potential for conflicting planning constraints due to an inconsistency between Government authorities when dealing with transport issues, particularly relating to road and rail, and access to and around major industrial centres.

Also, inappropriate or lack of planning control in many places has allowed residential development close to seaports and airports, which results in local pressure to restrict operations and access, to the detriment of the wider community.

National Competition Policy has had profound impacts on the infrastructure sector. It has increased efficiency, contributed to national growth, reduced waste, improved resource allocation, and improved Australia's competitiveness.

There is significant disquiet however, in many camps. Operators, owners and investors complain of regulation stifling investment and creating uncertainty, whilst regulators argue the need for more power. All sides agree that procedures for determination under the *PS Act* and *TP Act* need to be streamlined. Regional and rural Australia has been vocal about reductions in cross-subsidised services, and on the focus on achieving commercial rates of return. In the process, the costs of meeting community service obligations (CSOs) have become more transparent, as well as the political processes used to determine their level and application. This again is a step forward.

The Productivity Commission review of the National Access Regime (*Trade Practices Act Part IIIA*) is also expected to have an impact. In its *Position Paper*, the Commission noted the "chilling effect" that poor regulation can have on investment, and recommended that the regulators err on the higher side in access pricing decisions, to protect investment and, therefore, the long term interests of consumers.

If the Commission's final recommendations follow those in the *Position Paper*, implementation of these recommendations would be a step forward as well.

In the weeks leading up to the completion of this *Report Card* we have seen press releases on new initiatives to streamline access arrangements in the telecommunications sector, and State Governments agree on ways to speed up interstate connections in the electricity industry. Similar challenges await other utility and infrastructure markets and these should be addressed as soon as possible.

1.3.2 Sustainability

Development has been defined as sustainable '*if it meets the needs of the present without compromising the ability of future generations to meet their own needs*' (Brundtland Report, 1987).

Infrastructure assets are characterised by their longevity and by the major effect they have on quality of life in economic, environmental and social terms.

Australians enjoy the benefits of previous generations' vision and commitment to providing these infrastructure assets. In many sectors, though, the current generation has not demonstrated the same vision and commitment, and there is a risk that future generations will be left with a degraded legacy.

Equally, there are examples of over investment in infrastructure, such as in the irrigation sector, which is now recognised as not sustainable, as it requires excessive subsidisation, and brings with it substantial environmental costs.

The majority of infrastructure assets in Australia have been rated as no higher than adequate. The low rating reflects maintenance deficiencies, environmental concerns and problems with future replacement.

The most significant of these are discussed below.

Greenhouse gas emissions and non-renewable energy consumption are serious issues, largely caused by deficiencies in transport and energy infrastructure. Whilst the lack of real commitment by Government to reducing greenhouse gas emissions, developing alternative energy sources, encouraging demand reduction, and encouraging public transport use are unacceptable, the NSW Premier's recent call for a compulsory national scheme for meeting greenhouse targets is at least a step in the right direction (SMH, 8 June 2001).

The continuing increase in car use in urban areas is unsustainable, giving rise to congestion and pollution. To curb the increase, major investment in public transport is urgently needed. To further reduce congestion, current road capacity and efficiency could be increased through better maintenance, traffic management, and the removal of bottlenecks.

Our waterway systems continue to degrade, with salinity at the forefront of concerns. In addition, water pollution due to inadequate stormwater and sewerage systems is at unacceptable levels. *"Australia's catchment systems are facing enormous and ongoing threats from human activities. Unless we, as a national community, begin to address these problems, the quality of our life will be substantially eroded over the coming decades. It is not overstating the matter to say that the ecologically sustainable use of Australia's catchment systems is the most pressing contemporary public policy issue facing the community."* (Catchment Management, Dec 2000).

Whilst recent Federal Government initiatives are a positive first step, much more needs to be done, and urgently.

There is continuing conflict between the needs of the local and wider community for better quality services that require major investment in infrastructure. A balanced approach is necessary, and changing community expectations and choices have to be acknowledged, and taken into account by infrastructure planners.

It is not, however, the sole responsibility of Government to fix these problems. Each person's individual commitment is also needed. As Ross Gittins commented on a review of recent environmental surveys, *"it's clear that environmental concerns don't loom large in our day to day behaviour"* and further *"Australians are less and less concerned about the environment, especially if they think it will cost them money"* (SMH, 20 June 2001).

A fundamental principle of sustainability is that a project's social costs should be included in determining its total cost. For example, the adoption of the polluter-pays principle ensures the full cost of all outputs from a project or enterprise are captured, including those that were once given little consideration.

Consider salinity for example. Various estimates, which run into billions of dollars, exist on the likely cost to fund the repair of damage done by salinity in Australia. Charging ongoing users of irrigation water for the social costs of repair, should in theory, redress

the damage done from irrigation. Clearly, this would make irrigation cost prohibitive, and would lead to major social dislocation. What it highlights though is that current practices are unsustainable, and policy initiatives are required.

1.3.3 Information and Data

We cannot manage what we cannot measure.

Good quality data is essential to ensure that resources are applied to the most pressing needs. This is a basic element of any asset management system. Good quality data also enables the development of benchmarks and key performance indicators that in turn underpin continuous improvement. It is only within such a framework that the needs and resources can be equitably matched.

One of the difficulties encountered though, was the lack of timely, consistent and complete data. Overall this is an area that requires significant improvement.

For example, the recent audit of the national highway system identified problems with accuracy, correlation and utilisation of road condition and performance data and concluded, *“the absence of such data may inhibit the (Federal Transport) Department’s capacity to monitor future services levels and investment needs”* (ANAO 2001).

A similar problem was identified in the *Victorian Local Government Infrastructure Study* which noted that *“Councils were unable to distinguish between capital spending that was designed to renew existing services, upgrade or improve existing services, or extend services to a greater volume of rate payers”* (Vic 1998).

On the other hand, there are some good examples of quality information and statistics, such as that produced by the Water Services Association of Australia, Austroads and some Government agencies. However, even with these organisations it has generally not been possible to obtain data that would enable detailed analysis of asset valuation, replacement values and asset management systems. Within some sectors eg Stormwater and Irrigation, little data of quality was available.

One positive move that became clear in compiling this *Report Card* however, is that agencies, advocates, regulators and other stakeholders have significantly increased public access to reports, legislation, opinion and debate on issues related to infrastructure. Many of the references in this *Report Card* have been captured electronically and have informed and guided the debate. This widespread use of the internet, along with a policy of free access to information is to be applauded.

1.3.4 Planning and Integration

A century after Federation, the development and maintenance of our infrastructure assets still suffer from a lack of integration and coordination. This is obviously related to our form of Government, with the three tiers each having separate and sometimes overlapping roles and responsibility.

This issue is magnified by the general lack of long term (20 years) planning across all tiers and are glaringly apparent in the transport sector. Consider for example, the recent history of reports on road and rail transport. Over four years, five major reports were produced, examining the needs of road and rail, and calling for a national integrated transport strategy. The strategy was supported by the majority of owners and operators, but has not been supported by the Federal Government. In May 2001 in a report on implementation of the Government’s Response, the House Transport Committee again called for *“the establishment of a single land transport commission (involving all States*

and Territories and incorporating the National Road Transport Commission and the rail transport commission proposed above) to ensure that national transport planning is conducted in a coordinated fashion across all transport modes” (Back on Track 2001).

The need and urgency of such a strategy is self-evident. The recent CSIRO report on e-commerce, however, adds a further dimension with its predictions for major increases in freight movements. It clearly identifies the need for State and Federal Governments to develop an integrated national response (CSIRO June 2001).

In other sectors however there has been some progress, such as with the recent COAG endorsement of a National Energy Strategy.

At the Local Government level the need for improved planning and an integrated approach is demonstrated by the trend to establish Regional Infrastructure Groups (RIGs). Moree (2001) recommended that RIGs be established to facilitate resource sharing and to rationalise funding and priorities for roads and intermodal facilities. In addition a regional approach to asset management was recommended that *“would identify the local roads of regional significance, future funding liabilities, appropriate road standards, project priorities and all potential funding sources”*.

Regional approaches to water and sewerage facilities have also been established in some States.

1.4 Future Directions

The *2001 Report Card* identifies significant needs and deficiencies in planning, investment, intra-Government co-ordination and regulation.

A major objective of the *Report Card* is to provide a baseline for future analysis and benchmarking so that progress can be assessed. The assessment process is also expected to raise awareness and enhance the level of debate. In this way, it is hoped that the Report Card can contribute to achieving a national focus, overcoming sectoral interests, leading to improvements.

The provision of adequate infrastructure underpins the Australian economy and the standard of living of all. The current generation greatly benefits from the vision and commitment of those from the past; it is incumbent on them now to provide at least an equal legacy for future generations.

In particular the following broad areas require attention:

- There needs to be a coordinated approach to the provision of infrastructure which overcomes the problems identified with inconsistency of regulation and priorities between levels of Government. Government planning and approvals processes need streamlining; and Government strategies in key sectors are required, to enable greater certainty for investment and to improve efficiencies. The establishment of a National Infrastructure Advisory Council and an integrated National Transport Strategy are two areas where initiatives that should be implemented immediately.
- The collection, allocation, and analysis of data need improvement. This requires the establishment of appropriate standards or templates and the commitment by all infrastructure owners to providing quality data.
- Future works, their maintenance and management, require long term planning. This should be part of an every enterprise' and agencies asset management strategy which considers overall needs, funding, level of service and priority.

- Sustainability principles need to be incorporated which focus on conservation, demand reduction, innovation and efficiency. As well, the requirements of the local and broader community need to be balanced within an overall planning framework.

infrastructure asset management principles. It is only within an appropriate framework that additional road funding can address the underlying issues of sustainable levels of service.

The continuing increase in car usage is clearly unsustainable in the major capital cities as significant environmental impacts, particularly with congestion and vehicle emissions, are now being felt. Improved public transport is only part of the solution. Other initiatives, including demand management, supply efficiencies, traffic management, vehicle performance improvements and land use policies, need to be urgently implemented.

Road safety has improved greatly over the past 20 years. However, the achievements have plateaued, and there is still much to be done to further reduce road crashes and fatalities. The National Road Safety Strategy has a target of a 40% reduction in fatalities by 2010.

The variable quality and inadequacy of the road system is reflected in the gradings achieved with National Roads at C, State Roads at C -, and Local Roads at D.

2.2 Key Statistics

Australia maintains one of the most extensive road networks, per capita, in the world. Australia's road system comprised 810,000km in 1998, of which 319,000km (approximately 40%) were of bitumen or concrete construction. This represents a slight increase in both total length and sealed length since 1995.

Of the 178 billion kms driven by Australians in 1998, cars accounted for more than three quarters of this distance, travelling 360 million kms each day.

Of the total domestic freight tonnage carried in Australia, 65% is transported by road. Of this, some 80% is transported over short distances of less than 100 kilometres, however interstate haulage is a significant part of road freight.

Motor vehicle taxes and charges throughout Australia in 1997/98 totalled \$13.75 billion, of which fuel excise from road users accounted for \$8.53 billion. Total expenditure on roads in the same year was \$7.01 billion. (Austroads 2000)

2.3 Issues

2.3.1 Regulation

The ownership, funding, construction and maintenance of roads is the responsibility of Federal, State, Territory and Local Government authorities, and to a much lesser extent, the private sector. However, each level of government is responsible for its own road network and there is little co-ordination between them. Key road user groups such as the Australian Trucking Association (ATA) and the Australian Automobile Association (AAA) consider that the three tiers of government in Australia complicate the issue of responsibility and accountability for the provision and maintenance of road networks. (ATA May 2001, AAA May 2001)

The issue of national co-ordination is significant and has figured prominently in many recent forums. The Australian Transport Council (ATC) established the National Transport Secretariat (NTS) in May 2000. It comprises all State, Territory and Federal Government Transport Ministers to, amongst other tasks, establish a National Transport Planning Process. This has now been completed but will achieve little without a national approach to its implementation.

Freight operators perceive an increase in restrictions on truck operations because of limitations imposed to protect residential amenity, often at the expense of transport efficiency. They believe the balance between perceived and actual environmental effects needs to be redressed. There has, however, been an increase in the designation of routes available to combination vehicles such as road trains and B-doubles, which has contributed significantly to transport efficiency in rural and urban areas.

2.3.2 Funding

In 1997-98 the Federal government collected over \$8.5 billion in fuel excise from road users. In the same period, \$1.64 billion for road funding was provided.

State and Territory governments collected \$5.2 billion in motor vehicle related taxes and charges, equalling the amount disbursed on roads by State, Territory and Local governments.

Private sector funding has been used to construct some major high volume roads in some capital cities, including the CityLink in Melbourne, and the Eastern Distributor and Sydney Harbour Tunnel in Sydney. The Australian Council for Infrastructure Development, (AusCID) in 2000, estimated the total value of such investment to be \$5.2 billion.

Otherwise, the three levels of government share responsibility for the funding and management of the 810,000 km of public highways and roads in Australia. Essentially the Commonwealth funds the national highways and roads of national importance (2.5% by length) while the States fund the major arterial road system (13.5%). Local Government is responsible for the balance of the road system (84%).(Moree 2001)

There is continuing debate concerning both the amount and allocation of road funding. Motorist groups such as AAA and ATA have recommended a complete reform of fuel tax and road funding arrangements and have commented on the overall shortfall of funds, the ad hoc nature of allocations and lack of long term (5 and 10 year plans) planning (AAA 2001) and the need to establish a Federal Roads Corporation (AAA 1997).

Groups representing Local Government voice similar concerns (ALGA 2001, IPWEA 2001)

The November 2000 "Roads to Recovery" programme increased Federal Government allocations by \$1.6 billion over four years. However, at the same time the Financial Assistance Grants (FAG) to the States have been abolished and replaced by GST revenue. Whereas FAGs originally identified road funding (they were subsumed into the general purpose FAGs several years ago) there is no requirement that GST funds be applied to roads (AAA February 2001). There is therefore the potential for a reduction in the level of funding for roads from Commonwealth sources unless the States maintain road funding as a high priority.

The funding issue is complicated and funds are required for both new and improved roads and for maintenance of existing roads.

In its Roads 2020 paper the former Bureau of Transport and Communications Economics (BTCE) estimated the total forecast expenditure needs for the national highway system as \$16.8 billion over 22 years (BTCE 1997). Estimates by ALGA show a shortfall of \$1 billion annually for local roads, (ALGA 1997) although the "Roads to Recovery" programme has in part addressed this issue.

This funding shortfall has been commented on by many organisations. A general view expressed is the need for more direct linkage of road funding and usage (eg a road

usage charge rather than a fuel excise tax) and more co-ordinated planning and investment to ensure more efficient use of funds. This is often better done at the regional level and should involve other modes of transport as well.

More effective road funding is only part of the solution. In urban areas, particularly, there is a need to reduce road usage and introduce policies that reduce demand and maximise capacity of current assets. There is also a changing community view that supports increased investment in public transport in urban areas as an alternative to increased road provision.(UTIP 2001, Warren 2001))

Currently this is a State issue; it is not addressed at the national level, nor does the Commonwealth provide funding. This lack of commitment by the Commonwealth to public transport is seen by many as a failing. In its Sustainable Transport report, the Institution of Engineers recommended that *“Greater Commonwealth investment in urban transport is necessary because of the central role it plays in the national economy. Investment is specifically required to improve intermodal connections, to help build circumferential road networks linking the national highway system, and to provide seed investment funding for infrastructure that will enable greater public transport provision”* (IEAust 1999)

2.3.3 Asset Management

In recent years there have been increased efforts to implement strategic asset management systems for roads. The results are variable. Generally, the State authorities have good data and are well advanced in implementing systems. For example, the NSW RTA annually publishes data on quality of roads and bridges (RTA 2000). Austroads (which represents all of Australia and New Zealand’s major road authorities) has an extensive performance measurement system.

However, in its recent audit of the national highways system (ANAO 2001) the Auditor General criticised inadequate asset management by the Department of Transport and Regional Services, and noted that it *“could find no correlation between the performance indicators, the agreed road conditions to be achieved by the States and the annual funding allocation to be provided by the Commonwealth”*.

The lack of consistent, consolidated data and the lack of standardised asset management systems have long been a problem for local roads. This was highlighted in the BTE Spending on Local Roads paper (BTE 2001) that commented on the lack of data and stated *“that no national figures are available on the physical conditions of local roads, on the numbers of vehicles that travel over them or on the tonnage of freight that they carry.”*

The Victorian Infrastructure Study (Victorian 1998) examined these issues for Local Government. The Study’s recommendations emphasise the:

- *Recognition that asset management is a corporate, not a technical responsibility;*
- *Need for good information;*
- *Need for comprehensive asset management planning;*
- *Need for community involvement in establishing service standards;*
- *Need for rigour in financial assessments; and*
- *Need for performance measurement of asset management.”*

The quality of the road system is variable. Generally, the National and State road systems have shown improvement over recent years. However, rural and local roads remain a concern to their local communities and the transport industry.

This is reflected in the results of three recent surveys which reported:

- 62% of rural Councils indicated that their community would regard their roads as unsafe (Moree 2001);
- 50% of motorists rated local roads as average or less than average (AAA Survey 2000); and
- 67% of regional industries rated regional roads as average or less than average (AIG 2001).

The lack of a regional approach has been recognised, as limiting by rural Councils in particular, and various actions have been proposed.

Roads are linear and cross local government boundaries. This can result in differing priorities and inefficient utilisation of resources between local government areas. The ALGA has studied this issue and in a recent report identified a number of options for resource sharing (Dockrill 2000).

The use of Regional Road Groups to improve planning and co-ordination has been successful in Western Australia. The scope of these groups needs to be broadened to include other transport modes to facilitate an integrated approach to transport planning and investment. This is a model that should be considered in all States.

2.3.4 Environment

Roads can have substantial impacts on the environment, because of the land required for right-of-way, and because of the direct environmental effects of traffic, including air and water pollution, noise and visual intrusion. The design, construction and operation of environmentally benign roads is a major challenge.

In recent years there has been a major change in approach by the proponents of new roads. Fuller consideration is now being given to environmental issues. This has generally resulted in better outcomes through the environmental impact assessment process.

However, a number of significant environmental issues remain, including:

- Vehicle emissions and greenhouse gases;
- Noise;
- Alienation of land; and
- Traffic congestion.

Congestion is a major contribution to vehicle emissions. BTE estimates suggest that 40% of fuel usage in major Australian cities is due to traffic interruptions. (BTE May 2000).

Greenhouse gas emissions from the transport sector are the fastest growing and represent 16% of Australia's total emissions. About 89% comes from road transport. Of this, trucks and commercial vehicles account for about one third of road transport emissions. (AGO 2001).

Increases in road traffic are unsustainable. The BTE analysis Urban Transport Looking Ahead (BTE August 1999) clearly shows the problem facing our major cities:

- Total travel in urban areas grew nine fold over 50 years;
- In 1995, 93% of passenger transport was by road vehicles;
- Since 1945, the rail share of trips has declined from 40% to 4%;
- By 2015 total vehicle traffic could grow by 30-40%; and
- This could result in the cost of congestion rising to \$30 billion per year.

Solutions to this problem are the subject of a major research project "Sustainable Transport in Sustainable Cities" by the Warren Centre (Warren 2000) and were addressed in "Sustainable Transport: Responding to the Challenges by The Institution of Engineers, Australia. (IEAust 1999)

There have, however, been important initiatives in recent years. Sydney's "bus only" lanes and proposed bus transit ways have increased availability and efficiency of buses. Brisbane is currently pursuing similar initiatives. The ATA has suggested that "freight only" lanes be considered and believes that this would reduce congestion, freight costs and emissions by improving freight traffic flow.

There are many other factors that can affect car usage. The International Association of Public Transport has pointed out the link between taxation, car usage and the environment (UITP 2001):

- The new tax system has increased public transport fares by up to 10% yet reduced new car prices by 6%; and
- Fringe Benefits Tax favours car use over public transport. Company cars comprise 16.5% of new car sales yet cause 40% of peak hour traffic.

This compares to many other countries where GST on public transport is reduced or a zero rate and where other taxation initiatives promote employee public transport.

As well as public transport initiatives there is the need to implement other actions such as:

- Improving road infrastructure eg CityLink in Melbourne,
- Improving efficiencies eg use of Intelligent Transport Systems;
- Reducing demand eg land use policies that reduce need for private vehicles.

2.3.5 Social

In many areas, roads provide the only convenient means of transport between home and employment for the majority of Australia's work force, as well as the only viable transport mode for many social and recreational activities. Roads are also the most important transport mode for freight and goods.

The form of Australian cities gives rise to significant costs for those who do not have access to a private car. Significant investment in public transport is necessary to provide an equitable degree of accessibility and mobility for the whole of the population.

The detrimental impact of poor access to public and community transport was highlighted by ACOSS in its recent Federal Budget submission (ACOSS 2001).

The cost of running a car is a major burden on low-income groups and can account for up to 25% of household income (UITP 2001).

In non-urban areas, public transport is not a viable solution to most accessibility issues. Rural roads support the social fabric of rural communities and regions. This has been emphasised by rural women who rate an adequate rural road system as high priority (Moree 2000). Failure to provide adequate rural roads:

- Restricts the educational opportunities of country children;
- Limits the ability to provide emergency medical services;
- Reduces safety for rural travellers;
- Reduces regional employment opportunities; and
- Reduces social and cultural opportunities.

In a recent survey (Moree 2001) Councils were asked whether there was a significant loss of schooling due to poor access in wet weather. Responses suggest that there was a problem for 43% of rural Councils and that between 40 and 140 children were affected in each Council area. The net result is that poor rural roads contribute to a reduction in educational opportunities for rural children.

2.3.6 Safety

The safety of road travel has improved greatly during the past 30 years, in spite of almost doubling the amount of travel. The number of fatalities on Australia's roads has nearly halved. In 1999, there were 1,759 road fatalities, compared with a peak of 3,798 in 1970. However, the number of fatalities has remained relatively constant in the last five years. The challenge remains to further reduce the number and severity of road crashes (Austroads 2000).

Australia's overall road accident cost is estimated at \$15 billion per annum. Fatal crashes cost the nation \$3 billion, serious injury \$7 billion, minor injury \$2.5 billion and property damage crashes \$2.5 billion. Of the \$15 billion, the human financial costs total \$8.5 billion, the vehicle costs \$4 billion and other costs \$2.5 billion. Each fatal road crash is estimated to cost the nation \$2 million. (Austroads 2000)

The fatality rate for rural roads is substantially higher than in urban areas, likely as a consequence of the combined effects of fatigue, and a generally lower standard of road in a higher speed environment. The ATA and AAA are calling for the provision of increased roadside facilities such as rest areas in order to improve safety on rural roads.

The particular safety concerns of fatigue and scheduling relating to trucks have been recognised by the ATA who have initiated a number of programs, including Trucksafe, to improve safety (ATA 2001).

Funding of road safety improvement projects such as the Black Spot program has been demonstrated to return substantial benefits, and should be expanded. The high rate of fatal crashes on rural roads indicates a need to improve the safety of those roads by improved road geometry, sealing of road shoulders and provision of delineators.

2.3.7 Economic

Road transport accounts for 65% of all freight tonnage carried in Australia (Austroads 2000). An efficient road system is essential, as part of a wider freight network, to minimise transport costs and maximise economic benefits.

Access roads to ports and industrial areas, inter-regional roads and the urban arterial network are all important components in the efficient transport of freight within Australia. There is a continuing debate concerning freight routes in our major cities. The needs of the local community, the freight operators and the broader economy need to be balanced. Obviously, in newer areas, industrial and distribution developments are planned with appropriate zonings and road access. The gentrification of existing inner city areas, particularly around ports, however, has resulted in conflicts.

In all States, the number of routes available to heavy road freight vehicles has generally increased. However, in urban areas concerns have been raised relating to noise, safety, amenity etc. There are differing views; in Adelaide accredited road trains have access, whilst in Perth access is being reviewed.

The Mass Limits Review identified the need to spend in excess of \$500 million on local road bridges to implement general access for the higher mass limits throughout all local

government areas in Australia. This amount was needed to upgrade assets that had deteriorated as well as provide for increased loads. While State Ministers rejected the full implementation of the higher mass without a significant Commonwealth funding, it is clear that local road bridges are an impediment to local government meeting the transport needs of local industries. The first priority for local government for a bridge upgrading program would be on those 'local roads of regional significance'.

Local government has identified the growth of new industries and changing freight tasks as adversely affecting their road networks. However, these are employment opportunities and add to the local economy. New mechanisms for equitably sharing the cost impacts must be found.

There is little capacity for rural Councils to meet the demand for infrastructure arising from trends in agricultural production and the emergence of new industries in regional areas (such as viticulture, blue gum forests, tourism, etc).

A recent study in the south-west of Western Australia identified a case for additional \$66 million to support their emerging blue gum industry. A similar figure could be expected from a current study of roads serving the wine, forestry and fishing industries in the Mt Gambier region of south-east South Australia. Both these studies have involved State and local governments working together with the local regional industries to plan future infrastructure needs including funding.

Significant inefficiencies in intermodal transfers do exist, be they between transport modes (road/rail, road/ship) or regions (interstate/urban). This impacts on both the passenger and freight network and is particularly exacerbated by the diversity of ownership and responsibility. The need for increased efficiencies has been recognised (DTRS 2001) however, very little action has been taken to improve efficiencies.

The cost of congestion on Australia's roads has been estimated at \$13 billion per annum and if nothing is done its expected to rise to \$30 billion by 2015 (BTE May 2000)

Economic benefits flow from investment in road projects such as Sydney's Eastern Distributor and Melbourne's CityLink. Benefits include reduced congestion, travel timesavings, reduced vehicle running costs and and reduced accidents.

2.4 Future Directions

A national framework for the planning of road funding is required, with a more sophisticated approach to allocation of priorities. This is best done at the regional level and should involve other modes of transport as well as roads.

A significant increase in overall funding will be required to meet the needs for road infrastructure replacement and refurbishment.

A re-evaluation of the balance between capital and maintenance expenditure is required, and this needs to be supported by improved asset management systems.

Initiatives to reduce private vehicle usage and congestion (including demand management, mode shifts and more efficient road infrastructure) are necessary.

Federal Government support of public transport is required.

Specific policies that reduce greenhouse gases and manage congestion at sustainable levels are needed.

The importance of road freight must be recognised, together with a review of important freight routes within and between our cities, and action taken to improve intermodal transfers.

Freight transport should be carried by the transport mode that is most efficient for the particular task in terms of direct costs, indirect costs and externalities.

2.5 Report Card Rating

Roads have been rated as follows. The ratings have not changed since the *2000 Report Card*. Despite improvements at specific locations, overall the issues relating to quality/condition, congestion, environment, funding and the need for improved asset management remain without significant change.

National roads	C	Despite some major upgrade works on the eastern seaboard, the overall quality of the national highway system is only average.
State roads	C-	State roads vary greatly in quality. Urban congestion is increasing, and the overall quality of rural highways has not improved. State roads are rated as average to poor.
Local roads	D	The average age of the nation's local roads continues to increase. Lack of both capital and maintenance funding is an on-going issue of concern. Increased traffic is reducing local amenity. The "Roads to Recovery" funding should improve this grading over time if the funding becomes ongoing.

Case Study

ROAD IMPROVEMENTS AND SAFETY

Road safety benefits directly from improved roads.

Fatality rates reduce markedly with improved road standards. Freeways and divided roads typically result in 25 to 50% of the accident rates of undivided roads.

This has been clearly demonstrated by recent statistics.

A recent NRMA audit of the Pacific Highway between Hexam and the Queensland border shows that since 1991 the crash rate has been halved and casualty rates have fallen by 64% despite an increase in traffic volume of 48%. Primary reasons are the construction of dual carriageways and overtaking lanes¹.

	1991	2001
Overtaking lane in either direction	22%	50%
Highway with more than two lanes	22%	50%
Divided road	36km	167km

Similarly, NRMA surveys of the new Hume Highway between Sydney and Yass showed that injuries and deaths from crashes declined by 80% following construction of the divided road².

Accident statistics for Sydney's Taylor Square similarly show accident reductions before and after construction of the Eastern Distributor.

The Federal Government Black Spots programme appears to have been highly effective in reducing the number of casualty crashes. The Bureau of Transport Economics estimates that the Programme prevented around 32 fatal crashes and 1 539 serious crashes between 1996–97 and 1998–99³.

1. NRMA, *The Open Road*, July/August 2001, p 20

2. NRMA

3. <http://www.dotrs.gov.au/bte/docs/r104/htm/executiv.htm>

3. Railways

3.1 Overview

Rail is a vital component of Australia's national transport infrastructure.

Until the 1990's, public rail was a publicly owned, vertically integrated operation. Reform was focussed solely on improving efficiency. During the 1990's, the industry underwent major change, with some State systems transformed into private/public structures, separating ownership, operation and regulation.

Rail infrastructure can be categorised as follows:

- Urban passenger services;
- Regional / interstate passenger services;
- Regional and interstate freight services; and
- Bulk materials freight, eg. grain, sugar, minerals.

The majority of urban rail infrastructure is for passenger use only, with major lines shared with freight.

The majority of regional and interstate infrastructure is used for freight alone. A mix of regional and interstate infrastructure is used for bulk material freight. A number of bulk freight providers have all or part of their infrastructure for their exclusive use.

Most companies operating rail infrastructure are in the private sector, and are profitable enterprises, operating in highly competitive domestic and international markets.

There are 22 rail freight operators, 4 Government owned, and 14 rail passenger operators, 4 Government owned. Of the freight operators, 8 are major operators, carrying more than 10Mtpa each. All rail passenger operators are major operators, each carrying more than 25,000 passengers per annum (ARA 2001).

3.2 Key Statistics

The rail industry consists of 180 private and public companies employing 80,000 people and contributing \$8 billion per annum to the Gross Domestic Product (GDP) (ARA 2001).

Rail transports over one third of the rail, road and domestic sea freight task, including all iron ore, 80% of coal and 70% of wheat. These three commodities comprise 20% of Australia's exports, which contribute \$15 billion to the nation's economy.

While the majority of the system was constructed around the turn of the 20th century, the focus since then has been on development of mining rail infrastructure, for example in the Pilbara; in renewals and upgrades such as the Queensland electrification and track upgrade; and in the completion of the 8,000km national standard gauge network.

In 1990/00, urban heavy rail systems carried approximately 480 million passengers in 2000 for a total of 10.5 billion passenger km, while light rail/tram systems carried around 134 million passengers. The Australian rail freight task was 508 million tonnes carried for 134 billion net tonne kilometres (NTK's). Of this, 12m tonnes was interstate rail freight.

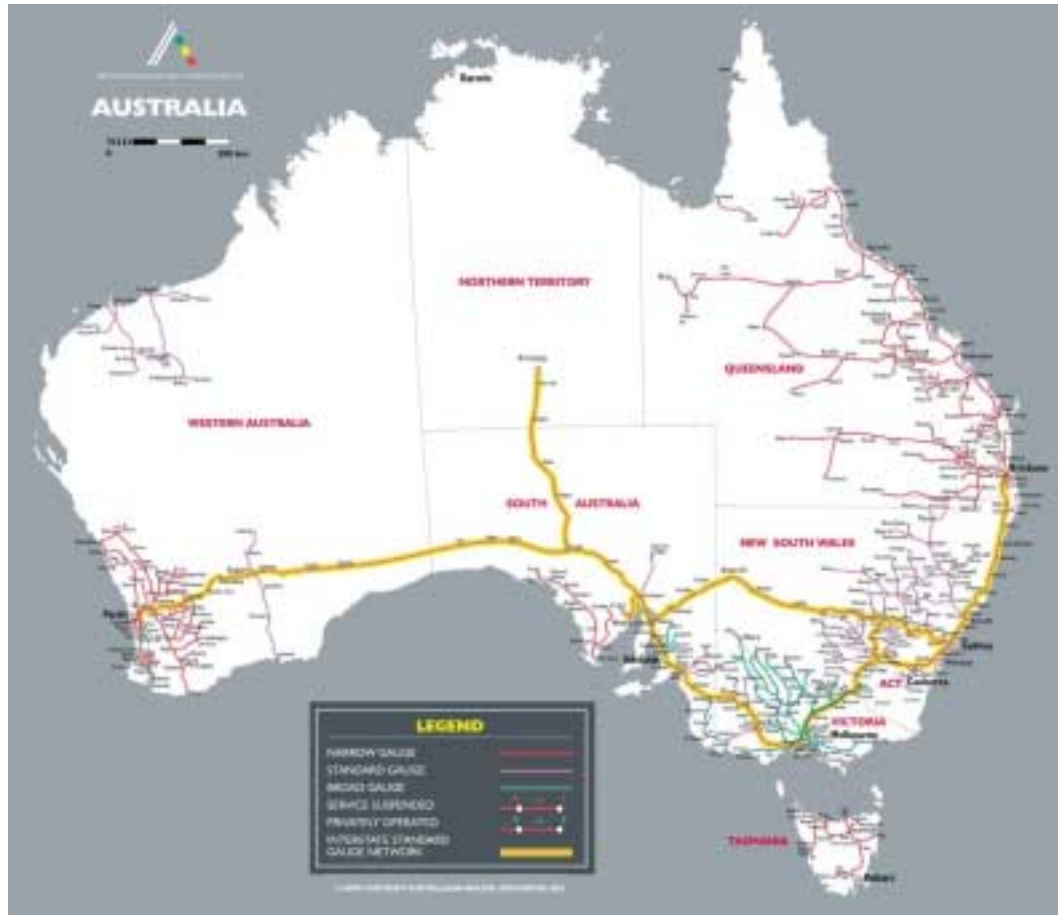
The network consists of (ARA 2001):

- **Heavy Rail**

Nearly 40,000 km of track, including 4,000 km of broad gauge, 16,340 km of standard gauge, 15,080 km of narrow gauge, 265 km of dual gauge, and 4,150km of sugar cane railway. The mainline rail system comprises the 8,000 km standard gauge interstate network plus 1,680 km of narrow gauge between Brisbane and Cairns.

- **Light Rail/Tram**

240km tram network in Melbourne, the 14km tram system in Adelaide, the 6.7km light rail system in Sydney, the 8.5km ski-tube from Jindabyne to Mt Kosciusko and the 6.6 km Sydney Monorail.



3.3 Issues

3.3.1 Integrated Planning

Over the past five years there have been five significant reports on road and rail transport:

- *Planning not Patching* October 1997
- *Tracking Australia* July 1998
- *Revitalizing Rail* April 1999
- *Progress in Rail Reform* April 2000
- *ARTC Interstate Rail Network Audit* April 2001

A common theme in all is the urgent need for a national integrated transport plan, with significant rail infrastructure funding.

This need is also the concluding comment of the Department of Transport and Regional Services Report, *Transport Directions Task and Outlook*, which states “Over and above the issues outlined above, there is a need for development of consistent transport strategies across Australia for development and operation of the Australian transport

system. These strategies need to adequately recognise international and interstate transport as well as interstate and regional requirements.” (DTRS 2000)

In an update released in May 2001 on the *Tracking Australia Report*, the House of Representatives Standing Committee reported that: *“The Commonwealth Minister for Transport, the Hon John Anderson MP, has clearly indicated that the Government does not support a ‘centrally-planned’ approach, which might be seen to be ‘dictating national transport development’. Representatives from the Department of Transport and Regional Services at the seminar reiterated this position. The Commonwealth’s position is that the ‘ATC should reiterate target performance levels which are agreed by all jurisdictions and which provide the certainty within which the industry can plan.” (Back on Track, 2001)*

The Australasian Railway Association (ARA), and key industry members, have indicated that lack of leadership and a national transport planning strategy, in which key investment decisions can be made, has constrained investment by Governments and the private sector.

There have been a number of private sector proposals that have not proceeded, such as high-speed passenger lines (Sydney to Melbourne and Sydney to Canberra), the Brisbane Light Rail, Bondi Beach Rail extension, Sydney Light Rail City Extension, or have been delayed, such as the Darwin-Alice Springs railway. The decision making process would have been improved if a national transportation strategy had been in place. Initiatives by the Australian Transport Council, and the formation of the National Transport Secretariat, which have resulted in further studies into areas such as e-commerce and freight corridor strategies, are positive signs.

3.3.2 Investment

Tracking Australia (1998) identified rail investment needs of \$3 billion over 10 years; previous reports by the National Transport Planning Task Force (NTPT) in 1995, identified expenditure in line with these estimates. Funding commitments since have not reduced this need.

As identified in *Back on Track* (2001), the issue of funding for rail infrastructure is far from simple, and there are significant obstacles to investment in rail, in particular the private sector, due to a lack of a stable investment environment (Back on Track 2001).

Back on Track (2001) also highlighted the problem of competition between rail and road: *“One of the most intractable problems facing the rail industry is the impact of the different approaches taken to determining funding and charging regimes for rail transport as compared to road transport. It has been argued by the rail industry for many years that these differences work significantly to the disadvantage of rail operators.”*

Rail has traditionally suffered from significant shortfalls in funding for railways. *“Between 1975 and 2001 the Federal Government spent \$43 billion on roads and \$2 billion on rail”*(ARA 2001). *Tracking Australia* (1998) commented as follows:

“There are strong reasons for increasing investment in public use rail infrastructure. In addition to the obvious benefits of maintaining a diversified national transport system, there are the benefits of more effective and efficient use of the nation’s rail assets, generating economic benefits for rail users and the wider community.

Less positively, there are the potential costs of losing those assets. Without urgent and substantial investment in this infrastructure, major sections of the national rail network are likely to become irretrievable within ten years. In this context, the rationale for increased

investment in rail infrastructure has to be about averting the potentially enormous costs of diminished or defunct rail services between major cities on the eastern seaboard, including increased road construction and maintenance, and the negative externalities associated with large and growing volumes of road traffic”.

Since 1975, rail's share of interstate non-bulk freight has declined from 60% to 35% despite the interstate non-bulk freight task more than tripling over that period. In part, this is because of lack of investment in rail infrastructure.

The recent rail audit undertaken by ARTC (2001), shows that a \$507 million investment would generate \$1.5 billion of benefits to the community and increase the share of interstate freight carried by rail, by 38%.

Since the *2000 Report Card*, was completed there has been some significant progress in investment in the industry, but also some disappointments; the delay and or cancellation of a number of major projects illustrates industry's need for a more stable and certain climate for investment.

Positive	Negative
<ul style="list-style-type: none"> Westrail Freight – privatised 	<ul style="list-style-type: none"> Sydney to Canberra high speed rail – cancelled
<ul style="list-style-type: none"> Alice Springs-Darwin Railway – proceeding Brisbane Airport Rail Line – opened 	<ul style="list-style-type: none"> Brisbane Light Rail Project – cancelled Parramatta to Chatswood Rail – delayed and curtailed
<ul style="list-style-type: none"> Sydney Light Rail Western Extension – opened 	<ul style="list-style-type: none"> Perth SW Rail extension – delayed
<ul style="list-style-type: none"> East Coast Very High Speed Train – Scoping Study commenced 	<ul style="list-style-type: none"> High Speed Rail links to Newcastle and Wollongong – delayed
<ul style="list-style-type: none"> Victorian Regional Fast Rail Links – progressing 	<ul style="list-style-type: none"> Bondi Beach Rail Extension – cancelled
<ul style="list-style-type: none"> Victorian Urban Rolling Stock upgrade under franchises – proceeding 	<ul style="list-style-type: none"> Privatisation of National Rail and NSW Freight Corp – delayed
<ul style="list-style-type: none"> Victorian and Urban Rail and Tram extensions under franchises – proceeding 	<ul style="list-style-type: none"> Sydney Freight bypass – delayed
<ul style="list-style-type: none"> ARTC National Standard Gauge Network Audit – completed 	<ul style="list-style-type: none"> Taxation changes fail to support public transport and rail services
<ul style="list-style-type: none"> NSW Rail Structure revised with RAC and RSA amalgamated to form RIC – in implementation 	<ul style="list-style-type: none"> Failure to replace outmoded safe working systems between Casino/Brisbane, Exeter/Medway, and Harden/Wallenbeen
<ul style="list-style-type: none"> Australian Inland Railway Express, further feasibility studies – progressing 	<ul style="list-style-type: none"> Allowing the rail bridge over the Murrumbidgee River at Wagga to incur a 20km/hr speed restriction
<ul style="list-style-type: none"> Victorian Country Network Gauge Standardisation – progressing 	<ul style="list-style-type: none"> No Federal funding for urban rail projects
<ul style="list-style-type: none"> Melbourne Spencer St Station Redevelopment – progressing 	
<ul style="list-style-type: none"> Melbourne Airport Rail Link feasibility – progressing 	
<ul style="list-style-type: none"> Sydney Airport Rail Link – opened 	

It is also noted that few of the major initiatives are designed to modernise and enhance the existing network.

The difficulties in the current Government policy direction are summarised well by Kenneth Davidson in his article *Wrong way, go back* (Davidson 28 May 2001), where he highlights the lack of commitment to public transport in the 2001/2002 Federal Budget.

3.3.3 Passenger Transport

Regional / Interstate Rail

Regional/interstate rail forms a crucial link between regional population centres for commuters and other travellers, reduces reliance on cars, and provides a boost for local economies.

Non-urban rail passenger services also play an important role in linking major regional centres with capital cities, for example Warrnambool – Melbourne, Goulburn – Sydney, Kalgoorlie – Perth and Rockhampton – Brisbane.

Some State Governments are reassessing regional services and Victoria has recently called for participation in regional rail improvements.

Nevertheless, the provision of viable long, distance passenger rail is difficult in Australia, due to the low population densities, long distances and the range of agencies that need co-ordination.

Whilst this is a matter for both State and Commonwealth governments, to provide services across State borders requires leadership from the Federal Government. Its position on this issue is unclear, particularly in view of the contribution made to the Alice Springs – Darwin funding.

Equally, the issue is how to capture the direct and indirect benefits of major projects in the context of commercial operation.

The current study into the East Coast High Speed Railway is a case in point. If implemented it will provide services to the 80% of the nation's population in its proposed operating corridor.

Before it can proceed however, it will need to demonstrate that it can successfully satisfy not only commercial issues, but State and Federal political imperatives as well.

Urban Rail

State Governments are generally responsible for urban transport. Most major cities however, have transport systems that include important links to the national transport network, including freight access to ports and industry.

It is apparent that for the problems of congestion, safety, air quality to be solved in Australia's major cities, we need to expand public transport systems, including the urban rail networks.

Various State Governments have proposals in place. For example, New South Wales has identified the extent of the task in its *Action for Air* a 25 year, Air Quality Management Plan. To achieve the goals of the Plan requires a major shift in passenger journeys to work, from cars to buses and trains. To do this requires a significant expansion of the rail transport network (DoT, 2010).

While the Federal Government also has an interest in broader urban policy issues, there is little evidence of Commonwealth contribution to the planning, policy and funding of vital urban facilities, even though there are no legislative impediments to Federal funding.

Other areas requiring more commitment at both State and Federal levels, include investment in the maintenance and improvement of the existing rail system.

The Commonwealth's *Transport Direction –Task and Outlook Report* (DTRS 2000), identifies the emerging congestion and environmental problems of our dependency on motor vehicles, but looks to motor vehicle and traffic management strategies for solutions. While the Report raises the need for land use policies to encourage rail use, this Federal Report continues the position of ignoring expansion of efficient and environmentally sound transport systems.

Failure to link land-use policies, and the long-term lack of investment to modernise and expand public transport including urban rail system, has been identified as one of the most serious issues facing cities (Warren Centre, 2001).

Commitments for expansion and modernisation of the Victorian Passenger system, the Epping to Chatswood extension in Sydney, planning for the South East sector of Queensland, and the Perth South East extension, are recent proposals aimed at urban rail renewal, they are yet to be realised.

Successful carriage of the Olympic Transport task by NSW State Rail Authority has been a boost to public transport and to urban rail, as it demonstrated the efficiency of a well resourced and managed railway under extreme demand.

3.3.4 Freight Rail

Australia's railways haul over one third of the rail, road and domestic sea task in net tonne kilometres.

The Australian rail freight task varies from time sensitive, high value freight, to long distance transport of bulk commodities.

Iron ore lines in the Pilbara and some of the coal haulage routes in Queensland are world-class operations.

The major debate in recent years has been over interstate freight and in particular the ownership, condition and access to the National Standard Gauge Network.

Competition policy has stimulated introduction of new private sector operators into the market, and the impending sale of National Rail Corp and the NSW Freight Corp, together with the recent sale of Westrail Freight, has ensured that transport competition continues to develop.

The cost to consumers and the service quality is however significantly influenced by the constraints imposed by the infrastructure, as confirmed by Freight Corp (Back on Track 2001).

The recent infrastructure audit by the ARTC determined \$500 million in investment is needed in the interstate rail network, to improve rail competitiveness. This investment is targeted principally at the East Coast services.

By contrast, the East-West corridor is in better shape, carrying over 70% of freight, due to the more favourable topography and to targeted investment made possible by the revenue generated.

3.3.5 Asset Management, Access and Accreditation

The move to separate infrastructure ownership from above-rail operations has improved operator performance and increased competition. However, on the interstate network, the issue of multiple “track owners” and therefore the complexity of access agreements and charges, is a highly charged issue for industry and Government. These issues require resolution and “Back on Track” clearly articulates industry’s frustration at the lack of effective State and Commonwealth cooperation in managing reform. (Back on Track 2001)

The issue of standardisation of safety, engineering and operating procedures are other examples of lack of cohesion within the industry. Multiple different safe-working systems across the nation, with different communication systems and equipment, have an adverse effect on the national network.

In May 2001, Transport Ministers meeting as the Australian Transport Council, finalised the Regulatory Impact Statement, providing for a voluntary industry code of practice for the rail industry, which are now being progressively introduced.

In reviewing the national rail assets it is apparent that overall this is a need to improve the management of those assets in terms of management systems, asset condition information and maintenance and renewal plans and policies.

3.3.6 Environment

Greenhouse gas emissions from fossil fuels used in transport are of global concern. Rail transport can provide a significant environmental benefit in meeting both freight and passenger tasks and can play a major role in reducing Australia’s greenhouse gas emissions.

- *Transport now comprises 16% of Australia’s total greenhouse gas emissions – an increase of 18% over its 1990 level. Transport is one of the fastest growing sectors of greenhouse gas emissions. (AGO Fact Sheet 3, 1999)*
- *Rail is responsible for 2% of transport greenhouse gas emissions (AGO Fact Sheet 3, 1998)*
- *Rail freight transport is at least three times more fuel-efficient than road freight and produces less than one-third of the greenhouse gas emissions per tonne of freight hauled. (ARRB 1998)*
- *Urban rail services are five times more energy efficient than cars and over twice as energy efficient as buses. (AGO Fact Sheet 3, 1998)*

Increased use of rail to absorb the growth in passenger and freight demand over the next 20 years could reduce Australia’s transport energy consumption, reducing forecasts for road transport greenhouse emissions.

3.3.7 Social and Community Issues

ARA Newspolls of community attitudes in 1998 and 1999 confirmed support for freight railways in comparison to road trucks (ARA Press Release 99.20).

The Warren Centre’s *Sustainable Transport Project Survey of Community Values* (2001), revealed very strong interest in city transport planning. It measured a perceived lack of effective overall long term planning for the city, and that traffic and transport were seen as serious problems, with road congestion the major issue.

The survey identified strong views about the need to develop public transport infrastructure and indicated respondents preparedness to pay for improvements at the

expense of road funding. On many issues, decision makers surveyed had similar views, however those decision makers appeared to underestimate the level of public support for improving public transport (Warren 2001).

The issue of social impact of transport has been canvassed in the Roads chapter section of this Report. Transport is a key factor in community values with equity of provision of public transport, accessibility and sustainability matters of concern. The impact of rail services on rural centres has been highlighted in Victoria with restoration and improvement of services planned. Removal or change of rail services must always examine the full social costs, not just the commercial ones, before implementation.

3.4 Future Directions

The rail industry has focussed on efficiency reforms for many years, somewhat to the detriment of investment in technology, growth and service quality.

However, restructuring under competition policy has resulted in the separation of above-rail operating costs and the cost of infrastructure.

With corporatisation and privatisation, the necessary commercial drivers are in place or identified. The infrastructure owners however, are still struggling with the management of their assets, in particular on issues of pricing and access.

Improvements are limited by the lack of sufficient operating revenue, the need to provide services on non-profitable lines, and the cost of multiple access and operating standards that apply across the nation.

These issues together with the lack of an agreed strategic planning framework for rail within a national land transport plan has precluded sufficient investment in the rail infrastructure both by Government and the private sector.

To deal with these issues there needs to be:

- Clarification of the strategic planning and management process for the National Standard Gauge Network, and by
- A substantial and sustained contribution to the national network and continued support of the recommended reforms.

There is also an urgent need for stimulating funding for urban rail enhancement and modernisation to meet the current and growing need for more efficient and sustainable urban public transport. This should become a Federal Government priority.

Apart from the Pilbara iron ore railways, little evidence was found of high quality asset management in the rail industry. This needs correction.

In terms of integrated planning, recent initiatives by the Australian Transport Council, and formation of the National Transport Secretariat indicate the first steps towards addressing the issue have been taken, but much still needs to be done.

3.5 Report Card Rating

In determining the *Report Card* rating it has been recognised that performance in the rail sector varies from worlds-best-practice in the Pilbara region iron ore trains (A+) and Central Queensland coal trains (A-); to Melbourne – Sydney – Brisbane interstate standard gauge line with poor track co-ordination, steam age alignments and inadequate signalling and communication systems (F).

Since the last report, significant investment in expanding and improving the Victorian passenger network, a strong service orientated audit of the standard gauge network and

continued investment in rail projects, notably the Alice Springs – Darwin line, have lifted expectations of improved performance.

However, the lack of progress in reform of the planning, enhancement, and maintenance of the existing network assets is disappointing. Asset management policies and processes show few signs of progress towards best practice, although the controls in place in the privatised franchises of the Victorian system have potential.

The improvements noted however, are insufficient to raise the grading level from that reported in the *2000 Report Card*. This is because of the unresolved issues of the national standard gauge network, and the lack of Government commitment to adequately fund or encourage the private sector to make investments in both rail passenger and freight infrastructure.

The *Report Card* rating for 2001 is D-.

Case Study

THE BENEFITS OF RAIL INVESTMENT¹

The recent Interstate Rail Network Audit released by the Australian Rail Track Corporation (ARTC) is the latest in a long list of major studies recommending urgent upgrading of the interstate rail system. The audit highlights the poor condition of much of the interstate network and details the significant benefits that can be gained by strategic investment.

For a recommended investment of \$507 million it is estimated that two million tonnes of freight per annum will transfer from road to rail.

The benefits to the Australian community from this investment will be \$1.5 billion, in lower freight costs, and reduced greenhouse gas emissions, noise and road accidents.

The proposed investment on the east coast alone would remove 111,000 long distance truck trips per year from the Hume, Pacific and Newell Highways. It will lower transport costs and reduce congestion and road accidents.

\$398 million of the proposed investment would upgrade the east coast rail corridor between Melbourne, Sydney and Brisbane. This section of the network is most in need of upgrading. There has been very little investment in this track in recent decades.

The \$146 million 'Sydney Freight Priority Project' - part of the proposed ARTC investment program - would begin to create new pathways through the very congested Sydney system.

The Sydney commuter rail system is a critical bottleneck for the nation's freight, causing many hours of delay to vital freight movements and significantly impeding rail's ability to compete with long distance truck haulage of freight.

The Sydney-Melbourne rail corridor has less than 18% of the land freight market share and the Sydney - Brisbane corridor less than 20%. If the national audit recommendations are implemented, rail could achieve more than 30% market share on the east coast, delivering substantial benefits to the environment and the Australian community.

The audit found that freight trains between Melbourne, Sydney and Brisbane could no longer offer competitive services, mainly because of obsolete and poor quality track and signalling.

1. ARTC Media Release 1 May 2001

4. Aviation and Airports

4.1 Overview

Since the inception of the Australian aviation industry under the *Air Navigation Act 1920*, civilian and military airports have been largely owned and operated by the Commonwealth.

In the 1980's, the Commonwealth progressively transferred civil airports to either local ownership or to the Federal Airports Corporation (FAC). In 1997/98, under the *Airports Act 1996 (Airports Act)*, the Federal Government leased 17 of the remaining 22 FAC operated airports, providing long-term leases (50 years with an option to renew for a further 49 years). These airports remain subject to Commonwealth regulation in areas such as ownership, access, development and environmental control.

Airport operators do not have responsibility for all aeronautical services provided at airports. Services outside their responsibility include en-route navigation and terminal navigation (air traffic control and airspace management within 50 kilometres of airports); aeronautical information; communications; and fire fighting and rescue services.

Currently:

- 5 airports remain under Commonwealth ownership, and are expected to be tendered for sale in the 2001/2002 financial year;
- 17 are privatised Commonwealth civilian airports;
- 16 are military airports controlled by the Department of Defence;
- Approximately 260 licensed airports are owned by local authorities or private organisations/individuals.

Under the *Air Navigation Act 1920* the Department of Transport and Regional Services (DOTRS) is responsible for the regulatory regime for Federal airports.

Prominent public policy issues that have emerged in recent years concerning the development of aviation infrastructure include:

- Expansion of Kingsford Smith and the proposal for a second Sydney Airport;
- Aircraft noise and environmental controls;
- Regulation of pricing of services under the *Prices Surveillance Act 1983*; and
- Congestion due to lack of airspace access, constrained by noise operating hours and flight path restrictions.

Other issues such as the introduction of new domestic airlines, and the grounding of Ansett 767 aircraft, are beyond the scope of this *Report Card*.

4.2 Key Statistics

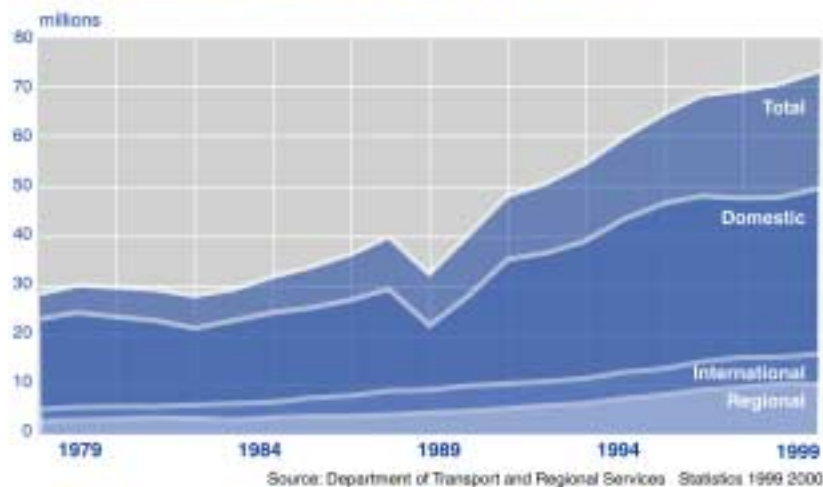
4.2.1 Aviation Industry Statistics

The aviation industry exhibited continued moderate growth during 1999–2000 and strong growth in international traffic. Figure 1 below shows an average growth of about 5% from 1979 to 1999, for all airline passenger traffic. Note that domestic traffic was severely affected by the pilots' dispute during 1989/1990.

Civil aviation activity, measured by the number of flying hours, grew by 16.1 % between 1979 and 1999, giving an average annual growth of 0.7 %.

The general aviation fleet (excluding aircraft operated by the major Australian airlines) comprised 10,190 aircraft at December 1999, compared with 6,047 at December 1979.

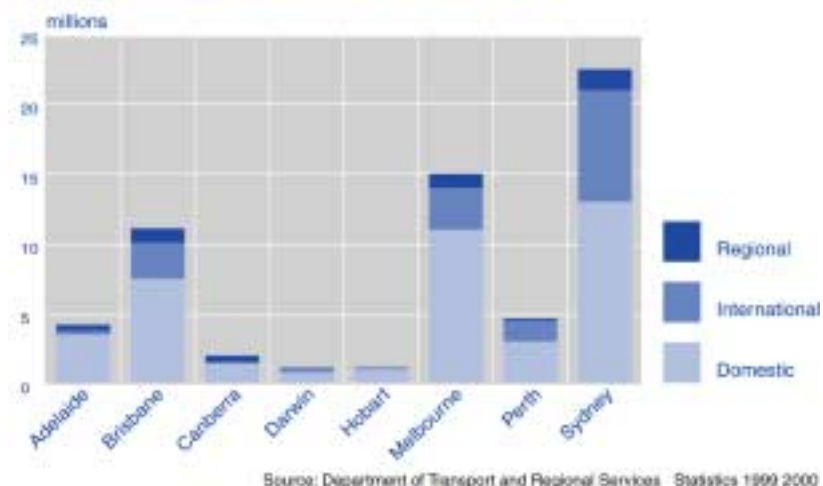
Passenger movements on scheduled flights, 1979 to 1999



Capital City Airports

Sydney Airport remained the busiest airport in the country, with passenger movements on scheduled flights totalling 22.25 million in 1999.

Passenger movements at capital city airports, 1999



International Airline Services

The number of international airlines flying scheduled services to and from Australia increased from 24 in 1979 to 51 in 1999. International passenger numbers increased from 3.77 million arriving and departing passengers to 14.98 million over the same period. This represents an average annual growth of 7.1%.

Cargo (freight and mail) carriage to and from Australia rose from a total of 129,900 tonnes in 1979 to 705,800 tonnes in 1999. This is an annual average growth of 8.8%.

Scheduled airline passenger traffic to and from Australia rose by 5.2% in 1998/99 compared to the world-wide international passenger average increase of 7%.

Domestic Airline Services

The domestic airline industry has seen considerable structural change since 1979. The most significant event was the deregulation of interstate aviation on 30 October 1990, bringing an end to the Two Airline Policy, opening the market to new operators.

Regional Airline Services

Regional airlines began operating in Australia in 1967, to provide regular air transport to areas not supported by the major airlines. In 1999, an estimated 4.44 million passengers were carried.

Federal and State Government legislative changes have progressively allowed the regional airlines to operate higher-capacity aircraft and to compete directly with the major domestic airlines.

During the period 1979 to 1999 regional airlines achieved an average annual growth rate of 10% in passengers carried, compared with 4% for the major domestic airlines.

Revenue passenger kilometres increased from 192.7 million in 1979 to 1,930.9 million in 1999, an average annual increase of 12.2%.

4.2.2 Freight

Air Freight Councils, drawn from industry, have been established with Federal and State Government funding, to assist in resolution of international freight logistic issues.

They have completed a National Export Logistics Framework (NELF) project to scope and provide tools including regulatory requirements, technology and management to improve national logistics co-ordination.

An Australian Freight Transport Logistic action agenda aimed at further building partnerships between Government and industry are currently being developed, with DOTRS undertaking initial consultations.

4.2.3 Infrastructure Development

All aspects of airport development and management, previously the responsibility of Government, is increasingly provided by the private sector. Primary drivers of this change are:

- Public policy reform reflecting world trends towards market driven and competitive service delivery;
- Reduced willingness of governments to accept capital and recurrent costs of ownership and operational risk;
- Political pressure to reduce government outlays;
- maturing Australian capital markets; and
- Expected efficiencies as a result of private sector involvement.

Whilst direct investment in civil aviation related infrastructure has included major terminal upgrades at Sydney, Melbourne and Perth, and major runway extensions at Adelaide, there is a growing trend to direct investment towards non-aeronautical activities at airports.

There remains however, a need to ensure that adequate investment is maintained in new infrastructure and maintenance, directly associated with civil aviation. In the newly regulated, privatised environment, it is imperative that pricing and investment decisions

are not based upon non-aeronautical commercial considerations alone, but also projected increases in demand for airport services.

4.2.4 Asset Management

At the privatised Commonwealth airports building development and environmental control is regulated through the *Airports Act*. The *Act* and Regulations are administered by private sector consultants appointed by the DoTRS as Airport Building Controllers (ABC). Master Plans must be developed by the new airport operators, within a prescribed period, to cover the next twenty years, and reviewed and updated at no more than 5 yearly intervals. Master plans are required to be approved by the Minister for Transport and Regional Services. Major development plans are required for certain types and scale of developments.

4.2.5 Investment

The following table presents a snapshot of private sector investment in airports.

Item	\$M	%
Total Private Sector Investment in Assets (1999 Figures)	5,162	100
Debt (1999 Figures)	3,832	74
Equity (1999 Figures)	1,330	26
Gross Turnover of Assets in 1999	591	
Gross Employment Costs in 1999	67	

Source: Infrastructure Industry Survey, Australian Council for Infrastructure Development

4.2.6 Revenue Snap Shot

The following table presents the operating revenue of major airports in the 1999-2000 financial year.

Airport	\$M
Sydney	320.5
Melbourne and Launceston	171
Brisbane	129.5
Perth	69
Adelaide	49.3

Source: Respective Airport Annual Financial Reports

4.2.7 Remote Air Services

Regional airport funding comes from Federal and State Governments through air service subsidy schemes such as the Remote Air Service Subsidy scheme (RASS), and from the private sector.

Under the RASS, the Federal Government announced additional funding of \$1.3 million for 2000/1 in the May 2001 Budget. The scheme ensures regular air services to over 200 remote communities in Queensland, the Northern Territory, South Australia and Western Australia. The additional funding will require all operators to upgrade or hold a higher safety category, to enable them to provide a full range of passenger, mail and cargo services (<http://www.DOTRS.gov/>).

Similarly, the Queensland Government propose to spend \$2.3 million in 2001/02 to significantly improve aviation infrastructure at regional and remote airports in Queensland. The funding will enable 10 key regional airstrip projects to progress under Queensland Transport's Rural and Remote Airport Development Program. Other States have similar programs.

4.3 Issues

4.3.1 Regulation – Economic

Background

Economic regulation of airports is governed by: the *Airports Act 1996*, the *Prices Surveillance Act 1983 (PS Act)* and the *Trade Practices Act 1974 (TP Act)*. These regulate a number of aspects of the provision of airport services, including planning, development and pricing.

The Government, in privatising the airports, capped the landing fees the airports can charge, allowing them to raise their prices each year by "CPI minus X". The value of X is set by the Government based on the recommendation of the ACCC, and varies from 1 at Townsville Airport to 5.5 at Perth Airport. This formula is intended to pressure the airports to raise their productivity and cut their costs by X%, or suffer a reduction in their profits. However, it does give the airports the incentive that, if they can cut their costs by more than X%, profits will increase.

Under the privatisation program, airport operators are responsible for providing a wide range of services. Some of these services are subject to regulatory prices oversight - that is, they are either *declared* for price notification, or subject to *monitoring* under the *PS Act*.

Declared services (under *s.21 of the PS Act, Declarations 87, 88 and 89*) are grouped in two main categories: aircraft movement facilities; and activities and passenger processing facilities and activities.

Aircraft movement facilities and activities comprises airside grounds, runways, taxiways and aprons; airfield lighting, airside roads and airside lighting; airside safety; nose-in guidance; aircraft parking areas; and visual navigation aids.

Passenger processing facilities and activities includes forward airline support area services; aerobridges and airside buses; departure lounges; immigration and customs services areas; public address systems, closed circuit surveillance systems; baggage make-up, handling and reclaim; public areas in terminals; flight information display systems; landside road and lighting; and covered walkways.

Services subject to monitoring under the *PS Act* include: aircraft refuelling; maintenance and buildings; freight equipment and storage sites; ground support equipment sites; check-in counters and related facilities; and public and staff car parks.

Airport operators' revenues that are neither declared or monitored include rents or leases for retail shops and cafes, administration and office space, catering facilities, valet parking services and VIP lounges.

Pricing in Practice

In general, airport owners have argued that the price surveillance regime is not working well. They describe it as onerous and question its requirement. Conversely, the representatives of the airlines are in favour of the ACCC continuing to keep a tight rein on

the airports. With any increase in aeronautical charges to fund new investment requiring airline and ACCC agreement, there is a further incentive for the airlines to disagree as a matter of course, which further protracts the approval process.

In addition, ACCC criteria for price determinations does not include renewable assets. This has the potential to contribute to deferral of major infrastructure maintenance projects, causing a long term run down in asset quality.

The ACCC has a statutory role in assessing new investment proposals, but regulation by the ACCC is viewed by many airport operators as offsetting the benefits of infrastructure development. This view is held because the ACCC determines what expenditures are to be considered for price increases. Airport operators claim that this introduces considerable uncertainty into the investment process, and several airport owners advise that the ACCC has intervened in commercial agreements between airports and their customers.

On 21 December 2000, the Federal Government referred the prices regulation of airports to the Productivity Commission for inquiry (PC Inquiry). The Commission is now conducting an inquiry into the ACCC's regulation of airport prices.

A number of submissions to the Inquiry have suggested that the ACCC in effect has created a situation where it appears to be formulating investment decisions on behalf of airport investors, owners and airlines, and pre-empting airport management choices.

An example is the disagreement on what services should be subject to regulatory control. An example is taxi charges at airports, which operators at Perth, Brisbane and Canberra introduced and argued should not be subject to a price cap. The ACCC disagreed and the matter was eventually settled in the Federal Court with a ruling that taxi charges are included within the price cap (ACCC Submission p 26).

Most airport boards have indicated that no investment will occur prior to ACCC decisions, with the result being that projects are delayed by several months, and often longer because of consultation processes that could be better structured. The ACCC acknowledges problems with the regulatory process. It notes that "... lack of clarity in the framework initially impeded negotiations and continues to concern some parties." (ACCC Submission p 28). The ACCC further notes that its target rate of return in assessing new investments is in the range of 14-16%, which it compares to the 11.3% average for the Australian share market over the past 10 years (ACCC Submission p 29). On the other hand, the ACCC commissioned analysis on the total returns on Melbourne, Brisbane and Perth Airports, indicates returns on total assets is only around 5%, reflecting the lease premium paid by the airport operators (ACCC Submission p 36).

The Issues

Essentially there are four issues regarding the economic regulation of airports. They are:

- Whether airports are able to exert monopoly market power in setting prices;
- What services should be subject to the regulation;
- The timeliness of regulatory decisions; and
- The financial implications of determinations.

These issues are being extensively examined by the Productivity Commission which is due to hand down its final report in December 2001.

Regulation – Planning

Planning impediments to infrastructure development include:

- Difficulties, costs, delay and uncertainties associated with obtaining approvals for major development, as defined by the *Airports Act* (ie. all developments over \$10 million and all runways);
- The need to integrate and coordinate regional road and rail access (particularly at major capital city airports);
- Increasing regulatory complexity and delays in approvals;
- Complex and confusing division of Federal/State/Local Government responsibilities for transportation infrastructure and environmental management; and
- Congestion at airports due to restricted airspace access (constrained by noise, operating hours and flight path restrictions), or reduced apron capacity resulting from works being undertaken (the latter is usually a short-term issue).

4.3.2 Funding

A substantial amount of the investment in Australia's major airports now comes from the private sector. The Federal Government has announced that it will sell Sydney Airport via a trade sale, rather than an initial public offering (IPO). One consequence of this is that it will limit the ability of the investing public to participate in the ongoing ownership of one of Australia's largest public assets.

4.3.3 Environment

Noise and terminal expansion have been major environmental issues, particularly in Sydney and Adelaide. A number of approaches have been applied to addressing these issues, including curfews, using a diverse range of landing and takeoff approaches, as well as noise insulation in affected corridors.

The construction of a new airport for Sydney at Badgery's Creek was the subject of major environmental impact studies, and faced considerable opposition on a number of fronts. The decision to construct the airport has now been deferred, with the Federal Government taking the view that Sydney Airport capacity will not be reached until at least 2010. The new owner of Sydney Airport will have first right of refusal over construction of any new airport at Badgery's Creek.

4.3.4 Development and Expansion

Enduring development and expansion issues at airports that will need to be addressed in the future at airports include:

- Runway length, width, capacity, lighting and navigational aids;
- Apron and terminal capacity;
- Airport area and extent of development and/or expansion potential;
- Location, capacity and convenience of landside access, and transportation interfaces for passengers and freights;
- Airspace and operational restrictions which effect or in any way limit:
 - Hours of aviation operation and airline access allocations;
 - Flight paths allocation and management; and
 - Noise and environmental pollution monitoring and control.
- Proximity to major population centres and tourism destinations.

4.3.5 Transport Integration

Airports are a major conduit for the import and export of goods. They require close integration with land based transport infrastructure, warehousing and distribution, in order to optimise the delivery chain. Their importance grows with an increasing focus on the delivery of products such as fresh produce and seafood to export markets.

4.3.6 Social

Airports are a key element in our society's infrastructure. They play a key role in the movement of goods and people across Australia and internationally. For many communities in remote areas they are the sole means of physical contact with the wider community. Major urban airports provide convenient access, but increasingly, at higher environmental costs.

One of the drivers for the development of the second Sydney Airport was to improve access to a major airport in Sydney for the wider community, create employment and improve regional infrastructure. Other issues such as aviation access to Sydney for regional NSW also required careful consideration. The Tourism Task Force Study (TTF Study 1999) highlighted the economic and social importance of such access. Ultimately the project has been deferred on political grounds (ABC PM 13 December 2000), perhaps indefinitely, potentially at significant cost to the broader community.

4.4 Future Directions

Airports are currently subject to declarations under the *Prices Surveillance Act, Section 192 of the Airport Act*, and for the major international airports of Sydney, Brisbane, Melbourne and Perth, general declaration under Part IIIA of the *Trade Practices Act*. This has the potential to lead to confusion and over-regulation, and act as a disincentive to investment.

One policy option which involves potentially less regulatory intervention, may be that the regulator should hold reserve power over airport operators, which can be enforced should an abuse of market power arise. This may introduce some flexibility into infrastructure investment decisions.

Another approach which could introduce some flexibility is called dual-till. This allows the conceptual separation of aeronautical and non-aeronautical functions of an airport, with only aeronautical costs used as the basis for setting aeronautical charges. Price regulation of the non-aeronautical elements can then be dropped, where it can be demonstrated that the asset owner does not have significant market power.

These issues are under consideration at present by the Productivity Commission, in its inquiry into Price Regulation of Airport Services.

4.4.1 Aircraft Noise

DOTRS and AA have advised the Federal Government on proposed strategies for dealing with aircraft noise issues at several major airports including Sydney, Coolangatta, Perth and Adelaide.

Adverse public reactions followed the opening of the third runway at Sydney Airport in November 1994. This led to the development of new approaches to better describe and communicate aircraft noise, based on common language. High-quality colour graphics are part of the new approaches, which more clearly show the location and nature of proposed aircraft activity. A copy of the discussion paper can be found at <http://www.DOTRS.gov.au/airports/index.htm>. The Long Term Operating Plan (LTOP) and

the proposal for the introduction of the Precision Runway Monitor for Sydney Airport. LTOP is the Government's primary direct mechanism for managing the policy of sharing aircraft noise in Sydney.

Work continues on the Sydney Airport Noise Amelioration Program (SANAP), and for the noise insulation program for buildings in the vicinity of Adelaide Airport.

4.5 Report Card Rating

Airport infrastructure was not included in the *2000 Report Card*.

All privatised Commonwealth and licensed airports are inspected annually by qualified personnel, with the process audited by CASA. In addition, all aerodromes used by aircraft with greater than 9 passenger seats, are required to have an annual safety inspection. Responsibility for standards at other unlicensed airports is shared by the airport operator and aircraft pilots.

Accordingly, all these airports are considered to be in a good condition satisfying stringent regulatory requirements, with most concerns relating to the environmental impacts of future expansion.

The aviation and airports sector has been given a *2001 Report Card* rating of B.

Case Study

ACCC AND PERTH AIRPORT.

Westralia Airports Corporation holds Perth International Airport (PIA), privatised in 1998, under a long-term lease. It is a "core regulated" airport under the Prices Surveillance Act 1983. Aeronautical and passenger processing services are "notified" services under that Act. The administration of the price cap and therefore regulation of Perth airport is conducted by the ACCC.

On the 21st of December 1999, PIA applied to have a range of proposals excluded from the regulated price cap, so the charge for this investment could be passed through, under "necessary new investment" rules. This means that PIA could increase airport charges to cover the investment without affecting its compliance with the price cap.

The most significant investment that PIA planned to undertake was to put an overlay over the second runway. This overlay would allow larger planes to continue to land on the runway, as well as allowing more frequent use of the runway. It involved the construction of a new wearing surface in two stages, which would address severe cracking and resultant stone and shape loss as well. The stage 1 cost of the project was \$2.7 million, and the overlay would have a useful life of 15 years

In its final decision the ACCC noted:

The Commission considers that, except for the upgrade of taxiway H5 the investments are only partly "new" and that a part of the costs cover asset maintenance. The runway overlay is the most expensive of the projects proposed. The reason the Commission does not consider that it meets the requirements of the Treasurer's guidelines is lack of user support and lack of information for the Commission to reach an informed decision on the level of costs associated with the "new investment" component of the project. In coming to this decision, it is noted that the consultation process was limited¹.

This meant that the Commission only allowed part of the costs of the investment to be passed through, as it considered only part of the project to be "necessary new investment". This meant that the remaining parts of the projects had to be funded through existing regulated revenue, which PIA was unable to do. Therefore the investment could not go ahead. In all, only 15 of the 37 projects that Perth Airport requested funding to be passed through passed the new investment test.

Perth Airport has now issued a "Notice to Airmen" stopping wide-bodied aircraft from landing on the runway, except for safety reasons such as strong cross winds or emergencies. Perth Airport is only doing minimal maintenance on the runway, which will eventually have to be replaced, at great expense.

The end result is that a critical project has not proceeded and that air services in Perth have been adversely affected. This highlights how differences in interpretation and approach between owner and regulators can have serious long-term impacts. It shows the need for regulators to consider all of the effects of investment when making regulatory decisions. It also illustrates the challenges of working in a new regulatory environment.

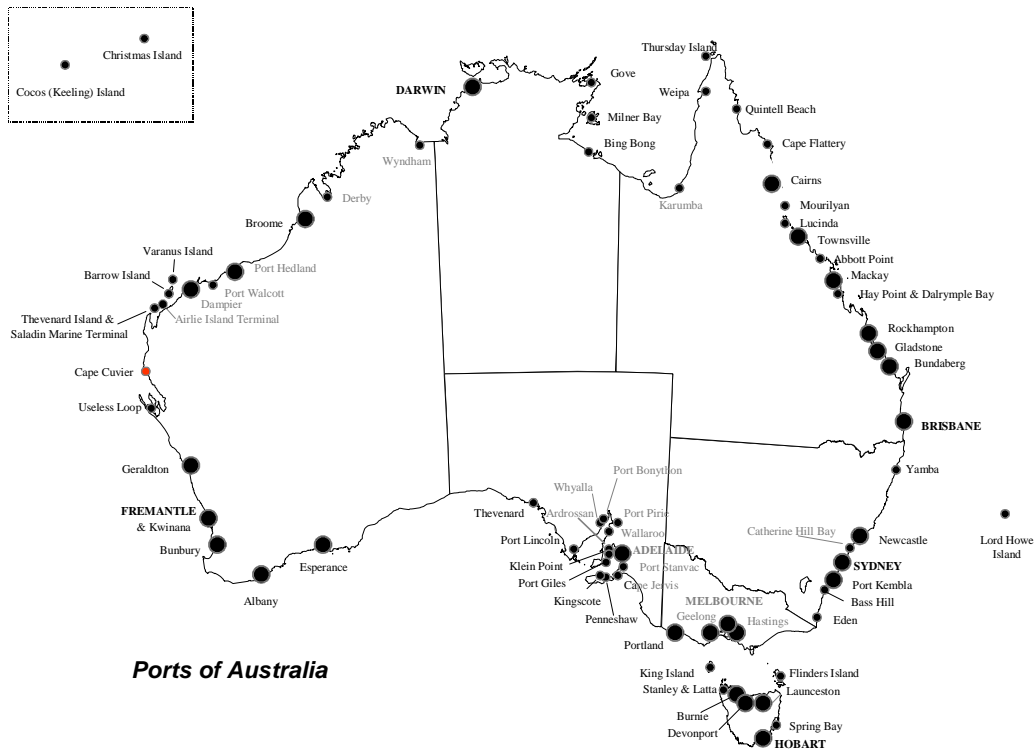
¹ACCC, Perth Airport - Proposal to increase aeronautical charges to recover the costs of necessary new investment, Final Decision, April 2000.

http://www.accc.gov.au/airport/pricing/perth_final.htm

5. Ports

5.1 Overview

Ports within Australia provide the key gateway for the import and export of commodities to and from Australia. In addition to international trade, ports serve to facilitate local coastal trade. There are more than 70 ports within Australia (www.aapma.org).



Ports of Australia

They range from high-volume bulk commodity ports and major city ports, through which the majority of general cargo is moved, to small facilities servicing remote communities. Container/general cargo ports are generally located in urbanised areas. These ports service the city and surrounding regional areas. Australia's major container terminals are located in Melbourne, Sydney, Brisbane, Fremantle, Adelaide and Bell Bay (Launceston), with significant container terminal operations in a number of other major regional centres.

Australia's major bulk commodities include iron ore (Dampier, Port Hedland), coal (Newcastle, Hay Point/Dalrymple Bay and Gladstone), grain (Fremantle and numerous others) and oil and petroleum products (North West Shelf area, Sydney, Brisbane, Fremantle, Geelong and Hastings).

Typically, port corporations are State Government owned. They have responsibility for facilitating development within the port and access from the sea. The infrastructure requirements for effective port operations include:

- Channels and navigation aids for access to and from the sea;
- Wharves, dredged berths, container yards, stock yards, container and materials handling equipment at the port; and
- Roads, rail and intermodal facilities for landside access to and from the port.

The port corporations generally lease facilities to the private sector such as stevedoring companies (who operate container terminals) and to bulk terminal operators (mainly in

the mining and grains industries). The private sector typically provides the capital equipment for the loading/unloading facilities and in some instances capital for wharves. Long lead times and integrated transport, town, land use, economic and environmental planning is required to develop new terminals and the landside infrastructure.

The *Report Card* rating for ports is B.

5.2 Key Statistics

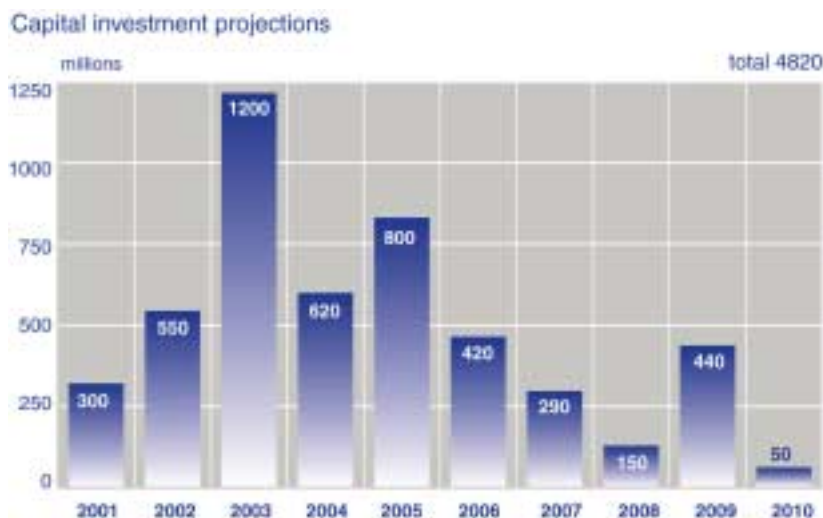
The volume of trade that passes through Australia's ports is measured in mass tonnes, which in 1999/2000 amounted to in excess of 564 million mass tonnes (www.aapma.org).

The vast majority of this volume is bulk cargo, however the value per tonne of general cargo is significantly higher than that of bulk trade. Over 93% of Australia's general trade is shipped in containers. The volume of this trade is measured in terms of the movement of 20 foot equivalent units or TEU's where twenty (20) feet is the length of a standard size container. In 1999/2000 container trade is estimated to have exceeded 37 million tonnes, the majority of this, 24 million tonnes, moving through Melbourne and Sydney ports (www.aapma.org).

The net assets of port corporations within Australia are estimated as \$2,900 million (www.aapma.org). It is expected the replacement value of the infrastructure is considerably higher given changes in regulations, technology and the fact that the net assets are calculated on an historical cost basis. The quoted figures exclude the additional value of private sector infrastructure.

The extent of future investment in port infrastructure will be driven primarily by trade growth, developments in the transport sector such as Government policy changes that drive the shift of freight from one transport mode to another, and compliance with increasing environmental pressures.

Outlined below are figures on the potential expenditure on infrastructure development required to meet anticipated trade, transport and environmental demands over the next 10 years (www.aapma.org). The decline in the projections reflects the capital investment planning horizon and is not necessarily indicative or reduced expenditure towards the end of the decade.



The majority of this investment will be directed to:

- Channel deepening projects to ensure ports are able to accommodate larger ships. Ship sizes are progressively growing to meet trade growth needs while lowering per unit operational costs. The cost of channel deepening projects will depend on a variety of factors including (1) the length of the channel; (2) the required increase in depth; (3) the types of material to be extracted (e.g. sand, rock); and (4) disposal requirements for the extracted material.
- Berth development – to meet both trade growth needs and to provide for new industries.
- Development of inter-modal facilities possibly including the purchase of land to ensure, where possible, adequate land access corridors for road and rail transport and environmental buffer zones.
- Specific purpose developments to allow new industries to develop and existing ones to expand, requiring storage, loading and unloading facilities and possibly specific berthing arrangements.

Although it appears that port infrastructure is adequate to meet present market needs, the development of port infrastructure needs to significantly precede actual trade growth and other changes dictated by market trends if it is to be available at the time required.

Accordingly, port-related infrastructure development requires long lead times, a factor that also affects the timing of other infrastructure developments such as road and rail access within the port. The aggregated figures clearly demonstrate a need for significant port infrastructure investment over the short to medium term if ports are to meet those needs.

5.3 Issues

5.3.1 Long term, integrated planning horizons

Ports are being affected by a lack of long term, integrated planning arrangements that recognise ports' role in the transport chain and what they require to be able to fulfil that role.

Landside access is essential for effective port operation and expansion. Port corporations play an important role in ensuring these links are included in planning processes and facilitating their development. Ultimately, however, the planning and funding decisions for such projects are not within the direct authority of the port corporations.

With increased urbanisation, landside access problems are particularly apparent in Australia's major cities. It affects all ports in Australia to some degree, and will affect the extent to which existing infrastructure can be utilised, and the feasibility of future infrastructure investments.

In large part, appropriate long term planning would have minimised the effects of the problems we now see associated with overall transport needs and related social and environmental issues outlined below.

5.3.2 Regulation

In general, port corporations remain owned by State Governments, with no national regulatory regime.

The existing ownership arrangements directly affect the on-going management activities and investment decisions of port corporations.

A full list of legislation relating to ports across Australia can be accessed from the AAPMA site (www.aapma.org).

5.3.3 Funding

Income is generally derived from levying of port charges on trade through the port and income from leasing of port facilities and real estate to private sector operators. Typically, income derived from port operations is used for operation and maintenance costs of the port facilities and returned as dividends to the shareholding Ministers.

Funding for future development is typically secured through retained earnings and/or loans approved by the shareholding Ministers often on the basis that the investment will yield Government pre-determined returns.

5.3.4 Management

As State Government owned Corporations, port corporations are responsible to shareholder Ministers who are, in most cases, the State Treasurer and the Minister for Transport.

A report (Meyrick/Tasman 1998) to the then Marine and Ports Group of the Australian Transport Council noted that:

“Modern theories of GBE [Government Business Enterprise] administration stress the interdependence of autonomy and accountability, and the importance of striking an appropriate balance between the two.”

The report found that:

“In the Australian ports sector, we do not as yet appear to have got this balance right. There is a widespread view, held not just by port authorities but also by port users and service providers, that bureaucratic and political intervention in the micro-management of Australian ports remains commonplace” (Meyrick/Tasman 1998).

5.3.5 Technology

There is a range of technologies affecting the development of ports, including:

- Ship sizes, which continue to increase in response to increases in trade growth and the drive to reduce per units costs of transport, which in turn, imposes greater demands on the port infrastructure to accommodate these vessels. The impacts on infrastructure include the need for deeper vessel channels, longer and deeper berths and larger container cranes.
- Dynamic Under Keel Clearance systems (DUKC) which are computer-based modelling systems that allow the dynamic physical conditions of a port, particularly tidal movement, to be taken into account when determining the maximum volume of cargo that can safely be loaded onto a ship. The benefits of DUKC are best illustrated in bulk commodity ports that require large sized ships such as Port Hedland. Port Hedland identified that it was able to achieve an average increase in draft of 30 centimetres which “on an average-sized iron ore carrier of 150,000 Dead Weight Tonnes) equated to an increase of almost 4,000 tonnes or \$100,000 per shipment.
- Electronic tracking of containers from the point of origin through to destination. The tracking of containers facilitates the more efficient consolidation and movement of containers at the port.
- Provision and receipt of electronic regulatory clearances and other information to various organisations including port corporations, the Australian Quarantine Inspection Service, the Australian Customs Service etc.

Greater use of developments in information technology will facilitate the more efficient use of existing port infrastructure – reducing the need for investment in civil works.

5.3.6 Environment

Port corporations have assumed very proactive roles in ensuring environmental imperatives are an integral part of all planning, development and operational aspects of the port. Environmental divisions typically form part of port corporation management structures.

Key environmental issues include:

- Dredging and spoil relocation
- Noise
- Dust
- Lighting
- Oil spills
- Marine incursions

Environmental regulation by Commonwealth, State and Local Governments is often inconsistent, leading to difficulties in compliance as well as potentially unnecessary costs.

5.3.7 Social

The social issues related to port development are sharply defined in the interface between urban areas and the port. Port operations require large areas of land. Increasingly, the public and developers are seeing the same land as fit for prime residential use. Unfortunately, residential development and 24 hour port operations with the attendant noise and lighting may not co-exist comfortably.

5.3.8 Economic

Ports are natural monopolies. In the absence of competition, and with the need to manage the often conflicting demands of facilitating trade and maximizing return on investment, there are difficulties in setting appropriate prices for access and rates of returns on investment, as well as determining appropriate investment targets.

There has been a variety of approaches used to overcome this, with varying degrees of success, which are detailed in the Meyrick/Tasman (1998) Report. In general though, while port corporations are State Government owned, there needs to be a clear and consistent policy statement of the appropriate objectives that they should pursue.

5.4 Future Directions

Better integration of intermodal transport is required to remove bottlenecks and improve the efficiency of freight movement from wharf to road, rail and air networks.

There is a strong need for integrated planning in relation to maintaining buffers around ports and controlling the urban development of previous port owned or port related lands. This urbanisation creates many of the community problems facing ports. Whilst this is particularly pertinent in capital cities, it is also becoming an increasingly important issue in regional ports and new remote area ports.

Further work on developing suitable pricing and investment criteria is necessary, in the absence of competitive market forces, to ensure sound investment, dividend and pricing decisions are made by port corporations and their owners.

5.5 Report Card Rating

The Australian ports industry was not included in the *2000 Report Card*.

The current level and maintenance of port infrastructure varies from port to port and terminal to terminal, and is currently rated as acceptable to very good overall.

The *2001 Report Card* rating for ports is B.

Case Study

PORT/RAIL FREIGHT SUCCESSES

Sydney Ports Corporation is leading the way in promoting and facilitating improved rail systems/networks to support the growth of container trade. The objective is to improve the inland transport system, through use of rail transport to further develop and streamline the logistics chain and through improvements generally to the current infrastructure serving the port areas of Sydney Harbour and Port Botany.

Currently over 1million TEUs are moved through Sydney ports with 88% through Port Botany. About 25% (220,000 TEUs) of Port Botany's throughput is by rail. Container throughput is expected to reach capacity (1.5 million TEUs) at Port Botany within 5-10 years. Rail's share is planned to dramatically increase and by 2020 could reach 40%, namely 800.000 TEUs

The Botany Rail Steering Group (BRSG) was formed almost two years ago to coordinate rail development at the port. BRSG members include SPC, FreightCorp, National Rail major rail operators, terminal operators, and stevedores. This coordinated and integrated approach to port planning and operations is facilitating implementation development strategies to satisfy growth.

Container throughput growth is strongly attributed to government and private rail carrier marketing, stevedores increased container handling rates and SPC's efforts to support development of intermodals and increase its port capacities.

The BRSG's efforts will ensure Port Botany is able to meet the anticipated growth in container trade through increased rail use and optimum use of infrastructure.

6. Water – Potable and Wastewater

The water industry in Australia is estimated to generate direct annual revenues in excess of \$6 billion and employ more than 30,000 people. The provision of reliable clean water and the collection, treatment and management of wastewater is a fundamental service in a developed society. These services are not only essential for the protection of public health and the environment. They also underpin much of the industrial development in the country.

Just over 300 authorities provide water and wastewater services to Australia's 19 million people. About 64% of the Australian population is served by 21 major urban utilities that each serves more than 50,000 connections to residential and business properties. There are a further 69 regional utilities (non major urban) serving a further 17% of the Australian population. These have between 10,000 to 50,000 connections. The remaining water utilities generally have fewer than 10,000 connections.

The size, scope and responsibility of the water utilities vary considerably. In the ACT, NT, SA and WA a single Authority provides water and wastewater services. In the remaining States, water and wastewater services are provided by either major regional water utilities (such as Sydney Water Corporation) or local councils. In the last decade the water industry has undergone significant change in structure, regulation and funding. Most States have restructured their water utilities and dismantled the vertically integrated utility structures. Many of the Council of Australian Governments (COAG) reforms have been implemented by most of the larger urban water authorities. Furthermore, many of the National Competition Policy (NCP) initiatives are close to being finalised. These initiatives have placed the water industry in a much stronger position to meet future customer expectations and the challenges of globalisation.

The private sector is playing an increasing role in delivering water and sewerage services. Although the private sector's role has tapered off in the last few years, some 50 significant contracts have now been awarded for a wide range of water projects. These have included major BOOT schemes, period concession contracts, operation and maintenance contracts, design and construct and, more recently, alliance type contracts.

Environmental, public health, water quality, reuse and asset replacement remain key issues for the sector.

This section of the *Report Card* is in two parts. The first deals with wastewater, the second deals with potable water.

Report Card ratings are C for wastewater, and C for potable water.

6.1 Wastewater

6.1.1 Overview

The collection, treatment and management of wastewater is an essential service required to protect public health and the environment. Increasing community awareness and concern about the environment and the impact of wastewater discharges on the nation's waterways has resulted in the introduction of more stringent environmental standards and a focus on the beneficial use of treated wastewater.

About 90% of the Australian population is connected to a sewerage collection system, while the remaining population uses on-site systems.

At present less than 10% of the wastewater generated in Australia's cities and towns is being reused. The major portion is discharged to waterways, either to rivers, estuaries or directly to the ocean. With shortage of new sources of water, there is a growing interest in reuse of effluent for agriculture and industrial uses with some States, eg. NSW, setting targets for their communities. The proportion of reuse varies considerably throughout Australia. In general, in the major coastal cities such as Sydney and Melbourne, the proportion of re-use is low. Many of the inland regional cities and towns have much higher levels of reuse.

6.1.2 Key Statistics

Asset Information

The following table summarises the extent of the wastewater assets in Australia.

Key Asset Group	Major	Major	Other ³	Estimated Total
	Urban ¹	Non-Urban ²		
Length of sewers (km)	24,500	81,000	16,500	125,000
Pump stations	3,900	4,000	950	9,000
Sewage treatment plants	270	180	350	800

¹ Major Urban represents 21 of the largest water utilities in Australia with more than 50,000 connections (WSAA)

² Major Non-Urban represents 69 of the larger water utilities mainly in regional areas serving between 10,000 and 50,000 connections (AWA)

³ Water utilities with less than 10,000 connections

Asset Values

The estimated replacement value of Australia's wastewater assets is summarised below:

State	Estimated Replacement Value of Australia's Wastewater Assets (\$millions)
VIC	9,500
QLD	5,100
NSW & ACT	15,500
TAS	1,200
SA	3,100
WA	4,200
NT	280
Total	37,600

Source: WSAA Facts 2000

In the absence of specific information on the condition of existing assets, use was made of the written down values reported by the utilities. This provides some indication of condition but is not necessarily an accurate indicator. The following table provides an

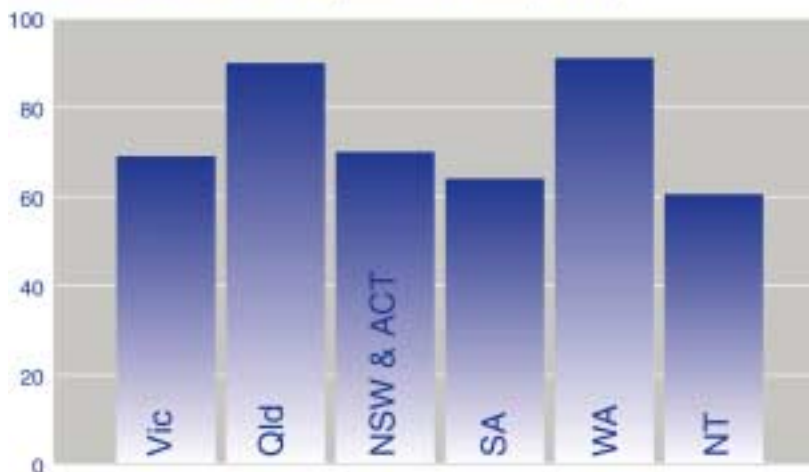
indication of asset condition for the majority of wastewater assets based on the WSAA data. This information is summarised graphically in the following figure.

State	Replacement Value Sewer (\$000's)	Written Down ¹ Value Sewer (\$000's)	Written Down as % of Replacement Value
VIC	7,984,386	5,429,457	68
QLD	3,090,221	2,762,415	89
NSW & ACT	11,564,382	8,104,148	70
TAS (i)	TBA	TBA	TBA
SA	2,578,544	1,655,925	64
WA	3,358,213	3,060,701	91
NT	218,742	132,431	61
Total	28,794,488	21,145,077	73

Source: WSAA Facts 2000

¹ Data on the written down value of wastewater assets was not available for the Major non-urban utilities.

Written Down Value as % of Replacement Value (WSAA)



It can be seen from this information that the condition of wastewater assets in the growth States of Queensland and Western Australia is relatively good. This probably reflects a younger asset base. In the remaining States the written down value of existing assets is below 70%, which indicates a significant level of depreciation and need for increased renewals expenditure.

6.1.3 Issues

The wastewater industry plays an important role in the future economic development of Australia. Often the management of wastewater is a limiting factor in the establishment of new industrial projects. Australia is fortunate to have access to some of the most advanced technologies for management of wastewater. With consistent regulation and clever engineering it is possible to accommodate major industrial development projects in Australia without causing environmental harm. The ability of our industry to do this provides Australia with a unique skills base to expand to the rest of the world.

The following sections discuss in more detail the major issues facing the wastewater industry.

Government Policy & Regulation

State and Territory Governments are generally responsible for the provision of wastewater services. In some States (Qld, Vic, NSW, Tas) the provision of wastewater services has been devolved to regional utilities (e.g. Melbourne Water) and Local Government. The Federal Government's role is generally in policy development and coordination.

Within Australia, there is a raft of legislation and regulations that impact on the provision of water and wastewater services, with 35 different State and Territory departments or boards administering some 29 different Acts.

While there are considerable commonality in the various Government acts and regulations there are also many inconsistencies and much duplication. For example, guidelines for effluent and biosolids re-use vary from State to State. Several States have established their own guidelines that overlap with Federal Government Guidelines.

The wastewater industry in Australia would benefit from streamlining of Government regulations and legislation and the adoption of more national guidelines.

Asset Management

Contemporary asset management practices are well developed in the water industry, although the quality and reliability of information is variable.

One of the major weaknesses identified in the *2000 Report Card* was the lack of information on the condition of the wastewater assets and the inadequate allocation for renewal and rehabilitation.

While there has been some improvement since 1999 there are still significant information gaps on the condition of the existing assets, especially those that are buried. These make up 70% of the replacement value of all the wastewater assets.

The two leading industry associations, Water Services Association of Australia (WSAA) and Australian Water Association (AWA), report an increase in renewals. However this falls well short of what will be required to cover the rate of asset deterioration.

Funding

In general, wastewater businesses are funded directly by users or consumers using full economic cost of service models with a range of returns on assets. Under policy established by COAG this return on assets is capped at a nominated weighted average cost of capital (WACC). All other costs, including depreciation (straight line) or average annual renewal annuity (AARA) are fully funded.

Community service obligations (CSOs), where they exist, are required to be fully transparent. Utilities report the proportion of revenue from CSOs in reports such as the NMU Report.

Technology

The Australian community's desire for clean waterways has resulted in almost every water utility in Australia having to consider upgrading the level of treatment in their existing wastewater treatment plants.

In areas such as South East Queensland and the Hawkesbury-Nepean Valley there has been a dramatic increase in the number of nutrient reduction plants.

The number of nutrient reduction facilities in these two regions is amongst the highest in the world. This has placed Australia as one of the leading countries in use and operation of biological nutrient reduction plants.

Shortage of water supplies for industry and agriculture has helped to create some innovative reuse projects. For example, the Virginia Scheme in South Australia is one of the largest effluent reuse schemes in the world involving irrigation of edible crops. In Brisbane a 20 megalitres per day L/d micro-filtration and reverse osmosis plant was recently commissioned to supply water to a major industrial facility. Similar schemes are planned throughout Australia.

Environment

The algal blooms and beach closures in the early 1990s highlighted the need for improved wastewater management practices. Loss of seagrass beds is an ongoing issue in several areas and is a very current driver for improvements.

In response to these issues, authorities have invested considerable capital to upgrade existing plants, improve the level of treatment and reduce the level of pollutants discharged to waterways. While very welcome, these initiatives have only addressed part of the problem. The contribution to waterway pollution from diffuse sources such as urban runoff and sewer overflows has not been as well addressed in Australia. This will become the next major issue that will require attention in most urban areas in Australia. Sydney Water Corporation has recognised the impact from sewer overflows and is in the process of implementing a \$1.5 billion sewer overflow reduction program over the next 20 years.

Urban encroachment near existing treatment and transportation infrastructure is also forcing many utilities to increase capital and operating expenditure to reduce odour and noise emissions from existing and new facilities. For example, the Water Corporation in Western Australia has allocated some \$80 million in capital works to reduce odour emissions from its existing facilities.

Social

Protection of public health and the environment are a major concern to the Australian community. This level of concern will increase in future as population grows and more wastewater loads are generated.

The Australian community is now more discerning and expects a higher level of service to be provided than ever before. It is generally prepared to pay a higher price for this service provided it could be demonstrated that the service is efficient and the community is engaged in the decision-making process.

Australia's water utilities have not had a good track record in consulting with the broad community and will require a concentrated effort to meet future community expectations. Utilities will need to engage more with their communities. They will need to raise awareness of the wastewater issues, how these issues integrate with the total water cycle, explain the costs involved in improving the level of service and the consequences if a lesser level of service was provided.

There is an accepted obligation to provide this essential service to everyone in the community. However, not everyone in the community has the same ability to pay for this service and many utilities have therefore traditionally cross-subsidised these services. Under the COAG reforms, utilities are required to identify their community service obligations (CSO) so the process is seen to be transparent. The determination of CSOs is

in the infancy stage and the accuracy of the information is variable. It is important, however, that utilities let the community know what it is costing them to provide CSOs so their performance can be properly benchmarked against other utilities.

Economic

Financially the major challenges facing the water utilities managing wastewater assets is how to balance the competing demands of:

- Funding renewals and higher regulatory standards for existing customers;
- Achieving a respectable economic return;
- Capping price rises for services below CPI; and
- Increasing dividend contributions to Government.

In the last five years, the major water utilities have been able to meet this challenge through the efficiency improvements they have achieved as a result of implementing the COAG and NCP reforms. A review of the financial performance of the major urban water utilities shows that since the implementation of the above reforms, customer bills have reduced in real terms by about 5%. This has been achieved without impacting on the economic real rate of return for the businesses that has hovered around 5% during this period.

Since the publication of the *2000 Report Card*, the major urban water utilities have increased their capital expenditure for both new works and renewals by more than 20%. Furthermore, utility contributions to Government in the form of dividends and/or tax equivalent regimes have doubled from \$490 million to over \$1 billion in the last five years. The increased investment in capital works and renewals has helped improve the level of service of these utilities. However, even with these increased investments, the amount allocated for renewals is still less than 0.5%, which is not sufficient to meet the rate of asset deterioration.

While there may be some further room for efficiency improvements by extending the reforms to the smaller utilities, they are unlikely to match those achieved in the preceding five years. Many of the smaller utilities in regional Australia simply do not have the financial resources to provide for renewals or improved standards from their existing rate base.

A matter of some concern to the industry is the level of dividends that is paid to Government, which in turn is not re-invested in the water industry. In many cases 100% of the profits generated by the utilities are paid to Government. Clearly this situation is not sustainable and will need to be addressed by the industry.

6.1.4 Future Directions

The initiatives by WSAA and AWA to publish performance data of the water utilities in Australia are commendable and should be expanded to cover all utilities. It is considered that more benchmarking should be carried out to ensure best appropriate practices (BAP) is adopted by all businesses.

A national approach to this BAP ideal, as has been adopted in New Zealand, would be beneficial in Australia.

For consistency it would be beneficial if the data published by WSAA and AWA were consistent to allow benchmarks across the whole industry, although it is appreciated that larger utilities require more sophisticated measures, there will always be variations in the intensity of information

Since the *2000 Report Card*, the wastewater utilities have improved their performance by increasing their investment in renewals and upgrading the treatment plant performance. To achieve further improvement, the utilities will need to:

- Address the condition of ageing sewerage collection systems. This represents about 70% of the total replacement value of wastewater assets. Anecdotal information in the form of sewer overflows suggest that there are many collection systems that are suffering from advanced deterioration;
- Engage with the community to raise awareness of wastewater management issues, explain costs involved to improve the level of services and consequences if no action is taken;
- Increase the level of effluent reuse. Given Australia's limited water resources and projected growth in water demand, the amount of reuse should be more than 10%. It is encouraging to see some States developing policies and targets to increase re-use;
- Reinvest the profits generated by the utilities to catch up on renewals and improvements in standards; and
- Continue the efficiency path. The efficiency gained using NCP and COAG reforms must continue.

Governments can in turn assist the process by streamlining and simplifying the raft of regulations. Given Australia's small population, there needs to be more uniform regulation for the management of wastewater.

6.1.5 Report Card Rating

A rating of C- has been given to the wastewater industry. This is a one-grade improvement from the *2000 Report Card*. This is in recognition of the increased investment in renewals and large number of treatment plant upgrades that have resulted in reduced pollutants being discharged to Australia's waterways. The current level of reuse is disappointing for a country with limited water resources. Moreover, a bigger effort will be required to obtain a better understanding of the condition of the transportation system and reduce the impact from diffuse sources of pollution.

6.2 Potable Water

6.2.1 Overview

The provision of potable water is an essential service for any community. By world standards the great majority of Australians are supplied with reliable and high quality potable water.

In Australia, this service is provided by over 300 utilities that are diverse in size and function. The great majority of these utilities provide both wholesale and retail functions, although in the major urban areas such as Sydney, Melbourne and Brisbane there are separate wholesale and retail utilities.

The wholesale utilities such as the Sydney Catchment Authority typically provide bulk storage and transfer functions and in some cases also provide water treatment functions.

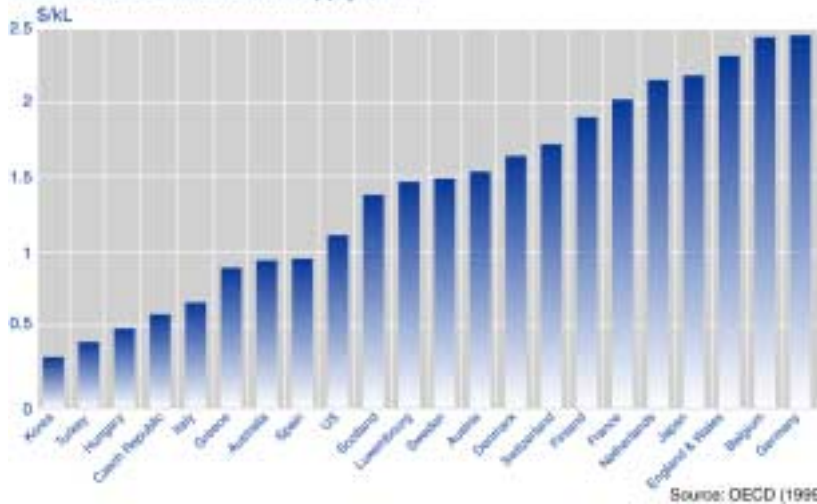
The retailers predominantly distribute potable water to the consumers although in some cases they also treat the water prior to distribution.

At present 98%, of the Australian population is provided with reticulated water. It is estimated the annual water consumption of all the cities and towns throughout Australia is about 3,400 gigalitres. The residential consumption is about 2,200 gigalitres.

While this volume of water may seem high, it only represents about 5% of the total water extracted from the Australian environment and about 15% of the total water consumption. Over 90% of potable water is sourced from surface water and the remaining 10% from groundwater.

The 1998 cryptosporidium scare in Sydney highlighted the importance of water to a community and brought some focus on drinking water quality and standards. A significant proportion of the potable water supplies are sourced from catchments that are protected from human activity.

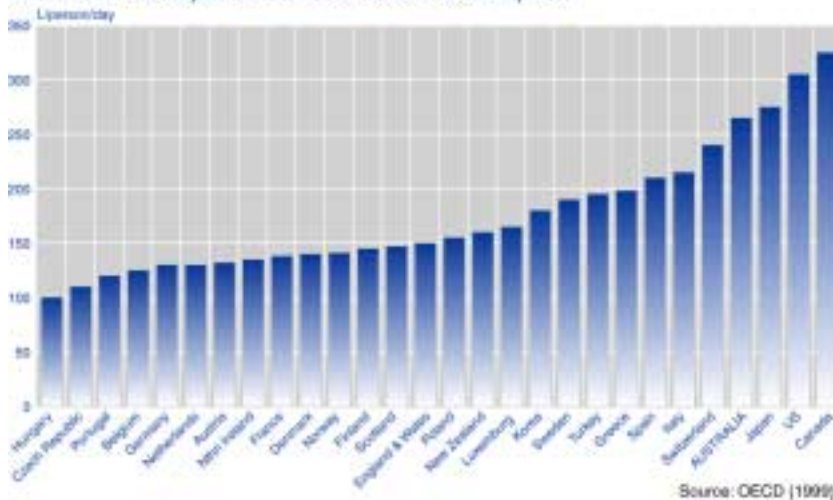
Household Potable Water Supply Tarrifs



Having such protected catchments has helped to reduce the level of treatment and maintain the cost of water supply in Australia to one of the lowest in the OECD. The attached graph compares cost per kL for different OECD countries.

The availability of relatively low cost water has led Australia to be one of the highest consumers of potable water on a per capita basis. The following graph compares the per capita residential consumption rate for different OECD countries. The water reforms in the last five years have encouraged water utilities to move more towards a user-pays system for charging for water. This has resulted in a reduction in unit consumption. Despite an increase in population, the total water consumption in the last five years has not increased.

Estimated Per capita Household Water Consumption



6.2.2 Key Statistics

Asset Information

A summary of the key water supply assets operated by the water utilities is outlined below. The information for the smaller utilities has been estimated after discussion with water association representatives. This has then been added to known data to provide an overall estimate for Australia.

Asset Group	Major ¹ Urban	Non-Major ² Urban	Other ³	Estimated Total
Bulk Storages/Weirs	300	310	250	860
Service reservoirs	1,300	1400	500	3,200
Bores	400	375	300	1,075
Aggregate length of water mains (km)	89,400	43,700	41,900	175,000
Water pumping stations	1,050	1,150	1,000	3,200
Water treatment plants	225	276	220	720

Source WSAA Facts 2000, NMU Report 2000

¹ Major Urban represents 21 of the largest water utilities in Australia with more than 50,000 connections (WSAA)

² Major Non-urban represents 69 of the larger water utilities mainly in regional areas serving between 10,000 and 50,000 connections (AWA)

³ Water utilities with less than 10,000 connections

Asset Values

The total replacement value of potable water related assets is outlined in the table below:

State	Estimated Replacement Value of Australia's Water Supply Assets (\$millions)
VIC	8,700
QLD	5,100
NSW & ACT	14,000
TAS	550
SA	3,700
WA	3,350
NT	600
Total	36,000

Source: WSAA Facts 2000

In the absence of specific information on the condition of existing assets, use was made of the written-down values reported by the utilities. This provides some indication of condition. The following table provides a summary of the replacement and written-down value for the majority of wastewater assets based on Water Supply Association of Australia (WSAA) data.

State	Replacement Value Water (\$millions)	Written Down Value Water (\$millions)	Written Down Value as % of Replacement Value
VIC	7,710	5,444	71
QLD	3,039	2,694	89
NSW & ACT	10,728	7,398	69
TAS	355	162	46
SA	2,980	1,894	64
WA	2,695	2,471	92
NT	505	328	65
Total	28,012	20,391	73

Source: WSAA Facts 2000

The above information is summarised graphically in the following figure. The trend for water supply infrastructure is similar to wastewater, where the condition of water supply assets in the growth States of Queensland and Western Australia is relatively good, reflecting a newer asset base. In the remaining States, the written-down value of existing assets is below 70%. In Tasmania the value placed on current assets is less than half of their replacement value.



6.2.3 Issues

Availability and Standards

The availability of clean reliable potable water is often taken for granted by the community. The Sydney cryptosporidium health scare in 1998 raised the community's interest in water quality and its safety. Since that event, many water utilities have assessed the potential pollutant risks to their water supplies and have implemented a range of improvement works and better monitoring regimes.

General awareness and debate in the community about water quality continues to increase. Issues include safety, taste and visual quality. For water utilities to continue to meet rising expectations, they will require additional capital and operating expenditure to improve the level of treatment.

At present many of the major urban centres have adequate potable water supplies for the next one or two decades. The increase in population will require additional sources to be developed in the near future to meet the projected shortfall in demand. Despite some tapering off in unit water consumption rates in recent years, more work could be done to encourage further water conservation and help defer major capital works by another one to two decades.

Government Policy & Regulation

Regulation of water supply is similar to wastewater. State and Territory Governments are generally responsible for the provision of water supply services. In some States (Qld, Vic, NSW, Tas) the provision of water supply services has been devolved to regional utilities (e.g. Melbourne Water) and Local Government. The Federal Government's role is generally in policy development and coordination.

Within Australia there is a raft of legislation and regulations that impact the provision of water and wastewater services, with some 29 different Acts administered by 35 different State and Territory departments or boards. The difficulty arises when introducing for example, a new technology. It is likely to have to meet a variety of different regulatory criteria across Australia, adding to the overall cost of installation and maintenance.

There is now more uniformity in the adoption of drinking water guidelines. The majority of the water utilities in Australia are adopting the 1996 Australian Drinking Water Guidelines (ADWG), although some utilities are still World Health Organisation guidelines. As part of the rolling revisions of the 1996 ADWG, a national framework for drinking water quality management is being developed. Under this new framework there will be a greater emphasis on risk assessment and community consultation in setting new standards, rather than the blanket adoption of specific targets.

Similarly most utilities have adopted multi-part water tariffs that combine an access fee and usage charge consistent with the National Water Reform Framework.

Asset Management

Asset management practices are well developed by most water utilities for the visible assets. However, as in the case of wastewater assets, the main drawback is the quality and reliability of the information on the buried assets that make up to 70% of the replacement value of the total water assets.

Water distribution assets are even more difficult to access to perform condition assessments than wastewater collection systems. Thus, the lack of information on the condition of this asset group that was reported in the *2000 Report Card* is still relevant today, as is the inadequate allocation for renewal and rehabilitation.

The majority of the water utilities have made good progress in addressing unaccounted for water. The urban utilities reported between 2.5 to 5% reduction in water losses since 1997/98, with total losses averaging 11.69% of total water supplied (WSAA 2000). There has also been a slight reduction in the number of main breaks per 100km (WSAA 2000), although this parameter can be affected by climatic factors, so it needs to be treated with some caution.

Funding

The funding requirements for water are similar to that of wastewater. In order to make the provision of services affordable in some locations, a Government subsidy is provided to water supply businesses. The areas provided with subsidy are known as Community Service Obligation (CSO) areas. Fifteen of the non-major urban utilities, for example, received some revenue from CSOs in the 1998/99 financial year (Performance Monitoring Report 2000). Kalgoorlie, for example, received a 59% subsidy for the period.

Conversely, some water utilities are subsidising other Government functions. Where CSOs do exist, they are identified in business reporting so as to be fully transparent.

Overall, most of the larger water utilities in Australia appear to have the financial capacity to fund their future capital and renewal works obligations. While this varies considerably, on average, they have low debt to equity and high interest cover ratios.

Technology

Since the *2000 Report Card* there has been a significant increase in the use of micro-filtration for water treatment. This has resulted from the adoption of more stringent water quality standards, requiring the use of more advanced treatment processes, and dramatic reduction in the cost of membranes.

A number of communities have introduced the use of ozone and granulated, activated carbon (GAC) in their treatment plants to handle water with algal toxins and to improve taste and odour of treated water.

In Western Australia the world's first major MIEX™ treatment plant is under construction, designed to reduce total organic carbon (TOCs) and to improve taste and odour of the treated water.

Environment

The past practice of providing new and larger infrastructure to meet ever-increasing water demands is not appropriate in today's environment. Communities are demanding a more holistic approach to water resource development.

The competition for water from growing urban communities, industry and agriculture now needs to be balanced against the needs of the environment. Considerable work has been undertaken in the last five years reviewing the allocation of water from different sources to determine appropriate allocation for environmental flows.

The National Land and Water Resources Audit of 2000 found:

- Many of the nation's water management areas are either close to urban areas or overused when compared with sustainable flow regime requirements;
- The surface water quality in many basins exceeds water quality guidelines for nutrients, salinity and turbidity; and
- Many groundwater management units are either close to urban areas, or overused when compared with their estimated sustainable yield.

Water utilities wishing to extract more water from the nation's water systems are now under pressure from legislation and general community expectations, to demonstrate:

- There is a need for additional water;
- They have taken all steps to reduce water demand by implementing water conservation programs;
- They are recycling or reusing wastewater for non-potable purposes to reduce the need for more potable water; and

- That the benefits of extracting more water take into account environmental, social and economic factors.

Social

Australian consumers expect a high level of service from their water supply utilities and their expectations will become even more demanding in future. The issues of particular concern include:

- **Public safety** – The community expects the water supplied to their tap to be safe to drink. The exponential growth in bottled water and use of tap filters is an illustration of this concern. Many people are prepared to pay more than 1,000 times the cost of tap water to drink bottled water, among other things, because of the perception that it is safer to drink and tastes better.
- **Chemical-free water**– Consumers are increasingly demanding chemical-free products. The perennial debate on fluoridation is an example of this. Increasing monitoring regimes of drinking water quality have raised the community’s awareness of the presence of a wide range of chemicals (natural and additives) in potable water. It will be important that utilities are able to educate the community and clearly explain that where chemicals are present in water, they are either a natural occurrence, or that the benefits outweigh the risks.
- **Water conservation** – Australian water utilities have been active in promoting water conservation. In the last five years, there has been a noticeable reduction in per capita water use because of this promotion, higher prices, new technologies and changing lifestyles and consumption habits, but there is still room for further reductions.
- **Alternative technologies** – There is a growing number of users who are looking to alternative technologies such as use of rainwater tanks and more grey-water reuse to supplement reticulated water. The general tendency in the past was for utilities to dismiss these options for cost and health reasons. In future, utilities will need to look at the increasing use of these technologies as their performance and reliability improve. In many cases they offer a more cost-effective option in meeting fringe development water demands than do conventional systems.

Economic

The economic challenges described for wastewater equally apply to water supply utilities. They are required to balance the competing demands of:

- Funding renewals and meeting higher regulatory standards for existing customers;
- Achieving a respectable economic return;
- Capping price rises for services below CPI; and
- Increasing dividend contributions to Government.

In the last five years, the major water utilities have been able to meet this challenge through the efficiency improvements they have achieved as a result of implementing the Council of Australian Governments (COAG) and National Competition Policy (NCP) reforms. A review of the financial performance of the major urban water utilities shows that since the implementation of the above reforms, customer bills have reduced in real terms by about 5%. This has been achieved without impacting on the economic real rate of return for the businesses that has hovered around 5% during this period.

Since the publication of the *2000 Report Card*, the major urban water utilities have increased their capital expenditure for both new works and renewals by more than 20%.

Furthermore, utility contributions to Government in the form of dividends and/or tax equivalent regimes have doubled from \$490 million to over \$1 billion in the last five years. The increased investment in capital works and renewals has helped improve the level of service of these utilities. However, even with these increased investments, the amount allocated for renewals is still less than 0.5%, which is not sufficient to meet the rate of asset deterioration.

While there may be some further room for efficiency improvements by extending the reforms to the smaller utilities, they are unlikely to match those achieved in the preceding five years. Many of the smaller utilities in regional Australia simply do not have the financial resources to provide for renewals or improved standards from their existing rate base.

A matter of some concern to the industry is the level of dividends that is paid to Government, which in turn is not re-invested in the water industry. In many cases 100% of the profits generated by the utilities are paid to Government. Clearly this situation is not sustainable and will need to be addressed.

6.2.4 Future Directions

Since the *2000 Report Card*, the water utilities have improved their performance by increasing their investment in renewals and upgrading water treatment plant performance. They have reduced water losses from their systems and introduced multi-part tariffs that provide price signals for high water users. To achieve further improvement the utilities will need to:

- Address the condition of ageing water distribution infrastructure. This represents up to 70% of the total replacement value of the water supply assets;
- Drive their water conservation programs harder. While there has been a noticeable reduction in the water consumption per household, there is room to achieve further reductions;
- Be more innovative in the way they develop future water resource projects by adopting total water cycle solutions;
- Engage with the community to raise awareness of water quality issues and explain costs and benefits involved in improving the levels of service;
- Reinvest the profits generated by the utilities to catch up on renewals and standard improvements; and
- Continue down the efficiency path so that gains through NCP and COAG reforms continue.

Governments can in turn assist the process by streamlining and simplifying the raft of regulations. Given Australia's small population there needs to be more uniform regulation for the management of wastewater, to simplify compliance and minimise costs.

The WSAA and AWA initiatives in publishing performance data of the water utilities in Australia are commendable and should be expanded to cover all utilities. It is considered that more benchmarking should be carried out to ensure best appropriate practices (BAP) are adopted by all businesses.

A national approach to this BAP ideal, as has been adopted in New Zealand, would be beneficial if adopted in Australia.

For consistency it would be beneficial if the data published by WSAA and AWA were in consistent format to allow benchmarking across the whole industry, although more intensive recording for larger utilities will always be a feature.

6.2.5 Report Card Rating

A rating of C has been given to the potable water supply industry. This is a half-grade improvement from the *2000 Report Card*, in recognition of the increased investment in renewals, improved water treatment and reduced water losses from their systems.

The amount spent on renewals is not sufficient to keep pace with the rate of asset deterioration. A bigger effort will be required to further reduce water consumption and better integrate future water resource development projects as part of the total water cycle planning process.

Case Study

WHY WASTE WATER

One of the main areas for improvement in water supply is through demand management. While there have been good attempts made by the industry in recent years to reduce household water consumption, it is still high by world standards.

Water consumption in Australia varies considerably between cities. Factors affecting usage include climate, pricing, availability, and management practices.

Examples of annual consumption per residential property are:

	KL/property 1999/2000 ¹
Geelong	206
Canberra	295
Melbourne	238
Gold Coast	196

Obviously, in some cities the existing infrastructure could cater for future needs merely by reducing consumption to more reasonable levels. Such demand management initiatives can have significant effects.

A major water resources study in South East Queensland² showed that by reducing household water consumption by 20% from current levels, it is possible to defer the need for new major dam by a further 10 to 20 years. A 40% reduction would defer the need by up to 40 years.

A 40% reduction may seem a difficult target, yet resulting consumption would still be higher than most developed countries in the world.

To put this in perspective, Hunter Water, through a combination of pricing and education initiatives, has been able to reduce the household water demand to less than 200 kilolitres per annum. By comparison Melbourne, Sydney and Brisbane household annual consumption is about 240 kiloliters³. With appropriate pricing signals, education and promotion of water-saving devices, lower water consuming plants and use of rainwater tanks, a 40% reduction is quite achievable.

Hand in hand with the reduction in demand, reuse of sewage effluent can have a major effect on overall water usage. A major impediment to this process however, is inconsistency in national and state guidelines.

Despite this, a growing number of utilities have made major commitments to increase the level of reuse. For example Hervey Bay, Shoalhaven, Albury and Goulburn Valley have developed major re-use schemes that recycle for agricultural use, almost all effluent.

1. Water Services Association of Australia, *WSAA Facts 2000, The Australian Urban Water Industry*, 2000
2. Department of Natural Resources, *South East Queensland Water and Wastewater Infrastructure Study, 1999*, prepared by GHD and Kinhill.
3. Water Services Association of Australia, *WSAA Facts 2000, The Australian Urban Water Industry*, 2000

7. Stormwater and Flood Control

7.1 Overview

The stormwater system is that part of the water cycle which collects and transports runoff water from urban areas to rivers, lakes and the oceans. It consists of man-made channels and pipes, and natural waterways. In a few major centres, there are small sections of combined drainage systems carrying both stormwater and sewage.

Although rivers are not normally seen as part of the stormwater system, the issues of environmental degradation, flooding and salinity are affected by stormwater management and are briefly assessed in this chapter.

Stormwater systems frequently have two parts: an underground pipe system which conveys regular flows and an overland flow system to direct large flows (often considered as floods) through urban areas in a way that restricts flood impacts.

Stormwater systems are designed for a statistical storm event, usually a modest one, such as that likely to occur every 5 or 20 years. Overland systems are often designed more conservatively, for example to cope for a 1-in-100 year event, depending on the risk, safety and damage considerations that would arise from a flood. It is rarely feasible to design for the maximum probable flood level, so when levels exceed those designed for, uncontrolled flooding will occur. It may therefore be necessary to provide flood protection using protective measures such as levee banks.

Many country towns and parts of our major cities are located in flood prone areas. Also, the historical approach to urban development up until the 1950s and 1960s did not include planning and land development controls that required the reservation of land for flood flows. Consequently, property and building flooding occurs regularly in some older built up areas.

Stormwater management for urban development up until the mid 1970s involved modifying many of the natural waterways, creeks and open drains and replacing them with pipes, concrete lined channels and more efficient earthen channels. Whilst this was an efficient stormwater system and maximised the area available for development, it often destroyed the natural environment and did not provide for improvement of the quality of stormwater.

In recent years there has been a significant change in approach to the design and management of stormwater systems. The whole catchment, not just the individual elements, is now considered in designing a system that provides for both quantity and quality.

The current approach in new urban developments is to design systems that better replicate the natural water cycles. This involves retaining natural waterways, setting building floor level controls, replicating the natural water quantity and quality cycles through water-sensitive design and installing water quality improvement mechanisms such as trash racks and sediment ponds.

Despite these improvements the management of stormwater, floods and water quality in urban areas remains a significant issue. The reasons are complex. In existing built up areas, proposed improvements need to overcome issues such as availability of land, clashes with other infrastructure, the cost of retrofitting and finding the funds.

Additional problems include the fragmentation of responsibilities for the management, regulation and control of stormwater and flood control systems where often adjoining Local Government areas have differing requirements. However, a common factor in the responses to these problems is the establishment of whole-of-catchment stormwater management plans which take into account both the catchment planning and the drainage assets

The stormwater industry also needs to address increased community expectations for improvement in quality of both groundwater and surface waters, and the need to improve environmental quality and recreational amenity of waterways close to urban areas. For this to occur, there is a need to improve catchment management practices and to improve the quality of urban stormwater infrastructure.

Addressing these issues requires a multi-disciplinary approach involving many stakeholders, as well as the identification of prioritised issues and creative ways to finance the works. There has been some progress toward this end, through a more holistic planning and consultation framework involving a range of stakeholders such as planners, engineers, scientists and the community.

The stormwater industry, however, is characterised by a diversity of assets, ownership, management arrangements and issues. These vary State by State and within States. This was one of the issues examined in the Report on the Inquiry into Catchment Management (HRSCE&H Dec 2000).

Most of the stormwater infrastructure is ageing, and there is a need for significant investment in the short to medium term. Changing community environmental expectations and perception of sustainable development will require a review of the form of infrastructure provided, and associated service standards. As outlined in this section, there will need to be changes to the form of infrastructure and retrofitting of new works in built areas.

The *Report Card* rating for Stormwater and Flood Controls is D.

7.2 Key Statistics

The cost of stormwater system failures and flood damage is not known conclusively. However, something of the magnitude of the problem was identified in a Bureau of Transport Economics Report (BTE April 2001).

It puts the total cost of floods where damages have exceeded \$10 million, for the period from 1967 to 1999, at over \$10 billion.

The average annual cost of floods for Australia overall is further estimated to be \$314 million per year. The cost to NSW is estimated at \$128 million and to Queensland at \$112 million per year. This figure does not include flood damage due to numerous local flooding where the damages bill is estimated to be less than \$10 million. This makes flood damage the single largest regular source of natural disasters in Australia. By contrast, bushfires rank at \$77 million per year.

The Stormwater Industry Association estimates that the stormwater assets in the six capital cities of Australia exceeds \$300 billion, and nationally a total of \$500 billion (Stormwater Industry Association 2001). This includes the land and environmental value of urban creeks.

7.3 Issues

7.3.1 Regulation

Stormwater regulation is diverse and varies widely throughout Australia. The Inquiry into Catchment Management (Catchment Management Dec 2000) indicated there are several hundred Acts at Federal, State and Territory levels that affect catchments, and many of these will also affect stormwater and flood control. In NSW alone, the Department of Land and Water Conservation administers 52 Acts (Catchment Management Dec 2000). This number of Acts, associated regulation and policies, results in significant difficulties and costs in achieving compliance. As the regulations come from different agencies, some contradict others.

This scattering of responsibilities creates substantial impediments to improved floodplain management, not the least being difficulties in achieving an integrated approach (CSIRO 2000).

7.3.2 Funding

Local authorities, via property rates revenue, mostly fund stormwater and flood prevention infrastructure. This is augmented by other funding mechanisms such as developer contributions, State and Federal funding programs.

Capital funding of new works is generally adequate in green-field sites. However, there are concerns as to the long term funding commitment for maintenance of these works. This is due to a lack of operating experience with many of the new water quality projects, so their maintenance requirements are unknown. Consequently, optimistic forecasts of maintenance budgets have been adopted, which may mean that inadequate budgetary provision will occur.

Funding of retrofit works is also a concern. Some of the retrofit works require very significant capital investment and the funding is not feasible under the current arrangements. For example, flood protection in older residential and industrial areas can be very expensive due to lack of space for construction, the need for service relocation or the need to acquire land at retail value.

Funding of improvements to water quality, including stormwater and flood control systems, is becoming more important with the National Water Quality Management Strategy (ANZECC 1999). It recognises that significant investments are required but there has not yet been a detailed evaluation of whether the community can afford to fund the necessary works. As an example, a Commission of Inquiry (NSW Government) identified a need for four inner Sydney Councils to spend around \$217 million, a sum that is reported to cause them financial difficulties.

Smaller rural authorities, with less capacity to pay, have even a more acute problem with funding of both the provision of stormwater and flood control infrastructure.

7.3.3 Management

The management of stormwater and flood control assets varies widely. At one end of the spectrum are authorities that use highly sophisticated digital asset databases containing information such as channel condition and an annual replacement budget. At the other end are authorities that rely on hard copy drawings of their drainage assets, and do not know what the flow capacities are, nor how often flood loads are likely to exceed system capacity. Most lie between these two extremes.

There is a range of management arrangements across the country. Most arrangements have focused on water quantity management. However, water quality is now receiving increased attention. Examples of management arrangements are:

- In Sydney, Sydney Water Corporation has responsibility for trunk stormwater drainage, and Councils have responsibility for local stormwater drainage in some cases. In other areas, Councils are responsible for all drainage with a possible co-ordination role. In some areas, co-ordination is undertaken by the Upper Parramatta River Catchment Trust;
- In Brisbane, the City Council is responsible for all drainage works which allows an improved integration of works;
- In Melbourne, the Melbourne Water Corporation has responsibility for stormwater drainage (flood protection and water quality) in catchments generally larger than 60 hectares. Councils provide stormwater drainage in small catchments;
- In the Northern Territory, the Department of Land Planning and Environment is responsible for drainage infrastructure in smaller urban drainage networks;
- In South Australia, responsibility is shared between Catchment Management Boards and Councils;
- In NSW, the Sydney Catchment Authority has responsibility for water quality upstream of Warragamba Dam, but has little legislative power.

7.3.4 Design and Technology

The traditional approach to stormwater management and design has changed. Previously, the individual sub-catchment was considered virtually in isolation. In recent years there has been a move to establish whole-of-catchment stormwater management plans (SMP) that take into account both the catchment planning and the drainage assets. These SMPs include town planning, environmental planning, drainage planning, drainage, and flood mitigation aspects combined to form an integrated approach.

A reduction in annual average flood damage in urban areas can be achieved through appropriate design in new areas, development controls and undertaking flood mitigation in established areas.

Reports of extreme weather conditions inducing severe flooding in urban and rural areas seem to be more frequent. These may simply reflect random extreme conditions that are not reflected in weather records.

Design standards and flood management strategies need to be adapted to reflect these extreme events.

New construction approaches, eg. trenchless technology, and new products for water quality control are emerging. These emerging technologies are necessary to permit retrofit and replacement of infrastructure in heavily developed areas.

7.3.5 Environment

An emerging issue is the need to better replicate water cycles within the urban environment in accordance with Ecologically Sustainable Development. This can be implemented as both a water conservation strategy and also as an environmental improvement strategy.

For example, the use of roof water tanks to harvest water reduces the magnitude and frequency of runoff from the built-up area and therefore allows an improvement in the

water quality because of reduced flows. Some local authorities are now implementing a policy of requiring tanks within new built areas.

Research work by the CSIRO has indicated the potential benefits through water conservation and a reduced potable water demand, annual and instantaneous, that can be achieved by implementation of strategies involving tanks and harvesting (SIA 2001).

Although salinity is usually associated with major river systems, it needs to be considered with stormwater. Salinity is an increasing community problem that will require an integrated and long-term management strategy. Whilst first reported for rural areas, salinity impacts in urban areas is an emerging issue with rising groundwater tables and salts causing damage to buildings. Salinity problems have been documented in urban areas, with severe impacts reported in regional centres such as Wagga Wagga. Less severe impacts and potential impacts have been identified in metropolitan areas such as inner western Sydney.

Provision of appropriate infrastructure needs to be considered together with the design of infrastructure, to minimise impacts of salinity on infrastructure, dwellings and landscaping included as part of the environmental enhancement within urban areas.

Conversion of existing drainage infrastructure to more environmentally sensitive forms will require significant investment. In built-up areas where the systems are being retrofitted, space and allowable flood levels are predetermined from existing development, and the cost of reconstruction. Costs associated with the environmental improvement from these works do need consideration. Limited research on the willingness of the community to pay for environmental improvement works suggests there could be a limit to the rate and extent of environmental enhancement.

There is also a major emerging issue, involving the maintenance of urban fringe, drainage systems. Few Councils have sufficient funds for the increasingly expensive task of maintaining major tracts of land, and major quality and quantity control systems such as water retention basins, sedimentation ponds, and trash collection systems, which are all part of contemporary approaches to stormwater management.

7.3.6 Social

Stakeholders at the Inquiry into Catchment Management (Catchment Management Dec 2000) accepted that regional institutions and communities would best deliver appropriate programs.

Implementation of a catchment management approach to stormwater management is relatively easy in green field development areas where appropriate controls and space requirements can be built into the land use planning. Integration of a catchment management philosophy into the stormwater management for highly developed urban areas is a complex issue that is affected by existing land uses, existing services, and available space. These significantly affect the cost and affordability of works identified from catchment management assessments.

In some rural communities it is impractical to implement a catchment management philosophy to stormwater management as the catchment area may extend to include a significant rural as well as urban areas.

Limited research has been undertaken to determine the preparedness of the community to flooding. Particular research has been undertaken in the Hawkesbury/Nepean catchment around Sydney where the community has been surveyed to determine their

preparedness for flooding and their reaction to flooding. Results of this, and similar research, will require consideration in future land use planning.

7.3.7 Economic

The economics of providing flood protection and water quality protection to the community require detailed consideration. Generally, provision of flood protection does not have a high benefit cost ratio and it is difficult to justify on pure economic terms. The regional importance of communities is such that flood protection can be justified by other means.

The form of flood protection and security of the protection are also important issues warranting consideration. The security of protection afforded by levees and the possible design standard and maintenance of the levees are issues requiring evaluation. An example is Narrabri in NSW, which was protected by levees. During recent floods, the levees failed due to flood levels exceeding design values.

Expectations of improved flood protection and water quality are increasing in line with awareness of these issues. However, the additional cost of providing systems to cater for these expectations has not generally increased the funding base.

7.4 Future Directions

Ideally, all legislation that deals with stormwater and floodplain management should be coherent and integrated (Catchment Management Dec 2000). To overcome this, as relevant legislation is reviewed, legislative and administrative needs of floodplain management should be taken into account (CSIRO 2000).

Given that issues with stormwater have been identified (catchment management, flood protection and stormwater quality) that are often beyond the financial means of authorities to address, additional funding must be provided. This would involve using alternative funding sources, including private sector investment and levies.

Implementation of catchment management philosophies requires an integrated approach that addresses land use zoning, potential changes to building codes and requirements, potential changes in community perceptions/attitudes, and detailed environmental assessment of alternative strategies. Implementation of catchment management philosophies will most probably be progressive as community attitudes change.

7.5 Report Card Rating

Stormwater assets were not examined in the *2000 Report Card*.

The *2001 Report Card* rating for stormwater and flood control systems is D.

Case Study

RAINWATER TANKS MAKE A COME BACK

There is a growing trend to utilise Water Sensitive Urban Design (WSUD) principles for stormwater design. These aim to reduce environmental impact and improve stormwater management.

Some recent housing developments collect stormwater for reuse in gardens and toilet flushing, and which use gravel trenches rather than pipes to enable groundwater infiltration.

Rainwater tanks for water supply and stormwater management are rapidly gaining acceptance. Some local councils in NSW, Gosford, Wyong, and Leichhardt and Strathfield in Sydney¹, have recently reversed policies prohibiting tanks, making them compulsory in new residential buildings.

Potential benefits include:

- Stormwater flow retention and reduced nuisance flooding;
- Better balancing overall water demand and reduced infrastructure requirements; and
- The potential to supply almost 80% of household demand.

1. Sydney Morning Herald 29 Aug. 2001

Irrigation

7.6 Overview

The irrigation industry is a very important part of the Australian economy. It is estimated that 25% of all farm production is reliant on some form of irrigation. The products from irrigated agriculture are estimated to be worth \$8.5 billion per annum at the “farm gate”, leading to a further \$25 to \$50 billion in value adding and manufacturing.

The irrigation industry is by far the largest consumer of water in Australia. About 75% of Australia’s water that is diverted from surface and groundwater sources is used in irrigated agriculture.

The wealth generated from irrigated agriculture has come at a price. The legacy of past irrigation practices is reflected in the environmental impacts evidenced by the increase in soil and water salinity levels and the dwindling or vastly altered natural water flows in many of the nation’s river systems.

Much of the irrigation infrastructure that was developed between 1920 and 1960 was part of major soldier resettlement and regional development programs. These schemes were heavily subsidised by Government and the revenue generated from the supply and allocation of water was barely sufficient to pay for the operation of these schemes. With much of the irrigation infrastructure now approaching the end of its service life, the challenge for the irrigation sector is to find a way to generate sufficient revenue to pay for the renewal or rehabilitation of these ageing assets.

The issues for the irrigation sector and Government are:

- Successfully managing the allocation and effective use of a limited resource within the irrigation sector and with other users;
- Focusing on the efficiency aspects of the distribution, application and usage of water;
- Providing for and implementing appropriate renewal and rehabilitation of a generally ageing irrigation infrastructure;
- Balancing the usage of irrigation water between the shorter-term economic drivers and the longer-term sustainability of the land, the water resource and the environment.

The *Report Card* rating for irrigation is D-.

7.7 Key Statistics

Irrigation Business Profile

The irrigation sector in Australia is fragmented. There is no national body that covers all the irrigation stakeholders. In recognition of the need to better co-ordinate and represent the water industry at a policy level, the three major water industry groups, the Irrigation Association of Australia (IAA), the Australian National Committee on Irrigation and Drainage (ANCID), and the Australian Water Association, recently established the Australian Water Industry Forum.

ANCID is the Australian representative body of the International Commission on Irrigation and Drainage (ICID). It represents some 47 irrigation businesses that supply about 30% of the irrigated water in Australia. The remaining water is used by a large number of river diverters and groundwater extraction individuals and/or organisations.

The IAA is a nationally based organisation representing manufacturers, consultants, farmers and Government agencies involved in the irrigation sector. The association’s focus is on professional development and improving industry standards.

The AWA is a nationally based industry association representing some 3,500 individual members and 600 organisations working in the water industry. The association's focus is on professional development and promotion of responsible management of water and related areas.

Water Use

The total water use in irrigated agriculture is about 18,000 GL (GL is 1000ML) during 1996/97 (Australian Water Resources Assessment 2000). The table below provides a summary of the water use by the States and Territories. Most of the water was from surface sources (85%) and the remaining from groundwater.

State	Estimated Water Use (GL)
NSW	8,643
VIC	4,451
QLD	2,978
WA	710
SA	819
TAS	276
NT	53
ACT	5
Total	17,935

Source: Australian Water Resource Assessment 2000

The majority of the irrigated water is presently used for production of low value crops such as pasture and grains. The following table provides a breakdown of irrigated water use for different crops.

Crop	Gross Value (\$m)	Net Water Use (GL)	Irrigated Area (Ha)	Value/Area (\$/Ha)
Livestock, pasture, grains and other	2,540	8,795	1,174,687	2,162
Vegetables	1,119	635	88,782	12,604
Sugar	517	1,236	173,224	2,985
Fruit	1,027	704	82,316	12,476
Grapes	613	649	70,248	8,726
Cotton	1,128	1,841	314,957	3,581
Rice	310	1,643	152,367	2,035
Total	7,254	15,503	2,056,581	

Source: (Water use and gross value for irrigated agriculture (1996/97) Australian Water Resource Assessment 2000)

Asset Information

The 47 water supply businesses represented by ANCID, own the majority of the irrigation infrastructure assets in Australia. While river diverters supply more water, the infrastructure required for this is generally a minor component of the total infrastructure.

Excluding dams and weirs, a total of 3,370 km of natural stream, 16,250 km of channels or canals, and 2,470 km of pipes help distribute water to irrigation customers. There is a further 11,850 km of these distribution systems providing water to only stock and domestic water customers.

Asset Values

The estimated replacement value and written down and value of irrigation related assets (excluding dams and weirs) is outlined below:

State	Asset Valuation: Replacement Value of assets (\$millions)	Asset Valuation: Written Down Value of assets (\$millions)	Written Down Value as % of Replacement Value
Victoria	2,147	1,298	60.5
NSW & ACT	1,388	373	26.9
Queensland	2,740	1,938	70.7
Western Australia	175	25	14.3
South Australia	196	80	40.8
Tasmania	36	28	77.8
Total	6,682	3,742	56.0

Source: (Australian Irrigation Water Provider Benchmarking Report, 2000)

In the absence of specific condition, information use was made of the written down value to provide some indication of condition. This is by no means an accurate indicator and will need further refinement in future *Report Card* publications.

The above figure shows that irrigation related assets are in a relatively poor condition, particularly in Western Australia and New South Wales/ACT, where less than about a quarter of the life of the irrigation related assets remains.

Some states are trying to address the issue of asset replacement. However, the taxation system is seen as a barrier to this by the industry. The requirement for government owned irrigation businesses to pay tax equivalent dividends erodes revenue that could be used for asset replacement. The industry has been lobbying the Federal Government to address this issue.

7.8 Issues

The irrigation sector is undergoing major reform and restructuring to reflect the objectives in the COAG Water Reform Agenda and National Competition Policy.

The demand for irrigation water has doubled from 10,200GL in 1983/84 to almost 20,000GL today. Many of the irrigation areas have attained the limit of their supply sources, and in fact a number of the irrigation areas have been operating at significantly less than their design allocation.

Poor irrigation practices in the past have resulted in major environmental impacts - increase in soil and water salinity levels and vastly altered natural water flows in many of the nation's river systems.

The irrigation sector is an important part of the Australian economy. For it to continue to grow it needs to find a balance between the shorter-term economic drivers and the longer-term sustainability of the land, the water resources and the environment. The following sections discuss in more detail the challenges facing the irrigation sector.

7.8.1 Government Policy and Regulation

State and Territory Governments are responsible for the provision of irrigation services. As in water and wastewater management, there is a raft of legislation and regulations in each State that impact on the management of irrigation assets. There appears to be little consistency of approach between the various States and Territories regarding regulation and investment planning for the irrigation sector.

In each State and Territory the sector is regulated by two principal sources of Government policy: the Water Reform Agenda, established under the auspices of the Council of Australian Governments (COAG), and National Competition Policy under the *Competition Policy Reform Act*. The *Murray Darling Basin Commission Act* is the only legislation that straddles State borders.

One of the key objectives of the Government reform process has been to encourage a shift towards higher value crop production using more efficient irrigation systems, and there is evidence that this shift is occurring.

Under the National Competition Policy, irrigation businesses are required to operate on a full business cost recovery basis, with the elimination of cross subsidies between services. It should be noted, however, that the mechanism for calculating full cost recovery differs between various water supply authorities, and among the States.

National Competition Policy is also impacting the development of new irrigation schemes. Many of the original irrigation schemes were fully funded by Government and for most of their operational life have been barely able to generate sufficient revenue to meet operating costs. Applying full cost pricing to new infrastructure is resulting in significant price increases in the cost of water supply, making the development of new and more efficient schemes more attractive compared with existing schemes.

7.8.2 Funding

In general, the water businesses should be funded directly by users or consumers using full economic cost of service models, including externalities with a commercial rate of return on assets. In recognition of the historical development of the sector and the inability of some consumers to pay, under the current COAG reforms irrigation businesses do not have to achieve a return on past assets. This has helped to keep prices down for existing users.

The price of water varies considerably between irrigation systems. Based on the Australian Irrigation Water Provider Benchmarking Report in 1998/99, the average price for water was \$26/ML. The price varied from \$6/ML to \$854/ML. In States that allow trading of water rights, the average peak season price was \$780/ML for permanently traded water and \$80/ML for temporary water.

Gross revenue from customers of irrigator service provider businesses totalled approximately \$229 million in 1999/2000.

7.8.3 Asset Management

In many of the irrigation schemes, the infrastructure is approaching the end of its service life.

Several irrigation providers have made good progress in assessing the condition of their existing infrastructure and are determining their renewal and rehabilitation annuities. However the majority of the irrigation providers do not have a good appreciation of the condition of their existing assets, nor the level of investment that will be required to maintain them in an acceptable state to satisfy their future service obligations.

Given the limited revenue generated by many of the irrigation providers, there is a significant risk that the sector will not be able to meet future renewal/rehabilitation requirements.

Changing crop demands, increasing competition for water and the need for environmental flows will require irrigation providers to drive more out of their existing schemes. This could be achieved through more efficient operation of the existing infrastructure and rewarding more efficient users of water.

7.8.4 Environment

The sustainable management of the environment by irrigation customers is essential to their long-term viability. Environmental issues facing irrigator providers vary depending on geographic location. Essentially the major environmental issues relate to salinity, water quality and in-stream versus consumption water use.

The key environmental policies governing the management of irrigation assets relate to water quality, biodiversity and environmental flows. Best practice guidelines are being developed for a wide range of users and applications. A number of authorities are proposing to encourage the adoption of these guidelines through regulatory and various reward schemes.

Examples of this are the development of catchment management strategies and Land and Water Management planning processes that are being implemented in irrigation areas around Australia. These processes have widespread acceptance and adoption in irrigation areas.

The limited availability of water in many of the developed catchments will make it difficult to secure additional water supply from existing sources for further irrigation developments. By focusing on water use and delivery efficiency, recycling, and trading and pricing strategies, there is still considerable scope for further irrigation development. For example, on average only 77% of the diverted water reaches the customer (some as low as 40%), the remainder is lost in seepage, evaporation, or simply not used. By improving the delivery efficiency it is possible to accommodate further development without having to extract more from the environment.

7.8.5 Social

Apart from the direct economic benefits, there are many social benefits from irrigated agriculture such as regional employment and reduced environmental and social pressures in urban centres. Many of the original irrigation schemes were in fact established in recognition of their social benefits. The problem has been to place a monetary value on this social benefit.

Many of the communities that rely on irrigated agriculture have made significant investments in plant and farm infrastructure.

The increase in competition for water from other users and for environment flows combined with the trend to full economic pricing is forcing the farming communities to change irrigation practices.

These changes are having a significant impact on farming communities and the social structure surrounding these communities.

The communities are concerned about their financial viability and whether they will be compensated for the capital investments they have made.

Some States and Territories are also reviewing the ownership of overland flows and are considering placing regulation on farmers constructing on-farm storages.

7.8.6 Economic

Most irrigation water providers have the financial objective of full cost recovery. Although data on this issue in the *Australian Irrigation Water Provider Benchmarking Report* is incomplete, of the 26 irrigators that supplied cost recovery ratio information, 16 were showing a surplus. This is a significant improvement on previous years.

Many of the existing schemes incorporate complex environmental and social costs that are difficult to quantify. To ensure the long-term sustainability of the irrigation sector, it will be necessary to establish pricing strategies that encourage more efficient water use, and more environmentally friendly irrigation practices.

The Water Reform Agenda has recognised this and promotes the concept of social and environmental credits in allocation of water as well as the use of trading and pricing mechanisms.

7.8.7 Research

Research in this sector is as fragmented as it is in the rest of the industry. The National Program for Irrigation R & D is entering the final year of its third funding triennium. Negotiations are underway to secure a fourth round of funding. Current NPIRD priorities are water use efficiency, environmental impacts on and effects of irrigation, irrigation knowledge and its use, benchmarking, monitoring and feedback, and socio-economic policy issues.

Research is also funded by the MDBC, commodity R&D corporations such as cotton, dairy, sugar, rice and horticulture, State agencies and private companies. The overall level of funding has been estimated at \$80 million per year.

A key issue for the sector is to establish a secure long term funding base for research and to ensure closer collaboration and links between research providers and purchasers to meet the challenges facing the industry.

7.9 Future Directions

This assessment has identified the need for improvement in a number of areas including:

- Overcoming the fragmentation of the sector. The formation of the Australian Water Industry Forum should assist in doing this;
- Increasing the knowledge of the condition and the performance of the existing assets so that proper provisions can be made for the future renewal and rehabilitation of the ageing infrastructure;
- Improving understanding of the needs of the environment, competing for the same source of water;

- Improving irrigation practices to reduce demand for water and impact on the environment;
- Improving efficiency in the delivery of water to customers;
- Undertaking further research to facilitate assessment of social and environmental costs and benefits associated with irrigation developments; and
- Promoting the use of “value chain” approaches similar to those used in the “Restore the Snowy” negotiations between States in dealing with the salinity problem.

Governments can in turn assist by reducing the inconsistencies in regulations, and providing funding support to encourage users to improve practices.

It is vital that a uniform method of infrastructure reporting is adopted and figures aggregated for all irrigation businesses and schemes (public & private) throughout Australia. The ANCID Benchmarking Report is a good start, but does not include all the irrigation providers. Additional resources and the support from other irrigation providers is required to produce an effective document.

It is recommended that the Federal Government promote and provide funding support for the development of such a document on an annual basis.

7.10 Report Card Rating

Irrigation assets were not reviewed in the *2000 Report Card*.

A *2001 Report Card* rating of D- has been given to irrigation infrastructure. The fragmentation of the industry is not helpful. The lack of information on the condition of the existing assets is not allowing effective rehabilitation/renewal of existing infrastructure.

To achieve a higher rating, much more needs to be done to improve irrigation practices to make more efficient use of existing water resources, reduce impact on the environment and improve the productivity of existing schemes.

It is vital that a uniform method of infrastructure performance is adopted that covers all the irrigation providers (both public and private).

Case Study

PIPELINES REPLACE CHANNELS

Following a major study of water supply and environmental concerns in 1992, Wimmera Mallee Water proceed with the replacement of a major open earthen channel water supply system with a pipeline system.

The open channel system dated from the early 1900s and supplied farm dams and town storages across an area of over 600,000 hectares in Victoria's Wimmera-Mallee region. The system was wasteful, with some areas losing 70 to 80 percent of channel water supply due to seepage and evaporation. The degraded channels were also havens for weeds and vermin, and water quality was unsatisfactory.

The area has low rainfall and the available water resources are finite and overcommitted. New water use therefore could only be permitted with counterbalancing water savings and transfers, and after environmental requirements are satisfied.

The final stage of the pipeline is due for completion in July 2002, when the whole scheme will supply 1700 farm properties and 12 towns through a 2500km pipeline system. The total cost of \$52million has been shared between government and the community.

The pipeline system provides 5000 megalitres/year whereas the open channel system required 50,000 megalitres/year to supply the same area. This significant water saving has major benefits:

- Over 30,000 megalitres/year available for environmental flows in Wimmera and Glenelg rivers;
- Improved salinity management due to decrease in channel seepage;
- Reduced weeds and feral pests due to channel filling;
- Increased productive farmland from reclaimed channels and easements; and
- Improved quality of life, economic development potential and farm management due to high security of supply and better water quality.

8. Electricity

8.1 Overview

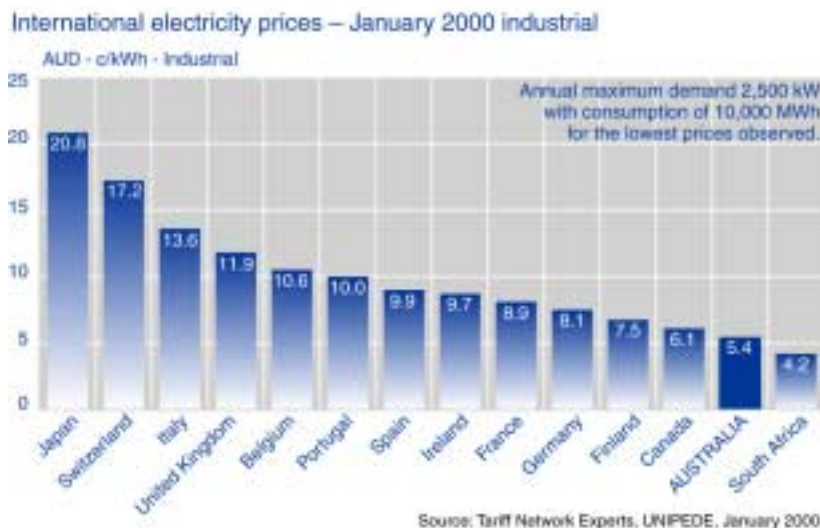
Electricity supply in Australia plays a key role in the national economy. Overall, it accounts for almost 18% of Australia's total energy needs and more than 1.6% of GDP. Annual industry revenue from electricity sales is over \$13 billion.

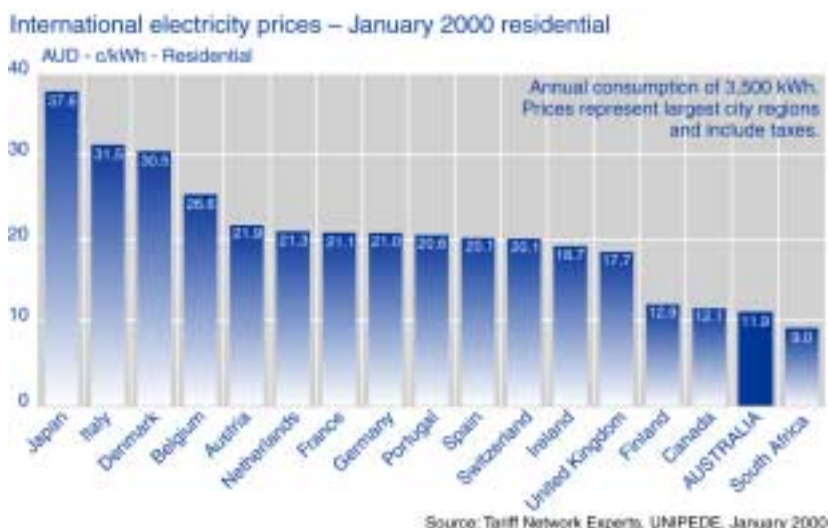
Australia's electricity supply services 8.3 million customers and directly employs 33,000 people.

The electricity power industry has undergone significant changes in ownership, regulation and funding in the last 10 years. Most States have restructured their industries and dismantled the vertically integrated utilities.

The changes have covered full privatisation and sale or leasing of the electricity generation, transmission and distribution assets in Victoria and South Australia; to the substantial retention of State Government ownership in the other States and Territories. In these States and Territories, Government policy has prevented privatisation. While the Federal Government has jurisdiction over interstate trade, constitutional responsibility for energy supply within each State remains with the six State Governments.

Australia is heavily reliant on fossil fuels for the generation of electricity. They currently account for over 95% of electricity production, with coal being the predominant fuel, accounting for 85% of production. Coal is the lower cost fuel and is likely to maintain this share of electricity production for some time. The advantage of having substantial amounts of low cost coal is that Australian power prices are in the lower quartile of international power tariffs.





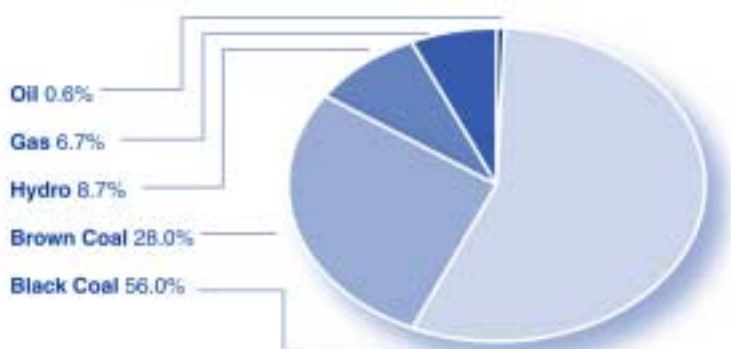
However, the negative is the greenhouse gas production, particularly CO₂ emissions. Greenhouse gas production is a major environmental issue for Governments across the world.

8.2 Key Statistics

8.2.1 Generation

Australia's generation of electricity is predominantly from four sources, coal (85%), gas (9.9%), hydro (2.9%) and oil (1.1%). The balance is produced from renewable sources such as wind, solar and other solid fuels such as biomass. The following graph shows the fuel types used for electricity production by Government owned companies. The makeup is changing as privatisation increases. At the beginning of 2000, Governments still owned or controlled 80% of generation.

Electricity generation by fuel type 1998/99 of public electricity companies
Excludes energy generated by independent power producers.



Source: Electricity Australia 2000 Magazine - ESAA

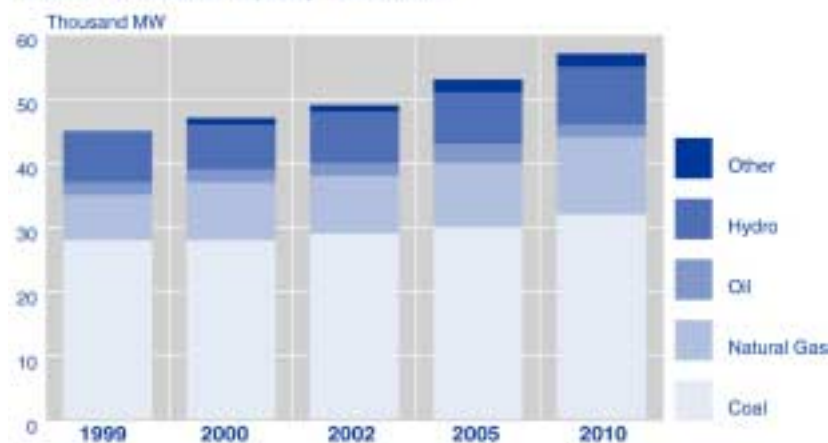
Within the States and Territories there is a great diversity of fuel types, with the predominant sources used for electricity generation listed below:

Location	Fuel Type
Queensland and New South Wales	Black Coal
Victoria	Brown Coal
South Australia and Western Australia	Gas/Coal (calorific value between brown and black coal)
Northern Territory	Gas / Diesel
Tasmania	Hydro

Total electricity generation amounted to 186,252 GWh in 1998/99, produced from an installed capacity of 40.7 GW. Of the total currently installed capacity, independent power producers represent 12%. This was an increase of 4.0% over 1997/98, with an increase in installed capacity of 3.4% over the same period. It is forecast that by 2010, electricity consumption in Australia will be 254,000 GWh.

While coal will continue to be a predominant source of fuel for electricity generation, there is an increasing trend to use natural gas. It is anticipated by the Australian Gas Association (AGA) that over 46% of the increase in gas consumption over the next 10-15 years will be due to the production of electricity. This trend is being driven by Government policies, such as Queensland requiring a 15% fuel switch to gas by 2010, and the increasing number of gas fired peaking plant being installed, particularly in Victoria and South Australia.

Forecast of installed capacity, 1999-2010



Source: Electricity Australia 2000 Magazine – E5AA

8.2.2 Transmission

Australia has large distances to cover in transmitting electricity from the generation stations to the population centres. The infrastructure to transmit this power includes over 51,500 km of high voltage overhead lines and underground cables. The highest voltage currently used in Australia is 500kV.

Each State effectively developed its transmission infrastructure in isolation over the years when each State ran its own electricity networks. The limited capability of the interconnectors between the States has been a problem, leading to additional risks for

those companies trading energy across State borders. New interconnectors, such as QNI between Queensland and NSW, are now in operation and others are planned, such as Basslink between Tasmania and Victoria, and between South Australia and New South Wales. These will then connect the grids in Queensland, NSW, Victoria, South Australia and Tasmania. Grid augmentation is expected to be one of the main issues that will affect the Australian electricity network beyond 2001. The connection of the grid to Western Australia and Northern Territory is not likely to occur due to the economics of such interconnections over the distances involved.

8.2.3 Distribution

Distribution of electricity from the transmission grid to the consumers is carried out by distribution utilities. They control over 1,590,000 km of overhead lines and underground cables.

During the last decade of electricity reform, the number of distributors has reduced significantly. This has occurred by the combining of many small Council area based distributors into much larger organisations.

Community expectations have forced distributors to install more of their networks underground, especially in new residential developments. Between 1998 and 1999 there was a 16% increase in underground assets, compared with a 1% increase in above-ground assets.

8.3 Issues

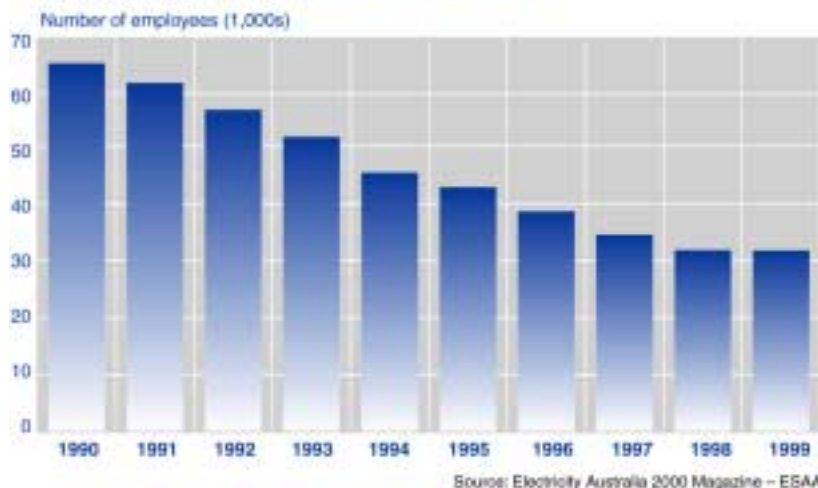
Energy-intensive industries in Australia are major contributions to GDP, and their continuing economic growth requires a continuing reliable, competitively priced electricity supply. At the same time, the supply and end-use of electricity has adverse environmental impacts in greenhouse gas emissions, marine pollution, reductions in biodiversity and increases in salinity.

8.3.1 Management Issues

Infrastructure Condition

While electricity has been around for many decades, the bulk of the construction of the electricity system occurred in the 1960s and 1970s. The electricity industry peaked at 80,000 employees in 1985 and has significantly dropped since that time, to approximately 33,000.

Employment level in the electricity supply industry



As most of the infrastructure is expected to last 40 to 50 years, there needs to be careful management of the assets to avoid the requirement for a large injection of capital, over a short time frame, to renew the infrastructure.

Most utilities have foreshadowed this, and have put in place mechanisms such as improving their asset management systems and maintenance strategies.

By knowing more about their assets and having a new commercial focus driven by the National Electricity Market (NEM), there is more emphasis on risk management and condition based maintenance.

This has allowed savings in operations and maintenance costs and deferrals of capital expenditure to allow a more even spread of the expected renewal costs over the next decade.

Security and Reliability of Supply

Each area of generation, transmission and distribution of electricity has different drivers affecting the security and reliability of supply.

For generation and transmission, the National Electricity Market Management Company Limited (NEMMCO) has responsibility for managing the security of the electricity supply system and operating the National Electricity Market (NEM) in accordance with the *National Electricity Code* (NEC). NEMMCO issues an annual *Statement of Opportunities* as a source of technical and market data for all parties having an association with, or interest in, the National Electricity Market (NEM). In the *2001 Statement*, which looks at a 10 year forecast, NEMMCO has stated that there are considerable reserves in the Queensland, New South Wales and Snowy regions for winter and summer demand. However, there are insufficient reserve margins for peak summer loads in Victoria and South Australia from 2001/02 onwards. To this extent, TransGrid has an application before NEMMCO for an interconnection with South Australia. A number of gas peaking power generation plants have been committed in the Victoria and South Australia region. Tasmania is expected to enter the NEM in the next two to three years with the establishment of Basslink. This will allow power flows at peak times to Victoria and off peak times to Tasmania.

In May 2001, NEMMCO issued a report titled *2000/2001 Summer Review of Power System Reliability and Security*. The report evaluated the performance of the network covered by the NEM, i.e. Queensland, NSW, Victoria and South Australia, and concluded that the system performed well, despite record summer demands occurring in all four regions.

In Western Australia the electricity market is deregulated, but Western Power is the State's major generator. In its publication, *Electricity Outlook 2000/2001 to 2009/2010* it forecast that additional generation capacity, to meet load growth requirements in the South West Interconnected System, will be required by summer 2005.

For most consumers, the reliability of their supply is driven by the state of the distribution network. Federal and State Governments have taken the role of regulating the electricity industry under the NEM and its Code.

In Victoria there has been concern raised by the community that privatisation means less reliable power with a perception that private sector owners will not spend enough money to properly maintain the network. The Office of the Regulator General (ORG) has put in place reliability targets that have to be met. The challenge is for the businesses to meet

the targets in a cost-effective way. The nature of electricity assets is such that plant can be refurbished to keep it in a reliable operating condition and partial replacement of assets allows the primary asset to keep functioning for a longer period, eg. replacing poles on a power line. The industry and community drivers to produce a more reliable and better performing electricity system should maintain the infrastructure in similar condition to that of today, or more likely, enhance its condition. This is already evidenced by the significant reduction in forced outages over the last few years.

Commercial Drivers

Notwithstanding the technical condition of the assets, a major concern that is raised with the current state of the electricity supply industry is the different commercial drivers of State corporations and private companies.

For example, the Victorian electricity industry is wholly privatised, while NSW's is State-owned. This affects market behaviour with State-owned corporations being seen, by some industry stakeholders, as less concerned about equity risks than their private counterparts. Notwithstanding this, the NEM is putting pressure on company boards and management of power suppliers to master the changing environment. There are already views in the industry that there will be mergers and acquisitions, leading to fewer, larger participants. While this raises a number of issues in political and regulatory areas, it does mean businesses need to change their management to adapt. If they do not, they will not survive.

8.3.2 Government Policy and Regulation

Electricity Market Reform

Reform began in May 1991 when the Industry Commission recommended that the industry be restructured, competition be introduced in generation and retail supply, and a National Electricity Market be created.

Key events since then include:

- The July 1991 Conference of Federal and State Governments made major decisions on the future reform of the electricity supply industry in Australia.
- The April 1995 *Competition Principles Agreement*, made by the Federal and State Governments, in which each Government agreed to implement a common competition policy in each jurisdiction.
- Victoria, which by 1994, had unbundled the functions of generation, transmission and distribution, and had split the generators and distributors into separate entities. Between 1994 and 1999, Victoria sold off all elements of the industry for almost \$23 billion. The sale meant that the entire industry was now under private ownership.
- By 1996, the States agreed to form two new entities to be responsible for management of the proposed NEM. The first was the "independent" market and system operator NEMMCO. The second was the "independent" rule-making entity, the National Electricity Code Administrator (NECA).
- The NEM being created by the NEC, which came into force on 13 December 1998.
- South Australia, in late 1999, after prolonged political debate, privatised all of its electricity assets, utilising complex, long-term lease arrangements, rather than outright sale.

Five criteria governed the design of the National Electricity Market in Australia. These were:

- **Competition** – the market was to be vigorously competitive so that competitive forces would always determine prices and there would be minimal opportunities for misuse of market power by any one or more competitors.
- **Customer Choice** – electricity customers were to be freely able to choose who they will deal with (including generators, traders and retailers).
- **Network access** – access to all transmission and distribution networks was to be available on a non-discriminatory basis, to all persons who seek it.
- **Market entry** – a person wishing to enter the market at any level was not to be treated more favourably or less favourably than if that person was already participating in the market.
- **Trading across regions** – the rules for trading of electricity (the pool rules) were not to treat trading within any region more favourably or less favourably than cross-regional trading.

The implicit goal of the Australian reforms was to promote efficiency and it was believed that it would be achieved as a direct result of competition.

The outcomes of the reforms were:

- Employment in the industry fell from 56,000 in 1992 to around 30,000 by the end of 1999;
- Average plant availability increased from 84% in 1992 to 93% in 1999;
- In NSW and Victoria, the introduction of competition led to much lower wholesale prices;
- In SA and Qld, lack of competitive pressures and lower reserve margins initially did not lead to as great a reduction in prices as in NSW and Victoria. However, current electricity prices are now similar to those States.
- Average delivered electricity prices have reduced in recent years, but not spectacularly.

8.3.3 Issues for Future Policy and Regulation

Some areas that need to be considered are:

- A perceived lack of competition in generation in some States. This is due in part to the non-privatisation of generation in NSW and Queensland.
- The form of network pricing regulation is causing disagreement between regulators and operators, with confusion over protocols and rules.
- A stalemate has occurred in the development of new interconnections between the States.
- There are concerns that arise from the conflict between State Government revenue requirements and the lower prices from competition, particularly where the State owns the asset.
- There is a complex proliferation of State and Federal Government regulatory agencies. This leads to excessively complex rules, high regulatory costs, considerable legal ambiguity and the risk of inconsistent decisions. Issues of sovereign risk and heavy handed regulatory intervention also provide mixed signals for investment in electricity infrastructure.

- Policy direction on transmission network charges and treatment of community concerns regarding air quality and noise concerns, need to be developed for embedded generation.
- Full retail contestability is being extended throughout the eastern States commencing in Victoria and NSW in 2002. Some of the issues arising from full retail contestability relate to meters and metering, metering settlement and transfer system, customer information systems and responsibilities of all participants.

ESAA members are pursuing an independent review of the electricity market through the Productivity Commission.

Three issues, in their opinion, that need to be dealt with are the:

- National electricity market's institutional arrangements;
- Threats to future investment posed by complex and overlapping regulation; and
- Need to augment interstate high voltage transmission of power.

8.3.4 Environmental Issues

Greenhouse

About 140 million tonnes of carbon dioxide are produced in the electricity industry from the consumption of about 90 million tonnes of coal and 3,500 million cubic meters of gas each year. (www.agso.gov)

In August 2000, the Federal Government released a statement explaining all Government decisions relating to the future development of greenhouse policy. This was aimed at providing Australian industry with greater certainty for the future. Some relevant specific commitments were:

- Future greenhouse abatement policies and measures will promote cost-effective actions that minimise the burden for business and community.
- Only implement a mandatory domestic emissions trading scheme if the Kyoto protocol is ratified by Australia and enters into force, and there is an established international emissions trading regime.
- Australia will continue to participate constructively in the global climate change negotiations.

Currently, sustainable energy generation accounts for approximately 6% of Australia's energy generation capacity, and statistics show that it is steadily increasing. This level of renewable generation is about the same as the OECD average.

The increasing use of renewable sources is being assisted by such initiatives as State Governments now requiring electricity retailers on a voluntary basis to increase the amount of renewable energy they use and to make regular reports on their progress.

The Federal Government's *Renewable Energy Bill 2000*, mandates a goal of 9,500 GWh to be generated from renewable sources by 2010. The secondary aim of the *Bill* is to assist the Australian renewable energy industry to grow and become a competitive force in world exports of this technology. To assist in achieving these goals, the Federal Government has created a number of renewable energy programs. These are aimed at funding projects demonstrating strong commercial potential, and the long-term technical and commercial viability of large-scale renewable energy applications.

The electricity supply industry together with the Australian Greenhouse Office (AGO) have in place a Greenhouse Challenge Program, which has delivered measurable

sourcing in CO₂ emissions (millions of tonnes per year) through adaptation of energy efficiency (co-firing) and technology upgrades.

Demand reduction is another approach, and the ESAA has been urging the Government to set an objective of attaining the average OECD energy efficiency level by 2010. If this is achieved, it could reduce the demand in electricity by 30,000 GWh per year, resulting in the reduction of greenhouse gas emissions of up to 30 million tonnes a year.

With no progress on meeting voluntary targets for greenhouse targets in the electricity industry, there are emerging proposals to introduce compulsory national schemes for meeting targets through mechanisms such as Council of Australian Governments (CoAG). (SMH Friday 8 June 2001 p8).

Hydro Generation

Hydro generation, in particular the Snowy Mountains Scheme, imposes environmental costs on the health of river systems. Environmentalists have long advocated for increased water levels in major rivers controlled as part of hydro schemes.

The nature of large hydro generation requires flooding vast areas of land, which can destroy other natural resources. Hydro generation can cause fish injury and mortality from passage through turbines, as well as detrimental effects on the quality of downstream water through river flow management, and the introduction of unnatural temperature changes.

Transmission

Transmission line creation and maintenance can also have an environmental impact. Robust environmental management plans and effective collaboration between utility, Government agency and contractors alike, are essential to ensure such impacts are minimised.

Increasingly, route selection for new transmission lines may involve realignments to avoid sensitive environments. Such deviations are likely to increase the cost of infrastructure.

There has also been ongoing debate on the issue of electric and magnetic fields (EMFs) from electricity lines. Adverse health effects from EMFs have not been established, but there remains a lack of scientific consensus about whether or not they can occur. This is an important issue both for the Australian community and the electricity supply business.

8.3.5 Social, Community Issues

Concerns with greenhouse gases produced from burning fossil fuels supports the aim to use more renewable sources of energy generation such as hydro, solar and wind. Nevertheless, these sources of energy do not have complete community support. A number of issues are raised in relation to renewable energy:

- Power from wind generation requires vast amounts of land. This could detrimentally affect farming activities. Wind power can have visual and noise impacts as well as possibly affecting birds and other living resources.
- Biomass generation concerns some sectors of the community as they see the risk of fuel sources, like wood, being utilised from areas such as old growth forests.
- Large solar farms also require vast amounts of land where the flow of sunlight is not impinged. Some forms of solar energy may increase the use of heavy metals in construction of solar cells and batteries.

8.4 Future Directions

For success in Australia's energy market, there must be some commonality between State regulators and the Federal Government, Australia should increase its competitors and its generators, and make sure there is a capacity incentive to operate with a much simpler market mechanism than we have today.

The Australian community must also expect to pay sustainable prices for electricity to ensure long-term market viability.

There has also been a lot of media speculation about the Californian market situation and potential impacts on the Australian electricity market. Some key deficiencies, which do not exist in Australia but are apparent in California are that the investment environment was not attractive because planning applications could not get through, and the existing generators did not want to build, and more importantly that retailers were unable to hedge against volatile and high generation prices.

8.5 Report Card Rating

The Electricity sector was not analysed in the *2000 Report Card*. This is the first time the sector has been evaluated.

The present state of the electricity industry infrastructure has been given a *2001 Report Card* rating of B-.

It is seen to be adequate to meet current and future short term needs, although continued investment is needed to maintain an ageing infrastructure and support the introduction of new infrastructure.

Case Study

RENEWABLE ENERGY

Australia has the world's highest per capita greenhouse emissions. A major contributor is burning coal to produce electricity. In an effort to reduce the amount of greenhouse emissions, the Commonwealth Government introduced the Mandatory Renewable Energy Target that requires all electricity retailers to produce an additional 9500 gigawatt hours (around 2% of total output) from renewable resources by the year 2010, based on their 1997 output.

As well as attempting to increase renewable fuel output, the legislation is aimed at making the production of renewable energy less expensive, through competition.

In another move to promote renewable energy generation, the New South Wales Government has introduced the Renewables Investment Program. This program is now in its sixth cycle and offers up to \$3 million for new projects in solar, wind, hydro, biomass, geothermal, wave and tidal power.

Sustainable Energy Research and Development Funding has helped pioneering renewable projects in NSW. Eighteen projects in total have received grants or low-interest loans.

There are a number of public companies that specialize in renewable energy projects. These include:

- Pacific Hydro Limited, whose projects include the Portland (Victoria) wind energy project. This \$250million project comprises 4 wind farms producing electricity for 100,000 homes and is expected to save 600,000 tonnes of greenhouse gases per year
- Energy Developments Limited's Solid Waste to Energy Recycling Facility (SWERF) in Wollongong (NSW). The SWERF, currently being commissioned, is the first of its kind in the world and at full capacity can process 110,000 tonnes of waste annually. It will convert household waste into electricity and at full capacity will generate electricity for about 24,000 homes.

9. Gas

9.1 Overview

Natural gas is Australia's fastest growing source of energy. In 1998-99 it represented 18.1% of the total national primary energy consumption and the Australian Bureau of Resource Economics (ABARE) predicts this to grow to 28.9% in 2014-15 as a result of increased availability and more competitive pricing (AGA October 1999).

The infrastructure involved in the production and delivery of natural gas consists of production facilities, high-pressure transmission pipelines, and low-pressure distribution networks. This report focuses on the core transmission and distribution infrastructure rather than the upstream production or retail components of the supply chain.



The sector has previously been monopolistic with each of the major gas markets being supplied by a single transmission pipeline from a single supply source. This is rapidly changing with the addition of new pipeline infrastructure connecting different gas sources, as the industry moves towards an integrated network that facilitates trade in natural gas.

Though once generally the domain of public utilities, the gas transmission and distribution industry is now almost entirely privately owned with separate transmission, distribution and retail sectors. Other changes include the disaggregation of a number of the larger distribution networks, the implementation of competition policy, as well as increased regulation. All of these changes have increasingly caused the operators to focus on improving efficiency and the implementation of world's best practice in areas such as asset management and operation.

A number of major new transmission pipelines are under consideration. These include pipelines to bring natural gas from the Timor Sea and PNG to the markets of South-Eastern Australia, to take Gippsland gas to Tasmania, and to supply gas to South Australia from western Victoria.

Around Australia, the development of the infrastructure required to ensure effective delivery of natural gas to the marketplace is at various stages of maturity. Most large towns and all cities are currently or about to be connected to natural gas with varying degrees of distribution throughout each.

In spite of this, Australia currently lacks the infrastructure needed to deliver natural gas from the major new and existing reserves in the north and northwest to the major markets in the east and southeast, as gas reserves currently supplying these markets are depleted. Substantial new pipeline infrastructure or successful development of new supply sources will be required to ensure continuity of supply.

The current regulatory practices regarding access and tariffs, when compared with the overseas experience in mature markets, remains an impediment to growth in the sector. Moreover, uncertainty over access arrangements and return on investment are critical issues for all aspects of the gas transmission and distribution business.

Following advice given in the Ralph Report, recent Federal Government initiatives have significantly changed the asset depreciation arrangements for new infrastructure in the gas industry, extending the effective lives of assets, and removing many accelerated depreciation provisions.

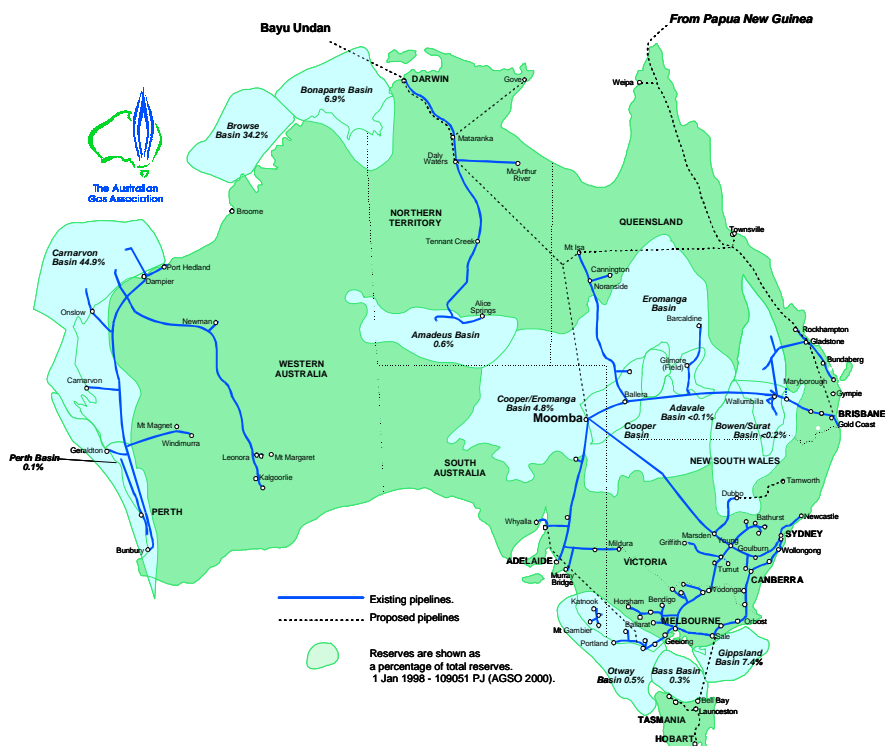
However, lower company and indirect taxes for the industry have not fully offset the negative impact of extensions to the tax treatment of effective life of assets, nor the removal of accelerated depreciation.

These changes to the taxation arrangements have significantly affected the economic feasibility of pipeline and other gas related infrastructure developments, retarding resource development and slowing the growth of competition in the marketplace.

As an example, economists have estimated that the implementation of the new effective life regime (which currently envisages an effective life for gas transmission pipelines of 50 years) could add 20% to tariffs.

9.2 Key Statistics

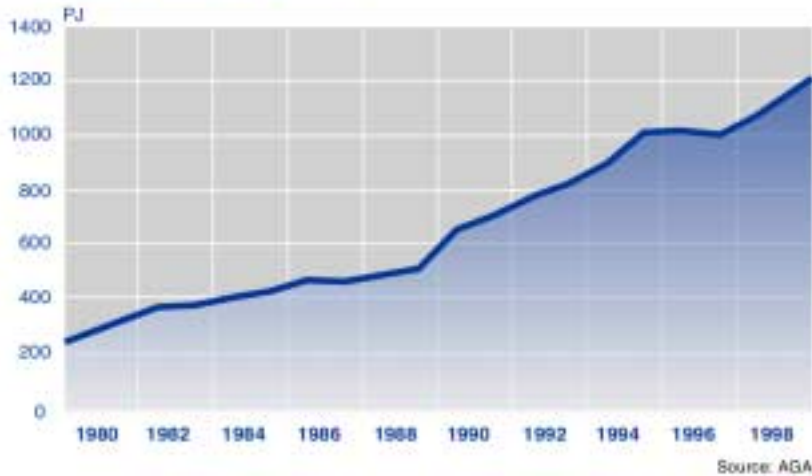
Australia has abundant natural gas reserves with proven and probable reserves amounting to 108,475 petajoules (PJ) in 1997 (AGA October 1999). The following map provides an indication of the location of Australia's existing gas reserves and the current and proposed pipeline infrastructure.



9.2.1 Gas Reserves and Production

The ratio of recoverable reserves to production in 1998-99 was 91 years. Production in 1998-99 was 1203 PJ compared with 1115 PJ in 1997-98, an increase of 7.9%. When analysed by basin, the reserves to production ratio of the major producing basins drops to 23 years for the Cooper/Eromanga Basin, 40 years for the Gippsland Basin and 69 years for the Carnarvon Basin (ABARE 1999).

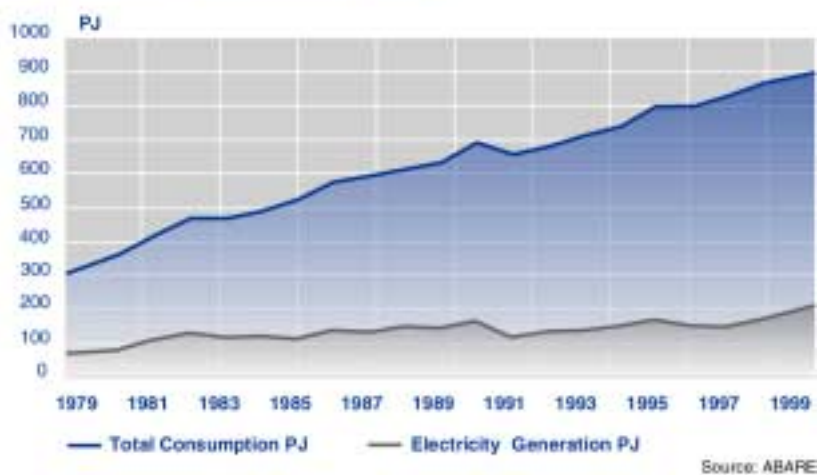
Natural Gas Production, Australia



9.2.2 Gas Consumption

Consumption of natural gas is anticipated to grow from 817.6 PJ in 1996-97, to 1170.9 PJ in 2004-05, and to 1672.4 PJ in 2014-15. This represents a compound growth rate of 4.1%. The bulk of this expanded consumption is expected to come from electricity generation, 397.5 PJ (or 46.5%) and industrial uses, 330.2 PJ (or 38.6%) (AGA October 1999).

Total Natural Gas Consumption, Australia



9.2.3 Liquefied Natural Gas (LNG)

LNG is now one of the key gas industries within Australia. Since 1990 the amount of LNG exported from Australia has increased by a factor of four, with current exports exceeding 8000 kt (kilo tonnes) per annum (AGA August 2000).

Australia is now the fourth largest exporter of LNG in the world. The substantial new investment planned in LNG infrastructure of the Northwest Shelf and Darwin will again improve our position in the market.

9.2.4 Transmission Pipelines

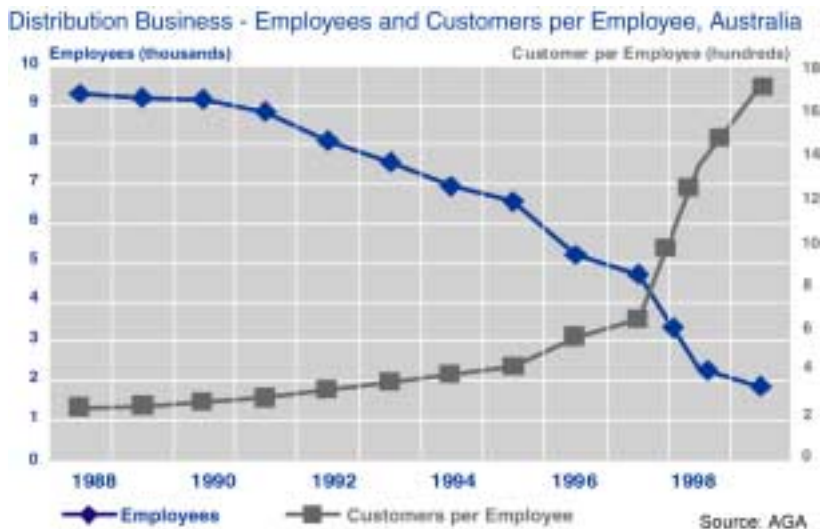
Over 15,000 km of high-pressure transmission lines are currently in service in Australia, moving more than 860 PJ of gas per annum (AGA August 2000).

The total number of people employed by pipeline owners has remained static at approximately 800 people over the last 10 years, despite an increase of more than 6,000 km of new pipeline infrastructure (AGA August 2000).

9.2.5 Distribution Networks

The natural gas transmission and distribution networks cover a total length of nearly 75,000 km (AGA August 2000).

The number of customers serviced has risen from around 2.9 million in 1996-97 to approximately 3.2 million in 1998-99, with 3.1 million residential customers and about 92,000 commercial and industrial users (AGA August 2000).



The impact of energy reforms and outsourcing has seen the number of persons directly employed by gas utilities decline substantially over the past 10 years, with resulting improvements in productivity.

9.3 Issues

9.3.1 Regulation

Existing infrastructure asset owners and prospective developers see economic regulation as their most contentious issue. They view the progressive deterioration in outcomes, including return on investment and pricing, that the regulators have determined as

presenting a significant uncertainty to major new development activity in the gas transmission and distribution sector.

The industry argues that the current regulatory practices regarding access and tariffs do not recognise the immaturity of the Australian gas market and the high risks to the private sector associated with infrastructure. Instead, Governments have sought to transfer the regulatory paradigms from the mature markets and infrastructure of North America and Europe. This approach continues to act as a serious impediment to growth in the sector.

The National Third Party Access Code for Natural Gas Pipeline Systems provides the legislative basis for regulation of the industry. The Australian Pipeline Industry Association (APIA), which represents the Transmission Pipeline Sector, has said that "Urgent changes to Australia's Pipeline Access Code are needed to instil the confidence required for massive investment in the nation's private sector infrastructure development" (APIA 2001), though there is some doubt as to whether this will occur.

9.3.2 Approvals

Gas transmission pipelines face approval arrangements that vary considerably between the States. In some States, approvals are delivered within six months, which is a reasonable outcome for pipeline development. In other States, notably NSW, the approvals process is typically much longer (in the case of the Wagga-Albury link the time taken was 28 months for a short 151 km traversing disturbed agricultural land (APIA Personal Communication).

Delays and uncertainties add to project costs and, in cases where major customers face choices in energy supply, e.g. new mine development, can lead to customers adopting more timely fuel supply options.

9.3.3 Funding

There appears to be an abundance of Australian and international companies and groups who are notionally prepared to invest in new gas infrastructure in Australia. In spite of this, and the promotion of new projects, the industry sector is stagnant. The key reason for this is an inability to achieve certainty for the financial return on projects.

Investment groups such as Hastings Fund Management (Market Realities 2000), have indicated that the issues of taxation and economic regulation currently provide a substantial disincentive for the financial community to invest in new gas infrastructure.

9.3.4 Management

There has been a substantial change to the environment in which the gas industry in Australia operates over the last 15 years. This has had a major impact on the management of the industry throughout Australia. Some of the key changes are:

- Governments have effectively implemented free and fair trade by removing many of the legislative impediments to gas trade that existed in the 1980s;
- There has been large scale privatisation of Government-owned transmission and distribution assets, coupled with varying degrees of "unbundling" of services previously provided by integrated, Government-owned monopolies;
- Governments have introduced independent economic regulation of many elements of the gas supply chain (with the exception of production activity);
- Governments have committed to choice for all customers, with progressive tranches of the customer base becoming opened up to direct competition by suppliers and retailers;

- There has been a substantial expansion of infrastructure to supply gas to markets, including linking of markets which were originally single supply/single market;
- Other major energy markets – in particular electricity – have undergone major changes, including privatisation, reform and progress towards a national electricity market;
- Security of supply was highlighted in the October 1998 Longford gas plant failure;
- Greenhouse has emerged as a major challenge and opportunity for the entire energy sector;
- Business tax reform is underway, including a very different treatment of the "effective life" for taxation depreciation than has been the case previously;
- Specific focus on energy research and development has ceased with the demise of the Energy Research and Development Corporation in the mid-1990s; and
- Native title has emerged as a critical issue to be addressed in building new infrastructure.

9.3.5 Technology

Due to the vast challenge of distances and relatively small markets, Australian industry leads the world in a number of areas for the development of gas infrastructure. The technical codes that govern the construction of the transmission pipelines in particular are considered to be innovative in the adoption of innovative materials and construction practices.

The construction costs for pipelines and related infrastructure have decreased in real terms by nearly 40% over the last 15 years, as higher strength materials are used in combination with improved construction practices.

9.3.6 Environment

There are benefits to the environment through the adoption of natural gas as a preferred energy source over coal use. According to the proponents of the PNG Gas Project (representative of one of a number of major pipelines proposed for Australia) the project would save 88 million tonnes of carbon dioxide emissions in its first decade of operation with an annual saving of 11 million tonnes per annum by 2012. This would be the equivalent of eliminating the emissions of 6,000,000 households (PNG Gas 1999).

Environmental concerns associated with gas transportation include impacts during construction such as erosion, disruption to fauna, land clearing, and impacts on cultural heritage. With the continuing development of environmental standards and attention to impacts on local communities, gas pipeline proposals are increasingly being subject to intense scrutiny. The pipeline industry works under a rigorous Environmental Code of Practice (APIA – 1998), which was developed in conjunction with environmental groups and authorities as well as the construction industry to ensure effective environmental management.

9.3.7 Supply Reliability

The Longford gas plant failure in Victoria demonstrated the vulnerability of gas supply to disruption and the consequent economic harm caused. The incident substantially raised awareness risks associated with security of supply across the community. Specific steps have been taken to address the security of supply in Victoria with the construction of the Western Underground Storage System, which is able to provide at least short term back up for supply.

Similar problems could face NSW, South Australia and Queensland, if gas from the Moomba facility were disrupted (Australian 29 Sept 1999).

The only truly effective mechanism to provide for security of supply is to ensure that there is an interconnecting network of pipelines from a variety of supply sources. This is beginning to occur in Australia following the connection of the NSW and Victorian pipeline grids.

A loss or substantial restriction of supply could occur in almost all areas of Australia following a major production failure in any of the key production locations – hence the need for development in the sector.

9.4 Future Directions

The following are the key policy objectives that would assist the development of infrastructure for natural gas within Australia:

- Ensure that the energy policy setting encourages greater use of natural gas, particularly in view of the environmental benefits;
- Ensure that regulatory settings are genuinely supportive of new development activity;
- Ensure development of timely, consistent approval processes between the States and Territories for new pipelines; and
- Ensure that taxation does not discriminate against essential infrastructure projects with long physical lives such as pipelines.

9.5 Report Card Rating

The Natural Gas sector was not analysed in the *2000 Report Card*. This is the first time the sector has been evaluated.

The present state of the natural gas industry infrastructure has been given a *2001 Report Card* rating of C.

Whilst the condition of assets is good, many pipeline systems do not have the capacity to meet demand (the Moomba to Adelaide pipeline is one example), with no incentives to develop new infrastructure to meet incremental demand, which is expected to double over the next 15 years.

Considerable investment is needed in order to meet the demands forecasted for the future, with over \$9 billion worth of potential projects (some competing) currently under consideration (APIA Feb 2001).

Case Study

TAXATION, REGULATION AND GAS INVESTMENT

“The gas pipeline sector is currently unattractive (for investment) due to sovereign and regulatory risk” (Mike Fitzpatrick, Managing Director. Hastings Funds Management Ltd, APIA Pipeline Development Forum, 27 July 2000)

There are several issues related to the development of gas pipelines which hinder further investment in Australia, particularly regulatory decisions relating to third party access to pipelines, and an Australian Tax Office plan to extend the effective life of pipeline assets from 15-20 years to 50 years.

What the ATO plan means is that rather than being able to depreciate a pipeline asset over 15-20 years, pipeline investors have to depreciate it over 50 years for tax purposes. Gas pipeline developments generally have negative cash flows in the early years as markets for the gas develop and grow, and become profitable later in the life of the asset as the full capacity of the pipeline is utilised. These uneven returns were offset to a degree by favourable taxation depreciation arrangements which gave an effective tax life of 8 years in 1992 moving to 20 years in 1999 for pipeline developments.

Due to the uncertainty and risks involved in pipeline development, this tax regime effectively discriminates against projects with long physical lives. According to the industry, the impact of the ATO plan will be a significant decrease in all infrastructure development in the gas industry.

Another case in point is the recent draft decision by the Office of Gas Access Regulation in Western Australia on the Dampier to Bunbury Natural Gas Pipeline. In this case, the owner of the pipeline, Epic Energy, believed it had an understanding with the Government on the prices they would be able to charge for gas transmission and this influenced the price paid to the Western Australian government for the pipeline. Unfortunately, the regulator did not acknowledge the existence of the understanding, and significantly reduced the price able to be charged for gas transmission. While the final decision has not been handed down yet, Epic are preparing to resolve the matter through the courts.

While the merits of individual regulatory decisions may be argued, and the ATO has not as yet finalised its deliberations on effective lives, there is a significant risk that these issues will have a major negative impact and hinder future infrastructure development, particularly in the gas pipeline industry.

10. Telecommunications

10.1 Overview

For the purposes of this report, telecommunications infrastructure is considered to be the broad range of voice, data and video systems, plus related services such as data centres, internet operations, and broadcast systems for radio and television.

The sector is one of the fastest growing and dynamic sectors of the economy.

New technologies are sweeping the globe, led in large part by the widespread take up of the internet.

As the first Government monopoly market in Australia to be opened up to competition, it has been the testing ground for much of successive Government's competition reform proposals.

Key issues for the sector include regulation and the application, compatibility and utilisation of new technologies.

The *Report Card* rating for telecommunications is B.

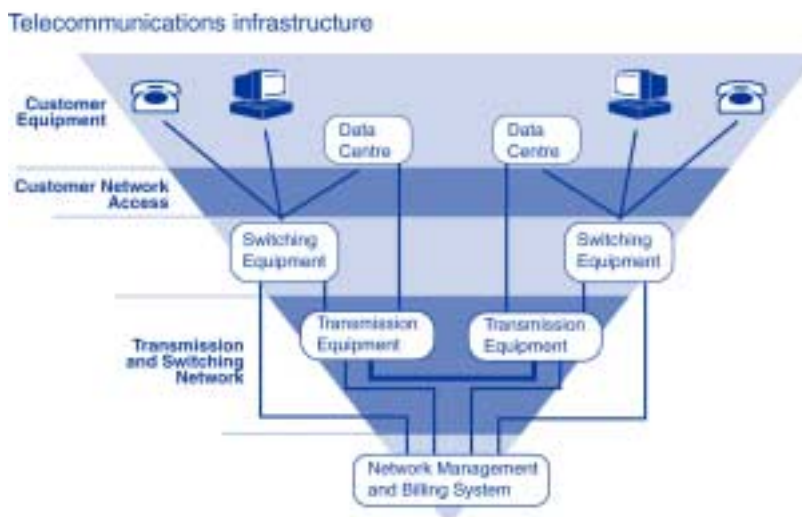
10.2 The Systems

In this Report the distinction is made between the public access telecommunications systems, and those used by Government for non-public communications.

10.2.1 The Public System

Customer Access Network

Telecommunications infrastructure consists of several different forms of communications network as well as the equipment and structures needed to provide telecommunications services. The main infrastructure is illustrated and summarised below.



Wired Systems

These consist of:

- Twisted pair copper cables which are the principal connection to most household premises;
- Fibre optic cable for customers requiring high bandwidth; and

- Broadband (pay television) co-axial cabling.
- **Wireless systems**
- These consist of:
 - Terrestrial radio links to customers in rural areas where connection by cable is not economic;
 - Mobile telephone networks GSM and CDMA;
 - Mobile Radio Networks for voice and data including land mobile and coastal marine systems, plus high frequency networks for long range terrestrial communications;
 - Data networks such as local multipoint distribution servers (LDMS); and
 - Satellite systems including data systems which can deliver broadcast programmes, internet data services and mobile telephoning, such as Optus Mobilesat and low earth orbiting system such as Globalstar.

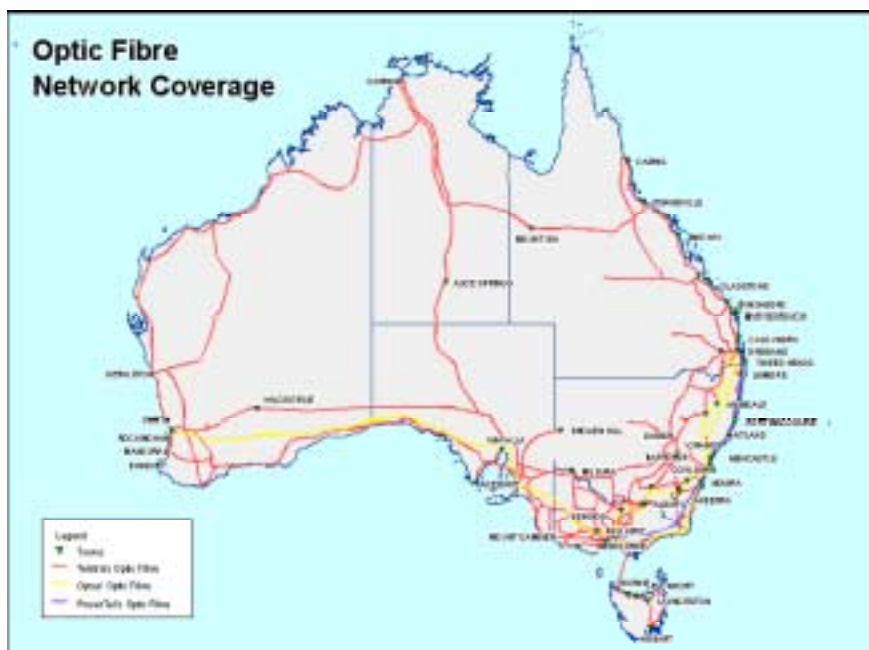
Switching Systems

Switching systems comprise equipment and facilities for switching and connection of voice and data services between customers. The infrastructure varies in size from rural telephone exchanges for a few lines to major city exchange sites.

Transmission Network

The transmission network provides the interconnection between the switching systems and connections to facilities such as data centres and mobile telephone base stations. The network infrastructure includes the transmission equipment and interconnecting cable and radio systems, and provides the backbone communication links to mobile telephone base stations.

The extent of the major non-copper transmission network infrastructure is illustrated in the following maps.



Examples of systems implemented are those operated by electricity transmission authorities throughout Australia. These systems include all the elements of a carrier type telecommunications network.

10.3 Regulatory Framework

The telecommunication industry operates within a regulatory framework with the intent that there is a large degree of self-regulation to enable and promote competition. The Australian Communications Industry Forum (ACIF) was established by the industry to develop voluntary codes and standards within this framework. The Federal Government exercises a degree of regulation via the following Government agencies:

- Australian Communications Authority (ACA). The ACA has responsibility for regulating the telecommunications industry including internet and pay television services. This responsibility includes:
 - Licensing of carriers;
 - Administration of universal service obligations;
 - Management of the radio frequency spectrum;
 - Monitoring of compliance with technical standards for communication equipment and cabling;
 - Compliance with standards for electromagnetic radiation emission and immunity;
 - Standardisation for communication network integrity and interoperability.
- Australian Competition and Consumer Commission (ACCC). The ACCC has responsibility for administration of the following telecommunication specific issues.
 - Ensuring competitive safeguards regarding conduct by carriers with respect to tariffs;
 - Determining whether access to carrier networks should be regulated; and
 - Determining the framework for Telstra's retail price controls.

Technical regulation is in general determined by compliance with the relevant standards and codes, specifically the standards of the International Telecommunications Union (ITU).

In addition, the Minister can also make regulations by implementing licence conditions on carriers.

Within this framework of regulatory control of licenses and bandwidth, it is essential that transparency of costing allows access to carrier networks to efficiently use existing and planned infrastructure.

10.4 Key Statistics

The telecommunications industry is a significant contributor to the national economy. The annual revenue is in the order of \$36 billion, which represents 5.5% of Australia's Gross Domestic Product.

Annual investment in telecommunication infrastructure is approximately \$5 billion. Industry growth is approximately 13% per annum.

10.4.1 Carriers

- | | |
|---|----|
| • Licensed Carriers | 71 |
| • Major Information Service Providers | 47 |
| • Major owner/operators of carrier infrastructure | 6 |

10.4.2 Service Provision

- | | |
|---|------------------------|
| • Basic phone lines in service | 10.7 million |
| • ISDN lines in service | In excess of 1 million |
| • Mobile phones | In excess of 9 million |
| • Pay phones | 80,000 |
| • Internet connected households | 2.2 million |
| • Customers connected to cable pay-television | 900, 000 |

10.4.3 Infrastructure

- | | |
|---|--------------------|
| • Fibre optic cable (Telstra) | 3.1 million km |
| • Exchanges local connections (Telstra) | In excess of 1,300 |
| • Mobile phone base stations | In excess of 9,000 |

Sources: (ATUG, Telstra, Optus, Vodafone)

Comprehensive national statistics and/or audit information on the extent of infrastructure are not available.

10.5 Issues

10.5.1 Regulation

Telstra, the former wholly Government owned monopoly telecommunications company, dominates the sector and owns much of the infrastructure.

The major regulatory issue faced in the sector are the prices, terms and conditions of access by telecommunications providers, to Telstra's infrastructure. The ACCC is in charge of administering access and approving access prices, with rights over review of decisions available through the Australian Competition Tribunal, and ultimately, the High Court of Australia.

The access regime is designed to encourage competition in the industry, without duplicating infrastructure in an uneconomic way. A major concern of infrastructure owners however, is that if access prices are set too low, there is no incentive for them to develop infrastructure.

Network access pricing for incumbents has been embroiled in disputes from the outset. It has led to significant disputes on the terms of access to Telstra's copper cable network, as well as on the prices that the access provider has to charge the access seeker to use the network. The time taken because of this legal process to reach decisions has been criticised as benefiting no-one in the industry, with all stakeholders facing regulatory uncertainty.

The Productivity Commission is currently investigating the telecommunications access regime and competitive safeguards, while the Minister for Telecommunications is also currently showing great interest in reforming access rules, possibly before the Productivity Commission reports.

The digitisation of Telstra's hybrid fibre co-ax network, commonly known as the Foxtel cable network, is an example of how access regulation impacts on telecommunications industry investment in infrastructure. Telstra claims to have deferred its investment in the

digitisation of the network at an estimated cost of over \$1 billion, because of uncertainty over the terms and conditions that future access seekers will be granted by regulators to the upgraded network.

The unbundling of the local loop is another example of unacceptably slow development. Unbundling refers to technology and access to Telstra owned, local switch-stations in the copper cable network, which allows third party telecommunications providers to install their own equipment to service their customers, rather than being forced to pay for access to Telstra's infrastructure.

Non-public telecommunications systems infrastructure remains the responsibility of both the Federal and State Governments. This has led to a proliferation of standards and inoperability between systems. In areas such as emergency services, where co-ordination is essential, often across State borders and between agencies, this is a real problem.

10.5.2 Rural and Regional Access

The Federal Government has done much to assist rural access to telecommunications.

The provision of services in regional and rural areas is generally subsidised by the Federal Government through community service obligations. Current Government funding is in the order of \$670m (Time Running Out, May 2001).

10.5.3 Privatisation

Dual rollout of network systems because of competition and lack of network access by various carriers has resulted in many cases to competitor's cables following parallel routes. This has led to wastage of capital through lack of proper protocols for sharing network infrastructure between carriers.

10.5.4 Funding

The telecommunications industry is predominantly privately funded, with the 50% Government ownership of Telstra the major exception, which in any case is a net contributor to the public purse. Private investment however, has generally been directed to the roll out of services in the cities, where there is a higher concentration of customers and therefore a higher potential return.

The half-privatised nature of Telstra means that there is great potential for direct Government interference in the telecommunications industry, despite the largely light handed approach to regulation seen in telecommunications.

10.5.5 New Technologies

Projected exponential growth in the demand for mobile phone and broadband internet services propelled significant investment in new technology. In the telecommunications sector, investment has been enormous to provide new infrastructure to meet projected demand, although mainly in areas least affected by regulation. The infrastructure for fixed and wireless telecommunications services is therefore among the newest and most rapidly expanding of all of the sectors covered in the *Report Card*.

The introduction of digital television has seen a significant upgrade and replacement of broadcast television transmission equipment and associated links for program content. Continued investment and the deployment of digital technology can be expected.

The impact of the introduction of recent and future waves of technology however is uncertain and carries significant commercial risk. There is potential for the earlier

investment in technologies to be wasted through redundancy and there is the risk that services and technologies will be introduced that is industry not market driven, with no economic market for them.

Additionally, third party content for services such as digital television and internet services for mobile phones, may not be available or in a format acceptable to the market.

The sale of 3rd generation spectrum licences overseas has raised issues of commercial risk that could have profound economic repercussions (Economist, May 3 2001). These risks are also evident in optic fibre cabling, where it was reported in the New York Times (18 June 2001), that globally \$US 35 billion was spent on providing 100 million miles of optic fibre cable, with only 5% in use today, and that it may take many years for the capacity to be fully used.

In Australia, the delivery of broadband internet services may also further exacerbate the perception of a digital divide between rural/regional areas and the cities, due to access and pricing of services (Bandwidth Report).

In the case of non-public telecommunications systems, many are old and rely on analogue technology. As these are progressively replaced, they raise the problem of incompatibility with the newer digital systems.

10.5.6 Environmental

Major environmental issues related to telecommunications include:

- Siting of radio communication facilities, namely mobile telephone and microwave towers. Their placement is often required in prominent positions to provide adequate radio coverage and/or line of sight to the antenna. This is a problem in both the public and non-public telecommunication sectors;
- Radiation from mobile telephones and base stations, which is the subject of ongoing research and debate; and
- The visible presence of cabling, with pay television cabling in particular often run on overhead power poles. The majority of telecommunications cable plant is installed underground and therefore has a low environmental impact.

10.5.7 Social/Economic

- Telecommunications access to Australia's regional and rural areas has been an issue for some time (Time Running Out, May 2001).

These issues are being addressed by the Federal Government and require subsidisation of carriers to provide services such as reasonable bandwidth access to the internet, and satisfactory mobile phone coverage.

Another issue that needs to be resolved is the appropriate and cost effective sharing of the Customer Access Network (CAN).

The majority of this is copper cable plant owned by Telstra. Access by other carriers is subjected to negotiations and determination by the ACCC.

10.6 Future Directions

10.6.1 Infrastructure Inventory

Currently, there is no national inventory that provides an overview or degree of detail on the extent and condition of the telecommunications infrastructure. Each carrier holds detailed information. A national inventory of sufficient detail to promote shared use and reduced duplication of infrastructure would be economically advantageous.

10.6.2 Streamlining Regulatory Arrangements

To ensure that competition in the telecommunications industry is vigorous and fair, the Government should look at streamlining the processes for making access decisions to CAN. Timing issues should be balanced against the need for fair access pricing decisions that take account of the need to provide a reasonable return to investors in infrastructure, to ensure that significant investment in infrastructure continues.

10.6.3 Sharing of Infrastructure

The co-operation between carriers in the deployment and sharing of infrastructure is particularly relevant in non-urban areas where it may not be economical to roll out several mobile telephone networks.

The carriers have formed a Mobile Carrier Forum (MCF) with the primary aim of improving the co-location of mobile telephone facilities.

The MCF is developing a set of policies and guidelines relating to:

- A national co-location framework;
- Site documentation;
- Antenna separation; and
- Mast replacement.

10.6.4 Fibre Optic Cable Route Diversity

Strategic co-operation could include arrangements to allocate cores in fibre optic cable routes to different carriers to provide diverse cable routes. This would enable services to be maintained if one route was damaged. The impact of lack of diversity cable routes was demonstrated recently when all of coastal NSW north of the Hawkesbury River was left without services following damage to a single cable.

10.7 Report Card Rating

The telecommunications sector was not assessed in the *2000 Report Card*.

The *2001 Report Card* rating for Telecommunications is B.

Case Study

TRAIN RADIO SYSTEMS

Mobile radio communication has become an essential requirement for railway operations in a similar way to the use of radio communications for air traffic control. Progressive standardisation of the national rail network has not been accompanied by standardisation of train control systems. However, train radio systems have continued to be implemented on a regional or State basis. This has resulted in communications incompatibility across the national standard gauge network.

A train making a transcontinental journey from Brisbane to Perth via Sydney, Melbourne and Adelaide would need to be able to communicate via a number of different systems, including:

- GSM mobile telephone;
- Private mobile radio – eight different types operating in two different frequency bands, namely VHF and UHF; and
- Satellite telephone – Optus mobilesat.

The capability of the national standard gauge locomotive fleet, of approximately 500 units, to communicate with train control using these diverse radio systems is as follows:

- 120 locomotives (owned by the National Rail Freight Corporation) are fitted with radio communication equipment, which will operate in most of the modes required, with the exception of the Greater Sydney area electrified network.
- Approximately 230 locomotives owned by Freight Corp have radios suitable for use in New South Wales country areas only.
- The remaining 150 privately owned locomotives may have radio equipment suitable for parts of the network only.

The consequence of this proliferation of systems is particularly relevant to New South Wales where the application of the national open access regime has meant that many freight trains and some long distance passenger trains operate without universal mobile radio communication to train control.

A national train radio standard would improve safety and efficiency.

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Appendices

Rating Methodology

To enable comparisons to be made, the following scoring criteria have been adopted. This is the same basis that was used for the *IEAust 2000 Infrastructure Report Card*. It follows a similar format to those used in the United States of America and the United Kingdom for similar *Report Cards*.

The overall grades are based on the consolidation of the Asset Condition, Asset Availability and Reliability, Asset Management, Sustainability including Economics, Environmental, and Social and Community issues.

The overall grades are:

Published Rating	Review Criteria
A Very Good	Infrastructure is fit for its current and anticipated purpose in terms of infrastructure condition, committed investment, regulatory regime and planning processes.
B Good	Minor changes required in one or more of the infrastructure condition, committed investment, regulatory regime and planning processes to enable infrastructure to be fit for its current and anticipated purpose.
C Adequate	Major changes required in one or more of the infrastructure condition, committed investment, regulatory regime and planning processes to enable infrastructure to be fit for its current and anticipated purpose.
D Poor	Critical changes required in one or more of the infrastructure condition, committed investment, regulatory regime and planning processes to enable infrastructure to be fit for its current and anticipated purpose.
F Inadequate	Totally inadequate for current and future needs.

The overall grading is developed based on a review of the following components of the infrastructure. The following key areas have been given equal emphasis.

Asset Condition

This section is based on the view that the infrastructure is considered to be fit for the purpose that it is currently being used for and its anticipated future use. An important component of this section is the trends in the general condition of the infrastructure in terms of the infrastructure condition relative to the purpose for which it is intended to be used.

Asset Availability and Reliability

The key elements of this sector of the assessment have included the expectation, and where available, the current known customer satisfaction levels with the infrastructure service delivery.

Asset Management

This section of the review included an assessment of the level of active strategic management undertaken to ensure that the infrastructure assets are being maintained for today and future generations in an efficient manner. This section also includes an overview of the impact and nature of regulation and legislative oversight on the efficient management of the infrastructure.

Sustainability

This section of the grading covers the issues associated with long-term sustainability of the infrastructure and consider the following.

Economics

Economics of the infrastructure management, including an overview of the total expenditure on the infrastructure compared with the expected levels based on the current degradation rates of the infrastructure. An opinion on whether sufficient funds are available to provide infrastructure to an appropriate level for today and the future.

Environmental

Environmental issues that include the active management of likely environmental impacts and the level of environmental assessments undertaken during the planning for infrastructure renewals and new construction. It takes into account the issues associated with the current and future care of the environment.

Social and community

Social and community impact issues such as distribution of infrastructure, equitable provision of infrastructure, the levels of support to customer service obligations, employment opportunities and issues including staff and customer safety.

Glossary of Terms and Abbreviations

Airside	Facilities directly for use by the aircraft at an airport.
Alliance contract	A form of contract involving varying levels of risk and gain sharing amongst participants, depending on the contract outcome.
Apron	Area used for aircraft parking
Asset management	The integration of the asset utilisation and performance with the broader business requirements of those whom it is intended to serve. Includes asset procurement, ongoing support, rehabilitation and disposal.
ATM	Asynchronous Transmission Mode Data transmission in which each character contains its own start and stop pulses and there is no control over the time between characters.
Bandwidth	The difference between the frequency limits of a band containing the useful frequency components of a signal.
Biomass	Organic material useable for fuel.
BOOT	Build, Own, Operate, and Transfer An approach to project procurement where the private sector builds, finances and operates a facility for a period. At the end of the period the asset reverts to the Government.
Broad gauge	Railway track gauge measuring 1600 metres
Catchment	Area which is used to catch precipitation and directs it to a water storage facility
CDMA	Code Division Multiple Access A second generation digital mobile telephone system, (competing technology to GSM)
CSO	Community Service Obligation The amount funded by Government to government trading entities, to cover the costs of meeting non-commercial community service objectives.
Dual gauge	Railway track with two gauges, for example standard and broad gauge.
Ecologically sustainable development	Development that does not reduce the ecological equity available to future generations.
Effluent	Discharge from wastewater or sewerage treatment.
Gas peaking power generation	A facility allowing rapid generation of electricity with gas turbines. Used for meeting peak demands.

Gigawatt hour	10 ⁹ watts/hour
Gigalitre	10 ⁹ litres
Granulated activated carbon	Adsorbents used in wastewater treatment plants to remove taste and odour causing organic substances.
Grey-water	Domestic wastewater containing
Groundwater	Water existing in the ground
GSM	Global System for Mobiles The European standard for a second-generation digital mobile telephone system.
Harvesting	Process of capturing rainwater runoff from a range of sources.
Hybrid fibre co-axial network	A communication configured using a combination of fibre and co-axial cabling, for example the pay television network.
IEC	International Electrotechnical Commission The international electrical standards body.
Interconnector	A facility for allowing interconnection between two or more electrical distribution grids.
Internodal	Transport, of freight, between locations using more than one mode. For example rail plus road.
ISDN	Integrated Services Digital Network Current generation digital telephone services
kV	One thousand volts
Landside	Facilities at an airport that are not airside
Life cycle	The total cost of an asset throughout its life including, planning, design, acquisition, operations, rehabilitation and disposal.
Local loop	The telephone service connection to the customer (typically the cable between the customer and the exchange)
Mass tonnes	Mass of an aircraft, normally depicted as the maximum take-off weight.
Megalitre	10 ⁶ litres
Narrow gauge	Railway track gauge measuring 1.066 metres
Nutrient Reduction	The process of removing nitrogen and phosphorous from effluent. Excessive nutrients in waterways are linked to algal blooms.
Outage	A loss of power through a network failure
Petajoule	10 ¹⁵ Joules
Potable	Water fit for consumption.

Retention basin	A facility for holding stormwater in excess of the systems capacity to transmit.
Reverse osmosis	A process involving where pressure is applied to wastewater, forcing pure water to pass from the solution through a membrane of hollow fibres of cellulose acetate or nylon, that will not pass contaminants.
Sedimentation pond	A facility which slows the flow of water, allowing sediment to settle.
Sewage	Liquid discharge from medical, domestic and industrial sanitary appliances.
Sewerage	The system for transport of sewage
Standard gauge	Railway track gauge measuring 1.4351 metres.
Statistical storm event	The likelihood of a certain level of precipitation over a defined period, usually an hour.
TETRA	Terrestrial System For Mobile Radio (Communications) A European Standard for a digital mobile radio system
TEU	T wenty F oot E quivalent U nit. A measure used for container volumes. Twenty feet being the length of smaller standard containers.
Third Generation Spectrum	The portion of the radio frequency spectrum allocated to, emerging, third generation mobile telephone systems
Turbidity	Cloudiness of a naturally clear liquid
UHF	U ltra H igh F requency The band of frequencies between 300 and 3000 megahertz in the radio system.
VHF	V ery H igh F requency The band of frequencies form 30 to 300 megahertz in the radio spectrum
Trash collection system	A facility for removing rubbish from a stormwater system.
Trenchless technology	A technology which allows pipes to be installed without opening up the surface and creating a trench.
WACC	W eighted A verage C ost of C apital The combined cost of funds for an organisation reflecting both debt and equity sources.
Wastewater	Another term for sewage
Water cycle	The complete cycle through which water passes, from the oceans, through the atmosphere, to the land, and back to the ocean.
Written down value	The value of an asset, reflecting its decline in value due to

depreciation.

xDSL

Digital Subscriber Line

A current generation of the local loop using high bandwidth digital transmission
