Australian Government
Infrastructure Australia

A Report to the

Council of Australian Governments

December 2008

Message from the Chair

Australia's future prosperity depends upon the quality of our national infrastructure.

Efficient infrastructure is essential to driving sustainable economic development and growth, lifting levels of productivity and boosting employment. It is critical to encouraging business innovation and improving the global competitiveness of our industries. It provides the foundation for vital community services such as schools, hospitals and housing. It is the key to managing population growth and meeting current and future environmental challenges. It is how high standards of living can be achieved.

Australia's infrastructure has been built up over more than 200 years. It includes our road and rail systems, ports and airports, communication networks, waterways and power grids, hospitals and aged care services, schools and universities, and museums, libraries and research institutes. These assets range from large-scale national networks to smaller community-based facilities. They extend from our inner cities to our most remote regions. Together, they have provided a platform for Australia's long and successful history of economic development and social cohesion and stability.

As Australia looks to the future, we must continue to find ways to extend this platform. We must find ways to make better use of existing infrastructure, remove the bottlenecks and gaps that are holding back Australia's growth, and identify opportunities for new capital investment. We must also ensure that the right regulatory and business environment exists to support increased investment in infrastructure and the timely delivery of major projects.

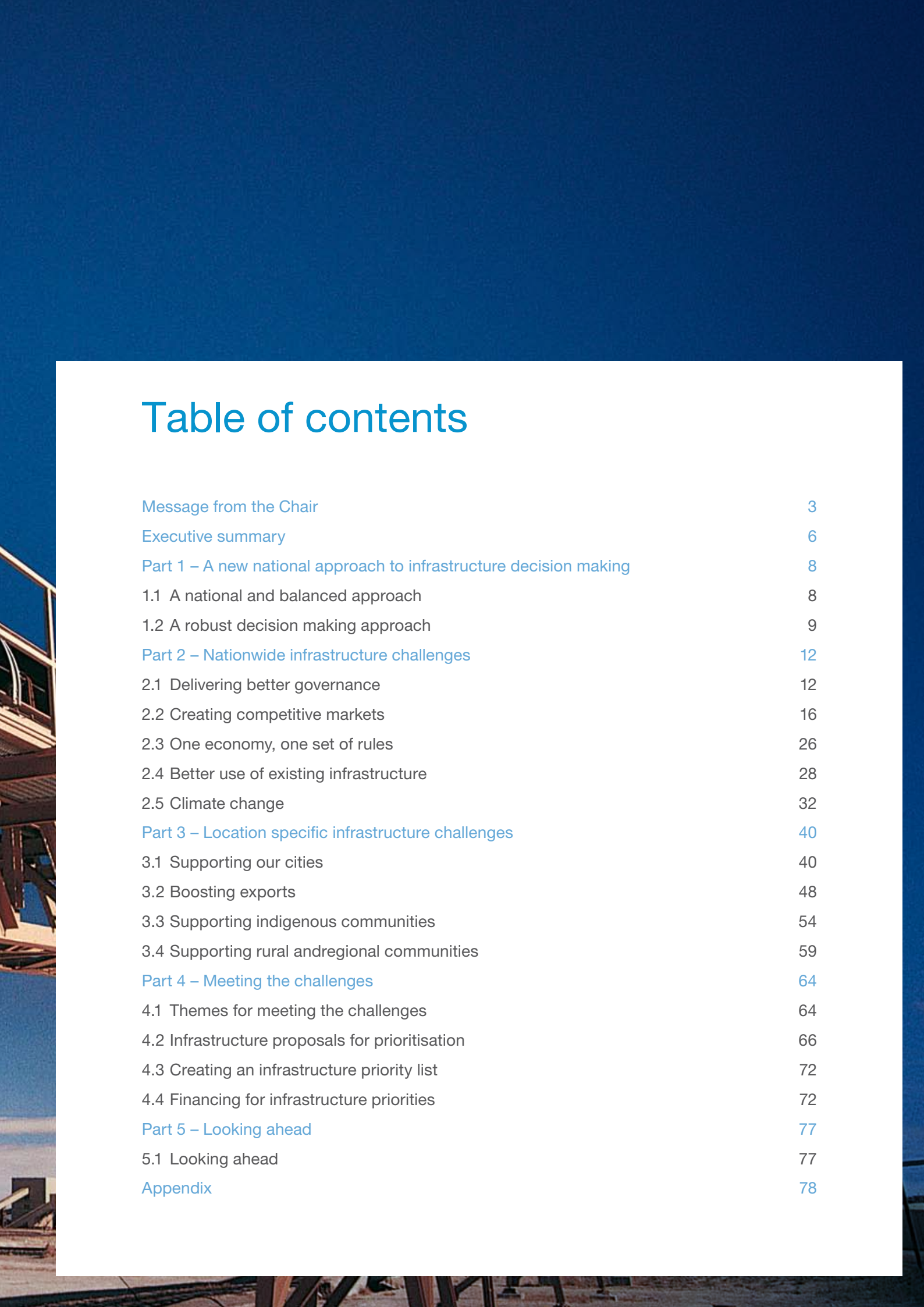
If we fail to take these actions, Australia will find it increasingly difficult to build competitive industries that offer quality jobs. It will become tougher to keep pace with scientific and technological change. It will be harder to protect our natural environment, maintain and improve the liveability of our cities and secure viable futures for our regions. The evidence is compelling. Without adequate investment in infrastructure, Australia will struggle to achieve sustainable economic growth and improve the quality of life for current and future generations.

The stakes are high – and yet there has been no national approach to assess and meet Australia's infrastructure needs and no national commitment to increasing our investment in infrastructure. Now, for the first time, Australia has a national body dedicated to the task of building an infrastructure platform for the future: Infrastructure Australia.

Infrastructure Australia signals a change in direction and a step-up in leadership on infrastructure at the national level. It introduces a bold new approach to identifying, planning, funding and implementing infrastructure of national significance across Australia. It also introduces rigorous and robust economic analysis of infrastructure investments prior to government decision-making.

Through this new approach, Infrastructure Australia will play a key role in ensuring that Australia identifies and invests in the infrastructure needed to meet the significant challenges ahead.

Sir Rod Eddington
Chair, Infrastructure Australia



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Executive summary

Infrastructure Australia aims to drive the development of a long term and coordinated national approach to nationally significant infrastructure that contributes to Australia.

Infrastructure Australia has adopted a new national approach to infrastructure decision making to improve the quality and efficiency of transport, water, energy and communications infrastructure across the nation. The intention is to boost national productivity, drive a more diverse, competitive and sustainable economy, and generate substantial and lasting economic, social and environmental benefits for Australians.

The **new national approach to decision making** uses a robust framework. Infrastructure Australia has established a 7 step process to outline the stages and rationale to clearly and objectively articulate the 'problem' to identify and assess various options or 'solutions'.

Infrastructure Australia has rigorously applied this framework. It has encouraged the public, industry and governments, through the Discussion Paper: Australia's Future Infrastructure Requirements, to provide input regarding problems and potential solutions of national significance.

As a result of the information gathered from the 600 received submissions and Infrastructure Australia's own analysis, a number of **infrastructure challenges** have been identified.

These **challenges** can be divided into two areas:

- Nationwide challenges
- Location specific challenges.

Part 2 of this report discusses the nationwide challenges being:

1. **Deliver better governance**: inefficiencies and inconsistencies in governance adversely impact infrastructure operations and investment in Australia.
2. **Create competitive markets**: regulatory complexity and competitive anomalies impede the operation of efficient and competitive infrastructure markets , including the development of a nationwide world-class communications network.
3. **One nation, one set of rules**: inconsistent rules, legislation and regulations governing markets impede productivity and create unnecessary costs.
4. **Better use of existing infrastructure**: changes in the operation, pricing or utilisation of existing infrastructure to solve problems without the need for investment in additional capacity.
5. **Climate change**: in addition to requiring a shift to a low carbon economy, climate change is increasing the demand for improved infrastructure, such as efficient public transport systems and low carbon intensive methods of power generation.

Part 3 of this report discusses the location specific challenges being:

6. **Supporting our cities**: improving the liveability, sustainability and productivity of Australia's major cities.
7. **Boosting exports**: Increasing the productivity of Australia's international gateways, making sure that they can meet the rapidly growing freight task without adverse impacts on community amenity.
8. **Supporting indigenous communities**: improving infrastructure in remote and regional indigenous communities, and closing the gap in essential infrastructure and services between these and non-indigenous communities.
9. **Supporting rural communities**: improving the quality of life and economic prosperity in rural and regional communities.

To meet these challenges, Infrastructure Australia has identified **themes** that steer a course for solutions to meet the gaps, deficiencies and bottlenecks in our nation's infrastructure. These themes are:

1. **A national broadband network**: developing a more extensive, globally competitive broadband system;
2. **Creation of a true national energy market**: more extensive national energy grids to enable greater flexibility and competition in the nation's electricity and gas systems, whilst creating opportunities for the development of renewable energy sources;
3. **Competitive international gateways**: developing more effective ports and associated land transport systems to more efficiently cope with imports and exports;
4. **A national rail freight network**: development of our rail networks so that more freight can be moved by rail;
5. **Adaptable and secure water supplies**: more adaptable and resilient water systems to cope with climate change;
6. **Transforming our cities**: increasing public transport capacity in our cities and making better use of existing transport infrastructure; and
7. **Providing essential indigenous services**: improved services for Indigenous communities.

Infrastructure Australia will continue to work on developing a program of solutions that addresses the themes mentioned above, and that might ultimately form part of a larger 'pipeline' of nationally significant infrastructure projects to secure Australia's future prosperity.

Part 1 – A new national approach to infrastructure decision making

1.1 A national and balanced approach

Infrastructure Australia's aim is to drive the development of a long term, coordinated national approach to infrastructure planning and investment, focusing on transport, water, energy and communications.

Infrastructure Australia's objectives are to:

- increase the economic standard of living for Australians;
- achieve environmental sustainability and reduced greenhouse gas emissions; and
- improve social outcomes, quality of life and reduced social disadvantage in our cities and regions.

Infrastructure Australia will pursue these objectives through seven strategic priorities being:

- Expanding Australia's productive capacity;
- Increasing Australia's productivity;
- Diversifying Australia's economic capabilities;
- Building on Australia's global competitive advantages;
- Developing Australia's cities and regions;
- Reducing greenhouse emissions; and
- Improving social equity and quality of life in our cities and regions.

Infrastructure Australia's approach to infrastructure planning and investment reflects the following principles:

A national perspective to complement state and territory ambitions

Infrastructure Australia has taken a national perspective in setting priorities for infrastructure investment by adopting a principle-based approach with a strong cooperative national focus.

A triple-bottom line approach

Infrastructure Australia has given regard to economic, environmental and social benefits, costs and outcomes when making assessments and providing advice. It has sought to balance across all three areas, by placing a strong emphasis on benefit to cost ratio analysis (including wider economic benefits).

Efficient use of existing infrastructure and resources

Infrastructure Australia has considered a wide range of potential solutions – looking beyond new capital projects to assess other areas requiring change such existing operational processes or existing resource allocation or existing methods of pricing.

Maximise the productivity of people and assets

Infrastructure Australia has focused strongly on how proposals boost productivity through new or existing infrastructure.

Examine demand and supply side patterns, options and solutions

Infrastructure Australia examined demand and supply factors when assessing proposals and ensured decisions are based on a thorough examination of both factors.

A long term, whole-of-life approach

Infrastructure Australia has considered long term whole-of-life costs and benefits when assessing infrastructure solutions and priorities. It has also considered the long term impacts of potential solutions on the environment, the economy, social equity and human behaviour.

Optimise the role of both the public and private sector

Infrastructure Australia has focussed on how best to optimise the role of the public and private sectors in future infrastructure development and management, including the part each sector can play in planning, construction, financing and ongoing planning provision.

1.2 A robust decision making approach

Infrastructure decision making in Australia has been criticised on the basis that projects are considered in isolation, lack coordination and are subject to short term horizons.

Infrastructure Australia was established to address these concerns and to bring an independent, rigorous and coordinated approach to infrastructure decision making in the context of a long term nation building agenda.

The benefits of changing the way we tackle infrastructure decision making in Australia are considerable.

The Committee for Economic Development of Australia (CEDA) has estimated that infrastructure bottlenecks impose a cost on the national economy of approximately $6 billion per annum.[1]

In delivering this **new national approach**, Infrastructure Australia has not sought to predetermine any particular infrastructure outcome or solution. Rather, it has created a broad framework that was used for assessing any investment or actions.

Figure 1 outlines the description, rationale and outputs in the stages of this framework.

To guide the input into this report and to frame its decision making, Infrastructure Australia consistently used this framework to analyse and present a national perspective on the key infrastructure challenges facing the nation's transport, water, energy and communications infrastructure.

Figure 1: Infrastructure Australia's framework

Stage	Description	Components required	Rationale
1. Goal definition	Definition of the fundamental economic, environmental and social goals that society seeks to achieve, for example: sustained economic growth and increased productivity, lower carbon emissions and lower local pollution, greater social amenity and improved quality of life.	• Formalised, comprehensive, and agreed goals/targets. • Quantified, objective and specific goals/targets.	A performance benchmark is needed against which the adequacy of infrastructure can be assessed.
2. Problem identification	Objective, specific, evidence-based, and data rich identification of deficiencies with the condition, operation and services provided by infrastructure that may hinder the achievement of those economic, environmental and social goals.	• A list of specific problems clearly identified, including network or geographical location. • Those problems accurately quantified and defined, including an assessment of future trends.	Specificity regarding inadequacies is essential in order to take targeted and therefore more effective action.
3. Problem assessment	Objective and quantified appraisal of the economic, environmental and social costs of those deficiencies, so that the most damaging deficiencies can be identified and prioritised.	• Accurate and objective assessment of the economy/envt/soc impacts of those problems. • Priorities identified which reflect the scale of impacts.	Understanding the costs/impact of deficiencies allows the worst problems to be identified and prioritised.
4. Problem analysis	Objective policy and economic analysis of why these deficiencies exist – i.e. what is the underlying cause (depending on the sector, reasons could include market failure, government failure, capital restrictions, etc). This should include an assessment of non-infrastructure reasons for the problem – e.g. land use patterns, peak demand; or education/business hours.	• For each deficiency, analysis of why those problems have developed. • Covers both immediate and underlying causes (e.g. not just 'lack of investment', but causes of underinvestment, e.g. regulatory environment).	Understanding the causes allows effective and targeted solutions to be created. Infrastructure not the only cause of problems.
5. Option generation	Development of a full range of interventions that might address the issue – e.g. pricing, regulatory, better use, packages/systems, capacity increases, informed by the Problem Analysis completed at Stage 4.	• A full range of option types have been identified for each deficiency / problem. • Those options have been objectively assessed, without some options having been ruled out early or favoured.	Looking at a range of options rather than relying on early judgements is more likely to identify the best solutions.
6. Solution assessment	Use of cost-benefit analysis to assess those options/solutions. The appraisal should incorporate the full range of economic, environmental and social impacts (including agglomeration and trade impacts, carbon impacts, noise, and social amenity) so that the impact on all society's goals is measured and understood as far as is possible.	• Accurate and justifiable Cost-Benefit Analysis has been used to appraise options. • CBA is comprehensive and includes wider economic, environmental and social impacts.	An understanding of the impact of solutions on all goals is essential to understand how the portfolio will achieve those goals.
7. Solution prioritisation	Identification of policy and project priorities from the list of solutions, on an objective basis. The objective basis should give primacy to the Benefit-Cost Ratio (BCR) of policies, but could include broader considerations set out in a transparent framework – such as portfolio/package issues, deliverability, risk, and affordability.	• Priority List clearly identified • Priorities reflect primacy of BCR analysis alongside objective framework • Relationship to State-funded policies/projects clear – i.e. prioritisation reflects all ideas, not just the unfunded.	BCRs provide the best available objective evidence as to how well solutions will impact on goals – but not the whole story.

Part 2 – Nationwide infrastructure challenges

Infrastructure Australia has identified five nationwide challenges:

1. Delivering better governance;
2. Creating competitive markets;
3. One economy, one set of rules;
4. Better use of existing infrastructure; and
5. Climate change.

2.1 Delivering better governance

Many of the underlying difficulties in meeting Australia's infrastructure challenges can be attributed to governance issues that span infrastructure planning, policy, regulation, financing, procurement and management. The governance issues include:

a) Roles;
b) Accountability;
c) Planning; and
d) Regulation, Pricing and Ownership.

a) Roles

- Conflicts over roles and approval responsibilities between and within tiers of government;
- Confusion within government in its role as policy maker, regulator and service provider;
- Duplication, contradiction and overlap of effort;
- Lack of integration and communication between jurisdictions and departments
- Lost opportunities to benefit from economies of scale; and
- Lack of national perspective.

There is a fragmentation of roles within government where an infrastructure initiative requires the involvement of different tiers of government, and/or neighbouring jurisdictions for input on planning, environment, water, energy, road, rail or climate change.

Agreements between different levels of government, departments, or neighbouring jurisdictions are often not established prior to funding and public commitment. In addition, there is sometimes confusion between government roles as policy maker, regulator and service provider.

Responsibilities for various types of infrastructure are shown in Table 1. Within these overall responsibilities it often is not clear who has responsibility for policy making, approval processes, asset ownership and management. This occurs across agencies within the same tier of government, as well as across tiers of government.

The consequence is a lack of national perspective in providing for infrastructure, even where it is of national significance.

Different approaches to infrastructure procurement exist across jurisdictions. These varied processes create overheads for national businesses. Different jurisdictions also adopt varying degrees of focus on value for money outcomes, procurement timelines and bid costs.

Separate regulatory regimes and compliance obligations across the jurisdictions are a source of unnecessary regulatory burden, cost and inefficiencies.[2]

TABLE 1: Responsibility for infrastructure in Australia across the three tiers of government

Level of government	Economic infrastructure
Commonwealth	Aviation services (air navigation, etc.)
	Aviation (major airports – although under long term private lease)
	Railways (shared)
	Roads (national, local) (shared)
	Telecommunications
State	Aviation (regional airports)
	Railways (shared)
	Roads (urban, rural, local) (shared)
	Electricity supply
	Public transport
	Dams, water and sewerage systems
	Stormwater management
	Ports and sea navigation
Local	Aviation (local airports)
	Roads (local) (shared)
	Electricity supply
	Public transport (bus)
	Sewerage treatment, water and drainage supply
	Stormwater management

Source: Adapted from Richard Webb 2008, 'Infrastructure Australia Bill 2008', Bills Digest, no. 69, 2007-08, 5 March, Parliamentary Library, Department of Parliamentary Services, Parliament of Australia, Canberra, p. 3

b) Accountability

- Lack of accountability and transparency;
- Inadequate evidence to support decisions;
- Cost-shifting between entities;
- Inappropriate infrastructure pricing; and
- Mixed messages to industry and communities about infrastructure investment.

The lack of clear responsibility for and leadership in infrastructure planning compromises clear accountability for infrastructure outcomes. All too often Commonwealth, state, territory and local governments can deflect criticism onto other arms of government when decisions are not made or where inappropriate decisions are made.

There is a tendency to see infrastructure projects as individual entities, rather than in the broader context of land use, community and integrated networks. As a result, infrastructure projects often involve cost-shifting between governments.

c) Planning

- Poorly coordinated planning, especially at a national level;
- Planning decisions are determined by administrative boundaries rather than social, economic or environmental interdependencies;
- Poorly timed, designed or located infrastructure developments, which impact negatively on other government entities, communities or industry;
- Projects that are poorly scoped which leads to cost increases; and
- Increased costs of compliance for industry, government and communities.

Planning decisions are often determined within existing administrative boundaries rather than being based on social, economic or environmental interdependencies.

This is particularly acute in urban areas where inadequate early planning and reservation of infrastructure corridors has resulted in encroachment by housing developments or alternative land uses. Lack of foresight or commitment to longer term outcomes has even resulted in the rezoning of transport corridors around major ports and other facilities.

Infrastructure and land use integration suffers from poor planning, timing and coordination, most notably in relation to residential land development and new extractive industries. In some cases, critical infrastructure is not delivered when and where it is required for private sector developments of national significance. In other cases, poorly timed, designed or placed developments are approved, for which other levels of government or other portfolios must then provide services.

Critically, where planning is fragmented, it places a burden on industry to navigate proposals through the various tiers of government. Whilst most state and territory governments have sought to address these issues through ‘projects of state significance’ legislation, the potential remains for considerable uncertainty and increased costs arising from protracted processes.

While decision-making processes associated with government-sponsored capital projects are often not well integrated, there are processes within jurisdictions for decisions on capital investment as part of annual budgeting.

However, the alignment of these processes with whole of government strategic planning needs improvement. This is about where and how urban and regional growth is to occur. Investment in planning, guiding where growth will occur, and how infrastructure will support desired outcomes, needs to be a more central part of decision-making, and be tied to the rolling annual budget processes.

Australia's infrastructure governance arrangements create an environment in which reactive, incremental policy approaches dominate. For example, authorities may be reluctant to undertake major infrastructure projects within urban environments due to public criticism or lack of popular support. This leads to a tendency to wait until congestion, bottlenecks, risks or inefficiencies reach a critical point before acting, leading to sub-optimal outcomes. Also, the development of policy reforms to address such capacity constraints is often poorly resourced and not developed in conjunction with capital project planning.

Most of these problems stem from a failure to align planning processes along the three tiers of government.

d) Regulation, Pricing and Ownership

- Misguided or contradictory regulation; and
- Distorted investment patterns where government or Government Trading Enterprises are not subject to competition or truly independent regulation of natural monopolies.

Government ownership of infrastructure can distort investment patterns because governments are less subject to market signals. Australia's governments have not given enough weight to fostering competitive market environments for the provision or use of infrastructure. While the regulatory environment has been improving for private sector participation, Australian governments are not yet providing a commercial and independent regulatory environment for infrastructure.

Governments have dominated the provision of infrastructure in Australia. In many instances, Government Trading Enterprises (GTEs) have been established instead of opening the infrastructure and related service provision to competition, including to efficient private market entities. This is a problem when GTEs are not subject to the same financial risks, market competition and performance imperatives as other market players. Governments have not sufficiently or consistently required GTEs to meet competition, or where they are operating in true monopoly markets, to price efficiently and fully recover costs.

Where infrastructure and related services are natural monopolies, such as rail lines and water distribution networks, the priority should be to implement independent regulation of access and pricing.

To address these problems, Australia needs to consider developing and implementing a strategic national plan for assessing and meeting national infrastructure needs.

Further effort is also required within all levels of government to develop integrated cross-sector infrastructure investment and intervention plans that are supported by robust, high-quality analyses and solid investment commitments.

2.2 Creating competitive markets

The provision of modern, world-class energy, transport, water and communications infrastructure at lowest cost is essential to the competitiveness of all sectors of the economy.[3]

Australia has made substantial progress in reforming its infrastructure markets since the early 1990's. Principally, this has included the adoption of National Competition Policy in 1995 and significant reforms across the energy and water sectors. It is now widely recognised that these reforms, accompanied by reforms to labour, capital and product markets and improved frameworks for macroeconomic policy, have underpinned Australia's recent economic prosperity.

A number of impediments to the operation of efficient and competitive infrastructure markets nevertheless remain. These impediments inhibit timely and efficient infrastructure development and use, and represent a considerable drain on national productivity.

Long infrastructure asset lives and the need to avoid budget deficits have meant that Governments have overlooked the productivity enhancing qualities of optimising infrastructure... Government infrastructure assets have not been treated in the way that a major business entity would be expected to account for its capital assets... Most infrastructure investment is undertaken as crisis management to address the latest calamity and/or pressure.[4]

A number of measures can be taken to improve the competitiveness of infrastructure markets, including reforms that encourage private sector participation and promote efficient and competitive outcomes, changes to governance arrangements for the planning and delivery of infrastructure and the development of methodologies to improve the efficiency and transparency of individual investment decisions.[5]

The degree of market competitiveness varies among communications, water, energy, and road and rail transport. Aspects of the markets for each of these sectors are outlined under the following headings:

a) Energy
b) Communications
c) Water
d) Transport

a) Energy

The Australian energy sector (confined here to electricity and gas) has undergone significant restructure since the early 1990s. In the electricity sector, state owned utilities have been disaggregated into separate generation, transmission, distribution and retail supply entities. These entities have been corporatised and sold to the private sector in some jurisdictions (such as Victoria and South Australia).[6] The gas industry has undergone similar structural changes.[7]

The central element of these reforms was the creation of the National Electricity Market (NEM)[8] in December 1998, a wholesale market for electricity supply in the ACT, Queensland, New South Wales, Victoria, Tasmania and South Australia. Western Australia has established the Wholesale Electricity Market, which commenced energy trading on 21 September 2006 (but is not part of the national market).

More recently, the reform process has created a single market operator for gas and electricity (the Australian Energy Market Commission, commencing on 1 July 2009) and a single national regulatory framework for energy (the Australian Energy Regulator, coming into full effect by 2010).

These developments have delivered significant benefits, including:

- An increase in national income of $1.5 billion[9]
- Significantly lower electricity prices than overseas[10]
- Annual investment of around $700 million in electricity transmission infrastructure and $3 billion in the local distribution network[11]
- Around $2.5 billion in new gas transmission pipelines and major expansion since 2000[12]
- An energy sector that is now one of the most reliable and competitive suppliers anywhere in the world.[13]

However, the reform process is not yet complete and there remains scope to improve the efficiency of Australia's energy sector.

A complete national energy market

One priority for the Australian energy sector is to develop a national energy market across the south east of Australia. At present, no such market exists.[14] The Australian energy market is a series of regional markets with limited interconnectedness and ineffective market-based pricing for network services due to poor market design.

The lack of a national energy market has implications for national productivity and economic growth. In particular, the current state-by-state approach to considering energy issues limits the energy sector's efficiency and ability to respond to emerging challenges, including climate change.

Capacity

One important obstacle to the national energy market is in the area of electricity transmission planning and investment.

The adequacy of interstate interconnection will be a key infrastructure issue for the National Electricity Market in the near future….Adequate interconnection will allow the National Electricity Market to accommodate structural change in the electricity sector as costs and demand change rapidly and differentially across the power sector.[15]

Inadequate interstate connectivity poses a problem not just for ensuring energy security under current arrangements, but is also likely to frustrate the development of renewable energy generation. Some of the most favourable locations for wind generation, for example, tend to be in western Victoria and South Australia. Current and planned transmission capacity will not permit efficient transmission of energy from those locations to the areas of highest demand.

The main interconnectors across the country are shown in Figure 2.[16]

Reforms to the regulatory and institutional arrangements for the planning and funding of improvements to interconnector capacity are underway through the Australian Energy Market Commission, including the establishment of a National Transmission Planner (NTP), effective from 1 July 2009. The core function of the NTP will be to prepare and publish an annual national transmission network development plan for the national transmission grid. Infrastructure Australia supports the recommendations for national transmission planning arrangements as outlined by the AEMC.[17]

Infrastructure Australia is also supportive of the Garnaut Review recommendation that the NTP's role be expanded to include a long term economic approach to transmission planning and funding.[18] This would include advising Australian governments on whether there is a need for initial public funding for transmission investments, with the objective of ensuring that extensions of transmission capacity are not inhibited by first-mover problems and that extensions and expansions of the network are designed at optimal scale. The NTP could also provide advice on processes for recovery of investments as use expands over time.

Ownership

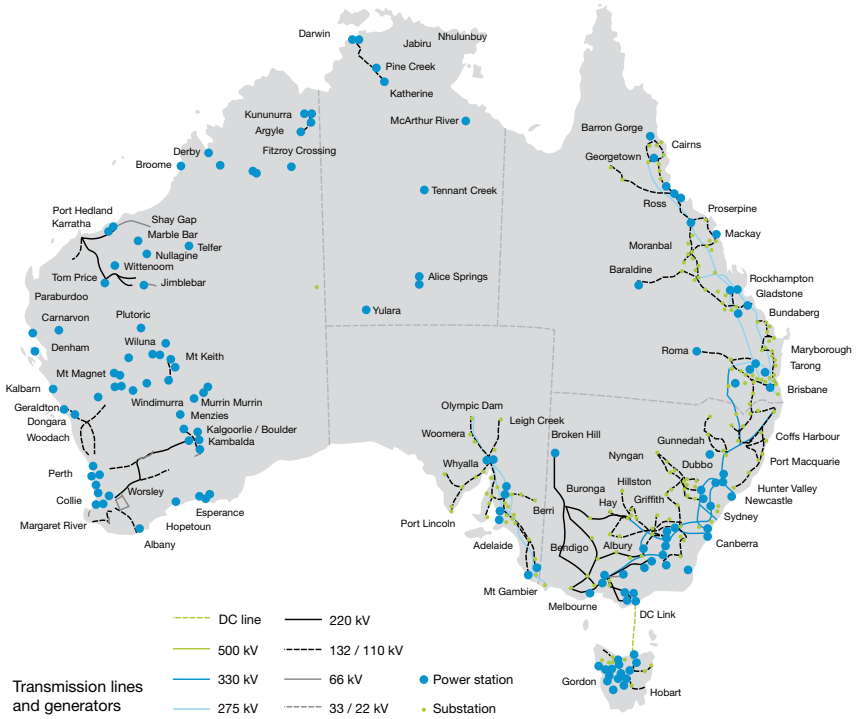
Infrastructure Australia notes that where government ownership of energy infrastructure is a factor, investment decisions (as well as demand side responses) are distorted and competition is impeded.[19]

Continuing state ownership of energy generation assets is placing a financial burden on governments to fund the next tranche of baseload generation. It also places a burden on those governments that will need to further invest in state-owned energy corporations to enable them to pursue investments across the NEM that will allow them to be competitive and successful. The investment required across the generation and retail sector is significant and constrains borrowing for other government services. It also has the potential to raise state net debt and impact on a state's business profile and credit rating.

Infrastructure Australia has also observed that in some jurisdictions significant vertical integration across the energy sector has emerged in recent years. Infrastructure Australia shares the opinion of the Australian Energy Regulator and the COAG Energy Reform Implementation Group that vertical integration is "not necessarily anti-competitive, but does pose some risks to competition."[20]

The energy sector has been on a path of continual reform since the mid-1990s and the journey is not yet complete. It will be important to create an effective link between the energy market and emissions reduction reforms through the Ministerial Council on Energy.

Figure 2: Australia's energy transmission lines and generators



Source: Australian Government, Department of Resources, Energy and Tourism 2008, *Energy in Australia 2008*, p. 51

b) Communications

It is difficult to overstate the importance of telecommunications to national productivity. A bold approach is required to improve Australia's communications infrastructure. Telecommunications, such as broadband and 3G telephony, represent an opportunity to achieve the kind of connectivity historically enjoyed by smaller, more densely populated nations closer to global markets. Finally the competitive disadvantage described by historian Geoffrey Blainey as Australia's 'tyranny of distance' can be overcome.

Ownership

Liberalisation of the telecommunications sector occurred in 1997. Since that time a number of carriers and service providers have entered the market. Notwithstanding the emergence of competition at the retail service level, the development of infrastructure competition has been limited.

While there are now four competing mobile networks, Telstra remains the owner of the only fixed line network in Australia. Many competitors in the telecommunications market rely on access to parts of this network to supply services to consumers. This network comprises copper wire connections to premises, exchanges and the backhaul links (primarily fibre optic) connecting exchanges with each other and with other networks.[21]

Singtel Optus is the second largest telecommunications company in Australia and owns and operates a GSM and a 3G network, providing mobile voice and internet services. It also owns and operates a HFC cable network, which is capable of providing voice, internet and Pay TV services to consumers.

This network passes approximately 2.2 million premises, but is currently only enabled to serve 1.4 million. The Optus and Telstra cable footprints overlap substantially.

The mobile voice and data services sector could be considered the most competitive market in Australian telecommunications. GSM networks are owned by Telstra, Optus and Vodafone and cumulatively cover 96 per cent of the Australian population. These networks offer mainly voice services, but are also capable of providing internet services of speeds up to 384 kilobits per second (kbps) (Table 2).

All four carriers operate 3G networks, providing voice and broadband services. This has resulted in significant infrastructure investment over the past few years, most notably in Telstra's $1 billion Next G network, which was launched in October 2006. Telstra claims to cover 98.8 per cent of Australia's population. Optus and Vodafone continue to develop their 3G networks, with Optus announcing on 7 May 2008 that it will invest $315 million to expand its mobile coverage to 98 per cent of the Australian population.

The deployment of 3G technology capable of supporting broadband services and complex applications is changing the nature of telecommunications in Australia. When Optus and Vodafone complete their network rollouts, Australia will have three competing wireless broadband networks that can deliver services at speeds up to 14.4 megabytes per second (Mbps). Take-up of mobile services continues unabated, with 21.3 million mobile phone services in operation — a number larger than Australia's population.

In response to competitive pressure, Telstra has announced that it intends to increase the maximum speeds offered by Next G to 21 Mbps this year and to 42 Mbps in 2009. However, it is important to note that these speeds are theoretical.

Pricing

In general, broadband services are considerably more expensive across 3G networks than over fixed-line or other fixed wireless services. Significant pricing discrepancies between urban and regional Australia — even where 3G services are available — has meant that the Australian Government continues to provide subsidies for broadband services.

Regulation

Telstra and some other industry players argue that the existing regulatory regime does not provide sufficient incentives for investment in telecommunications infrastructure. Conversely, critics argue that the regulatory regime fails to adequately address Telstra's incentives to favour its retail arm, thus limiting competition. There is also a large number of disputes between access providers and access seekers, requiring arbitration by the Australian Competition and Consumer Commission (ACCC).

The immediate challenge in the telecommunications sector is the relative lack of accessible and affordable broadband and third generation telephony, particularly in regional and some parts of urban Australia.[22] By way of comparison, broadband services in Canada are slightly cheaper than in Australia, yet offer six times the speed and 30 times the quantity of downloads.[23] These gaps in telecommunications services are major obstacles to economic development and service delivery.

In its *Broadband Blueprint* (2006), the Australian Government cites an estimate that universal availability of broadband could produce economic benefits of

Table 2: Size of the Australian telecommunications market

Measure	Market Share by revenue 2005-06 financial year[1]	Market size	
		30 June 2006[2]	30 June 2007[2]
Internet subscribers	Telstra: 67.4% Optus: 23.7% Others: 8.9%	5.95 m	7.10 m[3] (end December 2007)
Narrowband (dial-up) subscribers		2.76 m	1.89 m[3] (end December 2007)
Broadband subscribers		3.16 m	5.21 m[3] (end December 2007)
Total mobile services	Telstra: 44.7% Optus: 37.5% Others: 17.7%	19.76 m	21.26 m
GSM coverage as a proportion of the Australian population		96%	96%
3G (W-CDMA) coverage as a proportion of the Australian population		53%	98.8%
Total fixed lines		11.26 m	10.92 m
Public Switched Telephone Network (PSTN) services	Telstra: 74.6% Optus: 16.4% Others: 9%		

1. Source: ACCC Telecommunications Market Indicator Report 2005-06, 20 August 2007
2. Source: ACMA Communications Report 2006-07, 28 April 2008
3. ACMA's data referred to the ABS Internet Activity Survey for March 2007. Data has been updated using the Survey for December 2007, released 24 April 2008
Source: Adapted from ACCC 2007, Telecommunications Market Indicator Report 2005-06, 20 August; ACMA 2008, Communications Report 2006-07, 28 April.

$12 billion to $30 billion per annum.[24] Indeed, the first wave of information and communications technology (ICT) delivered an immense boost to Australian productivity, accounting for up to 70 per cent of productivity growth between 1984-85 and 2001-02.

Given the importance of telecommunications in an increasingly knowledge-based economy, a world-class telecommunications network is essential.

In this context, the Australian Government's proposal to build a National Broadband Network represents a once-in-a-generation opportunity to address structural issues and improve the competitive environment.

c) Water

The urban water industry has undergone significant reforms over the past two decades.[25] Some governments have pursued pricing reform, such as the introduction of usage based pricing and moves towards full cost recovery, to better manage demand and to encourage cost-effective investment in water infrastructure. Operational reforms in asset management and procurement have improved cost and risk management.

Water markets are effectively restricted to the physical boundaries of distribution systems, which are themselves determined by water catchments and the high cost

of transporting water and wastewater. Within these boundaries competition is limited. The natural monopoly nature of urban water distribution does lend itself to competition, such as through access to infrastructure and through competitive provision of specific services such as water and wastewater treatment. However, even in places where access is provided, such as the UK and recently Sydney, there are as yet few examples of it being used.

In 1994, the Council of Australian Governments supported the introduction of a more commercial focus for major city utilities – through contracting out, corporatisation or privatisation. COAG also recognised that an independent regulator is an essential element for good outcomes in the water industry, much of which is a monopoly. The importance of strong, independent regulatory oversight is also important as the industry moves to new sources of supply and potentially greater levels of competition.

However, pricing arrangements in many jurisdictions are still not truly independent and do not return long run marginal costs, often because of government influence over the pricing regulator. Consequently, inadequate revenue streams are constraining investment by many of Australia's major urban water utilities.

Proposals to introduce scarcity pricing for water are part of a wider debate about the best way to price water. The introduction of consumption based charging was the first step. In this aspect, Australia is many years ahead of many other countries. Further consideration of scarcity pricing for water is worthy, particularly in the context of bulk or wholesale water supply becoming more competitive.

d) Transport

In Australia, transport directly accounts for around 5 per cent of GDP. However, this underestimates the importance of transport to the economy and society. Transport facilitates employment and settlement, and allows for the distribution and specialisation of industry. As shown in Table 3, the four modes of transport (aviation, shipping, road and rail) serve several markets, sometimes in combination and sometimes in competition.

Ownership

Much of Australia's key urban rail networks are owned and managed by state and territory governments.

Regional rail networks are largely state government operated with open access regimes generally in place and private operators using such networks. The interstate rail network is managed by the Commonwealth-owned Australian Rail Track Corporation Limited (ARTC), which maintains and operates the network, and manages network access for freight and passenger operators. The ARTC also manages key parts of the New South Wales regional network. Again, private operators use these networks via access regimes.

There are some private railways. Private companies own and manage critical rail network infrastructure in Australia's major resource zones such as mine-specific rail links in northern Western Australia and Queensland and cane rail networks operated by various sugar mills in Queensland.

Table 3: Australian Transport Statistics

	Aviation	Shipping / storage	Road	Rail
% of transport value added (a)	13%	37% (including storage)	37%	13%
% of Australian employment	0.5%	0.2%	2.2%	0.4%
Principal tasks	Long distance passengers	Container (import) Bulk commodity (export)	Personal (car) transport Public (bus) transport Non-bulk freight haul and distribution by trucks	Public (train) transport Bulk freight haul Non-bulk freight long distance haul
Tonne (billion km)	na	122	168	189
Passengers (million journeys)	42	22	na	643
Principal locations	Intercapital International	International Bass Strait	Urban and rural	Urban (public trains) Regional (freight)

Source: Adapted from Australian Transport Statistics Pocketbook 2008, Australian Transport Statistics Yearbook 2007, Bureau of Infrastructure Transport and Regional Economics

Australia's main ports (about 70 trading ports) are generally Government Trading Enterprises with private companies undertaking stevedoring and other operations under long term leases. In South Australia, export ports are all privately leased and operated by the private sector. Australia's port authorities are generally not responsible for land transport links into and out of the ports.

Queensland Railways (QR) notes in its submission to Infrastructure Australia that the market share of previously rail-dominated freight corridors between Melbourne to Sydney and Brisbane has dwindled from nearly 70 per cent in the 1970s to single figures today.[26] QR compares the task of upgrading the national rail freight and passenger networks and addressing rail capacity constraints to the task that faced the planners of Australia's national highway network in the 1970s. Thirty years ago, sections of the highway between Melbourne and Sydney were still unsealed, whereas today this route is a vital component of the national road freight network.

Pricing

The markets in which road, rail and shipping operate are distorted by prices that do not fully reflect costs, inconsistent regulatory regimes and tax and other incentives that compromise transport policy objectives. Pricing policy differences between road and rail can distort decisions on the use of and investment in the two freight modes and between public transport and private car use. Full application of pricing does not occur for all road use.

2.2 Creating competitive markets

Regulation

There is a lack of uniformity in regulations for land transport across the nation. While significant elements of road and rail freight are national operations, there are separate rail safety regulators and communications systems in each state – in some cases driving up costs, creating inefficiencies and causing confusion. Inconsistent State and Commonwealth road safety, registration and licensing laws also hinder seamless and efficient transport operations.[27] Transport companies operating on a national level carry the overheads associated with these different licensing, safety and communications regulations.

Several national bodies (COAG, the Australian Transport Council and the National Transport Commission) are pursuing reform, but progress has been slow.

The lack of a competitive market in much of the Australian land transport sector leads to an environment where there is little private sector investment in infrastructure, except in the resource-specific private railways linking mines to processing plants and ports, in terminals to some extent and some roads.

For ports, ten years ago, the emphasis in the maritime freight sector was on waterfront reform to increase productivity levels and ship turnaround times; today, the focus is on port physical capacity and landside links. Recent rapid growth in demand at many of Australia's ports is placing strain on landside road and rail capacity and supply chain links from the ports.[28] End-to-end supply chain solutions are rare.

Issues requiring attention include planning, approval processes, supply chain coordination, and the provision, pricing and regulation of infrastructure.[29]

Progress to date

Since the late 1980s, some reform has been undertaken in the transport sector to create more competitive markets. These reforms have focussed on heavy road vehicles, interstate transport, rail regulation and, more recently, 'freight infrastructure' pricing.[30] However, the national reform program agreed to by COAG is incomplete, COAG's agreed regulatory reform program, to be implemented by the states and territories, is behind schedule. The program must be completed to ensure optimal investment in highways and interstate rail.

2.3 One economy, one set of rules

A more comprehensive and coordinated approach to setting out the long term infrastructure reform agenda would support timely and effective delivery of reforms and lessen the risk of ad hoc reform or distractions caused by reactions to the most topical issue of the day.[31]

Overlapping and inconsistent regulations in Australia impede economic growth. Without change Australia's future living standards will be compromised, the competitiveness of the economy reduced and our ability to meet the challenges ahead diminished. Present arrangements for infrastructure planning, investment, regulation, access and priority setting are state-based and fragmented across the nation. This poses a range of difficulties and compliance costs for anyone using or providing infrastructure services within and across state borders.

The Council of Australian Government's (COAG's) National Reform Agenda includes reform of infrastructure regulation to achieve a simpler and more consistent national approach. Considerable scope remains for progressing this agenda (as shown in Table 4). Examples of unfinished reforms include a national rail safety regulator, unified development assessment arrangements and building regulations, a national rail communications system and a national set of road rules.[32]

Moving towards a seamless national economy through regulatory reform and more consistent policy settings, will make it easier for businesses and workers to operate across state and territory borders. In some sectors – such as seafreight, communications and energy – a national approach is slowly emerging.

a) Energy

While much has been achieved in the energy sector, more remains to be done to enhance the competitiveness of national markets. Financial estimates of the annual costs to the Australian economy arising from current energy inefficiencies range between $36 million and $1,400 million.[33]

One specific area in need of consideration is that of state exemptions from the national electricity rules. At present, the electricity market rules include a set of exemptions for each state which, along with other separate legislation and regulatory instruments, make each state's electricity market unique. The COAG Energy Reform Implementation Group noted that this situation hampers efficient national competition and the emergence of a truly national market as differing state schemes cut across efforts to develop efficient national rules.[34]

The amended Australian Energy Market Agreement (dated 2 June 2006) between the Commonwealth and the states and territories, sets out the basis for aligning distribution and retail regulation and progressively removing some state regulation. But different state schemes continue to be announced in areas such as greenhouse gas abatement policy, customer protection and retail settlements.

Infrastructure Australia considers that the states should align as many legislative, regulatory and rule-based provisions as possible, in order to support a truly national energy market. There may also be grounds to explore the harmonisation of energy technical and safety regulations, and removing jurisdictional impediments to gas exploration and development.

Table 4: Direct impacts of regulatory reform

Reform area	Nature of change	Direct impact
Electricity generation	Transmission reform increasing dispatch efficiency in the NEM, and further pro-competitive reform	Improved productivity in the use of all inputs in electricity generation
	A more competitive and integrated NEM reducing the need for trade risk management	Improved productivity in the use of labour and financial services by electricity generation
	Regulatory governance reform reducing investment risk to participants in the NEM	Lower required risk-adjusted rate of return to capital in electricity generation
	Increased generator competition, transmission reform and demand-side management reducing electricity prices	Reduction in economic rent through pro-competitive pricing in electricity generation
Electricity supply	Regulatory governance reform reducing retail compliance costs	Improved productivity in the use of all inputs in electricity retail
	Regulatory governance reform reducing investment risk in electricity retail	Lower required risk-adjusted rate of return to capital in electricity transmission, distribution and retail
Electricity sector government administration costs	Reducing unnecessary duplication across jurisdictions	Improved productivity in the use of all inputs in government regulation of the electricity sector
Gas supply	Regulatory governance reform reducing compliance costs	Improved productivity in the use of all inputs in gas supply
	Regulatory governance reform reducing investment risk	Lower required risk-adjusted rate of return to capital in gas supply
Gas pipeline transport	Regulatory governance reform reducing investment risk	Lower required risk-adjusted rate of return to capital in pipeline transport
Road and rail freight transport	Reforms increasing the productivity of road freight infrastructure	Improved productivity in the use of all inputs in road freight transport
	Reforms increasing the productivity of rail freight infrastructure	Improved productivity in the use of all inputs in rail freight transport
Ports and associated infrastructure	Reforms increasing the productivity of ports and port handling services	Improved productivity in the use of all inputs in container ports and associated infrastructure
	Increased competition and investment in port services from incumbent port service providers responding to existing capacity constraints or market entrants investing in new infrastructure	Reduction in economic rents through new economically efficient investment in container ports and associated infrastructure
Regulatory reform	Reduction in regulatory compliance costs from reviewing existing regulations, improved gate-keeping mechanisms for new regulation, greater regulatory consistency across jurisdictions, reduced regulatory overlap and better measurement of regulatory burdens	Improved productivity in the use of business services in all industries
		Improved productivity in the use of labour in all industries
		Improved productivity in the use of capital in all industries

Source: Adapted from Productivity Commission 2006, Potential Benefits of the National Reform Agenda: Report to the Council of Australian Governments, Canberra, pp. 22-23

b) Transport

The issues surrounding the principle of 'one set of rules for one economy' are clearest in land transport.

Despite 15 years of heavy vehicle reform, rules and regulations on transport continue to be implemented differently in each state and territory. Transport companies operating nationally incur the additional costs associated with different licensing, safety and communications regulations as they move from state to state – costs that are in turn borne by consumers.

Over the last two decades, there have been a number of attempts to progress national land transport policy reform by promoting 'one set of rules', including seeking formal cooperation among the tiers of government.

Some successes have been recorded, including partial implementation of a nationwide heavy vehicles agenda led by the National Transport Commission (NTC), introduction of private sector disciplines to interstate rail freight operations, and the creation of a corporation that controls most of the rail links between the mainland capitals.

There has also been limited introduction of the COAG national framework for assessing the performance of Government Trading Enterprises.[35]

The most recent attempt at national cooperation includes the concept of a national economic framework for transport.

In addition, inconsistencies across state borders in areas such as how rail freight operations and network management (including access) are managed should be addressed. Governance arrangements can be improved to provide more commercially-based decision-making and greater transparency in below – and above – wheel costs to avoid cross-subsidisation through access charges. This would improve decision-making and provide better market signals for investment, network planning and potential new entrants to an industry that should be capturing greater market share from road freight.

Infrastructure Australia notes that, despite efforts by Australian governments over the last two decades, broad scale nationwide reform in transport has not occurred.

2.4 Better use of existing infrastructure

It is not surprising that many of the submissions to Infrastructure Australia focus on new capacity solutions to infrastructure bottlenecks and gaps. With the establishment of the Building Australia Fund, most attention has been given to new nation building projects and assets.

However Australia already has a substantial infrastructure asset base. It is on this existing base that much of our economic development and success to date has been built. Making better use of this existing infrastructure can often solve problems and defer the need for investment.

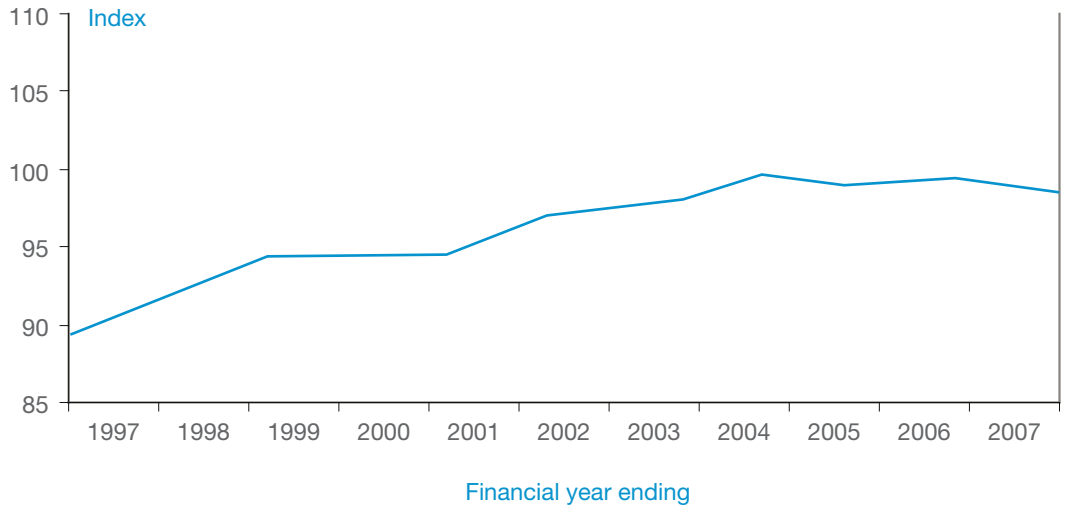
Productivity improvements expand economic output through better, more productive use of resources. Productivity improvements can be achieved through technological innovation, education and skills development, and efficiency improvements in processes and operations.

In the period from 1996-97 to 2006-07, Australia's productivity increased by an average of 1.1 per cent per annum.[36] However, in the last three years, productivity increases have flattened as the economy approaches full capacity and labour underutilisation rates continue to fall (Figure 3). Much of Australia's growth in the past decade has come from additional inputs of capital and labour into the economy, rather than from productivity.[37]

Making better use of existing infrastructure – changes in the way infrastructure is used, operated and managed to improve efficiency and asset utilisation – can deliver substantial benefits without the need for major new investment. These benefits include:

- Productivity increases. Increasing output from an existing asset base boosts productivity. Service improvements in shared infrastructure such as ports, telecommunications networks and major roads are particularly powerful. The productivity improvements extend to every person and business using

Figure 3: Australia's Productivity[(a)]



Source: Australian Bureau of Statistics, *Australian System of National Accounts, 2006-07* (ABS Cat. No. 5204.0)

the infrastructure, either directly or indirectly. Congestion relief, quicker turnaround times at ports and faster communications lower costs, decrease prices, increase competitiveness and growth, and boost employment.

- Avoidance or deferral of major new capital expenditure. When asked to nominate the infrastructure investment needed for Australia, governments and industry usually assemble a list of projects worth hundreds of billions of dollars. However, even without the impact of the current economic slowdown, such an agenda is beyond the current financial resources of governments and industry. Finding ways to achieve required efficiencies and increases in productive capacity without diverting scarce capital should be of the highest priority – a higher priority than building new assets.
- Environmental and amenity benefits. Often, new infrastructure comes at some environmental cost. Natural resources are used for construction and the natural landscape is reduced; often the visual landscape is damaged and there may be additional noise and air pollution. Making the most from existing infrastructure can avoid many of these negative environmental and amenity costs. It can also reduce the carbon intensity[38] of the economy by avoiding the carbon emissions generated by the construction process and through the more efficient use of infrastructure.

The following sections are key to improving the use of existing infrastructure:

a) Open access to infrastructure;
b) Efficient Pricing;
c) Technology; and
d) Reform of transport operating rules.

a) Open access to infrastructure

National Competition Policy (NCP) formed the basis of much micro-economic reform in Australia in the 1990s. At the heart of the NCP was the principle that where facilities of national significance existed, access to that infrastructure should be open to competing operators.

The relatively small size of the national economy has meant that Australia has had to struggle with this notion more than most nations. Diseconomies of scale have acted as barriers to investment that would duplicate essential facilities such as much of Australia's telecommunications network, energy transmission systems, some railway lines and ports.

Most Australians accept that duplicating these assets is a waste of scarce resources. However, key elements of Australia's telecommunications, energy, rail and port infrastructure remain either closed to competing operators or effectively closed due to unviable conditions of access. These obstacles to competition can lead to essential infrastructure being underused.

In most cases, the argument against more open access has been about pricing and incentives for private investment. There is often disagreement about the price new operators should pay to use such infrastructure. It is also argued that it is unfair for companies that have built or purchased the essential infrastructure to effectively subsidise competitors through low access prices.

Access prices should be fair and provide a reasonable return to incumbent owners and operators. At the same time, access rules should not discourage private investment and competition.

The interests of national productivity and competitiveness must prevail. Where access regimes on critical infrastructure are not working, reform is needed. Such reform can be painful and adversarial, but embarking upon massive new investments or unnecessarily duplicating infrastructure is far more costly.

Several submissions were put to Infrastructure Australia regarding investment in intermodal (road-rail) terminals. A variety of circumstances can arise with these terminals. For example, in some metropolitan areas there is a lack of suitable land for terminal development and use. Proposed or existing links to ports from some terminals can make these facilities very important to interstate and metropolitan freight tasks and provide owners with strategic advantages.

In regional locations where more land is available, the principal issues may be attracting sufficient trade or funds to make the terminal viable. There can also be competition between some terminals, including terminals located in adjacent regions, and private parties may have already invested substantial sums into terminals.

b) Efficient Pricing

Pricing reforms that reflect the real total costs of providing infrastructure are an important means of ensuring that infrastructure is used efficiently.

'Efficient pricing' refers to the pricing that corresponds to the efficient allocation of resources. One benefit of efficient pricing is that it helps potential investors – whether they are taxpayers represented by government or private firms – to determine the real value that society places on a particular infrastructure service. Where such prices are distorted – for example, through subsidies or the presence of externalities – it is difficult to identify what society genuinely wants and these needs can go unmet, generating a disadvantage for all.

Efficient pricing also helps to ensure that infrastructure is used for its most productive purpose and that capacity is being allocated to maximise output.

c) Technology

Technology can provide opportunities to unlock capacity in existing assets.

In the energy sector, 'smart' metering can permit the introduction of time of day pricing, allowing users to better manage their electricity consumption. This would also involve progressing to a genuinely national energy market that allows for the efficient distribution of energy in response to demand signals from consumers.

The transport sector in Australia is only beginning to apply and trial technological solutions to traffic management. These solutions include Intelligent Transport Systems (ITS), which enable road networks to be managed as a whole to improve overall traffic flow, and ramp metering, which moderates the flow of traffic attempting to join key routes. ITS and ramp metering can deliver large capacity improvements without new road construction.

The use of ITS and ramp metering is inconsistent across Australia. Submissions received by Infrastructure Australia refer to different levels of progress in different jurisdictions in rolling out such technology. No specific proposals for a national plan were received and proposals for new road infrastructure were not accompanied by an analysis of how ITS could defer or avoid such projects. Infrastructure Australia's view is that ITS should become an integral part of road management in Australia's major cities.

ITS can also benefit the rail sector, enabling more effective signaling which can increase capacity on freight and passenger systems.

It is possible to link infrastructure funding with the use of technology to deliver efficiencies. For example, the Canadian Strategic Infrastructure Fund requires as a condition of funding for municipal water projects that local councils address the issue of smart water metering and pricing in their projects.[39]

d) Reform of transport operating rules

There are opportunities in the transport sector to achieve greater efficiencies from existing infrastructure through new rules and regulations, including:

- High occupancy lanes – lanes set aside on congested arterial routes for vehicles containing more than one occupant
- Extended clearways – removing parking from key routes can free up road space in busy periods and can be used to give priority use to buses or trams to encourage modal shift to public transport.
- Traffic signal priority – buses and trams can be given traffic signal priority at busy intersections to increase the efficiency and attractiveness of public transport
- High productivity freight vehicles – road freight vehicle technology has enabled new trucks to carry larger loads safely, increasing productivity and reducing overall truck movements. The National Transport Commission has noted that "if an inter-capital network for B-triples was established on the Australian mainland beyond road train routes … a national long-haul truck operator with 60 B-double and semi-trailer trucks could reduce trips by one in four, save 3.7 million kilometers of truck travel annually, reduce operating costs by 22 per cent and reduce the truck fleet by 30 per cent".[40]

2.5 Climate change

The 'lock-in' effects of infrastructure, technology and product design choices made by industrialised countries in the post-World War II period of low energy prices are responsible for the major recent increase in world greenhouse gas emissions.[41]

Climate change is a major economic, environmental and social issue for the 21st century.

Sir Nicholas Stern's 2006 Climate Change Review for the UK Government and Professor Ross Garnaut's 2008 Climate Change Review in Australia have confirmed that the costs of conducting business as usual far outweigh the costs of abatement and adaptation.[42]

The potential effects of unmitigated climate change in Australia are well known: increasing periods of drought, higher average temperatures, rising sea levels and more extreme weather events.[43]

As the Australian Government's Green Paper on a Carbon Pollution Reduction Scheme (CPRS) notes: "The longer we wait to take action on climate change, the sharper the adjustment to the economy will be when we are forced to act. Taking earlier action will allow an orderly, gradual transition to a low-carbon economy. Delaying action would require sharper, more rapid – and thus more costly – adjustments later."[44] In response, the Australian Government has developed a climate change policy built on three pillars:

- Reducing Australia's greenhouse gas emissions by 60 per cent below 2000 levels by 2050;
- Adapting to climate change that we cannot avoid, but which represents considerable risk to assets, investment, environments, communities and regional economies; and
- Helping to shape a global solution that both protects the planet and advances Australia's long-term interests.

Investing in the right infrastructure and undertaking the necessary reforms to improve the operation of the market is a vital component in achieving these goals.

New 'green collar' jobs are likely to result from additional infrastructure developed in response to climate change and the impact of 'peak oil'. It will be necessary to facilitate the development of 'green skills' for up to 3.25 million workers in sectors that have an environmental impact.[45]

The following areas are key to addressing climate change:

a) Emissions trading
b) Energy security and peak oil
c) Renewable Energy infrastructure
d) Carbon Capture and Storage
e) Transport infrastructure
f) Water infrastructure

a) Emissions trading

The national emissions trading scheme, the Carbon Pollution Reduction Scheme, is a major part of Australia's response to climate change.

The proposed scheme is a cap and trade system, whereby the Australian Government will release a set number of permits to 'cap' the volume of emissions each year by the nation's 1000 biggest greenhouse gas emitters. The emitters then trade these permits or reduce their emissions (whichever is more cost effective), allowing the market to set a price for carbon based on the number of permits available versus the cost of abatement. The Government proposes to set a 'carbon trajectory' (the rate at which the cap will decrease over time) which will help to establish the initial carbon price.[46]

Industry and governments will then be able to respond with investments in new low emission technologies such as greener power generation, carbon capture and storage, and more efficient public transport systems.

b) Energy security and peak oil

A 2008 report commissioned by a UK Industry group – *The Oil Crunch: Securing the UK's Energy Future* – reveals disturbing evidence that 'peak oil' may occur sooner than many had imagined. At best, the world will reach an oil production 'plateau' by 2015; at worst, there will be a production peak by 2013, with reserves declining rapidly thereafter.[47] Alternative oil extraction technologies such as deep water, pre-salt layers, tight gas, coal-bed methane and tar sands are currently being explored,[48] as are substitutes such as bio fuels. However, it is clear that the age of 'easy oil' is drawing to a close even as energy demand continues to rise.

The diminishing supply of oil provides a double imperative to take immediate action. In the words of Lord Ron Oxburgh, former chairman of Royal Dutch Shell:

> For once what is right is also expedient – we know that we have to stop burning fossil fuels because of the irreversible environmental damage they cause, and now it may be cheaper to do so as well.[49]

Coincidentally, the same policies that must be pursued in response to climate change – reducing reliance on fossil fuels and reducing energy demand overall – are also the right response to the peak oil problem.

Australia is a net energy exporter of oil, coal, natural gas and uranium. The design of Australia's energy and transport infrastructure is predicated on the availability of cheap and plentiful fossil fuels. While transport is the most oil-dependent sector of the Australian economy, oil is also critical for the energy sector, particularly as fuel for electricity generation in remote areas. Our reliance on fossil fuels means that any disruption in global energy supplies could lead to major economic damage and social dislocation.[50]

Governments can do more to encourage private sector investment in less carbon-intensive energy and transport infrastructure.

c) Renewable Energy infrastructure

Climate change mitigation also requires new investments and reforms to fill infrastructure gaps and make the most efficient use of existing infrastructure. Stationary energy and transport are two of the biggest greenhouse emitting sectors of the Australian economy, contributing around 50 and 14 per cent of national emissions respectively (Figure 4).

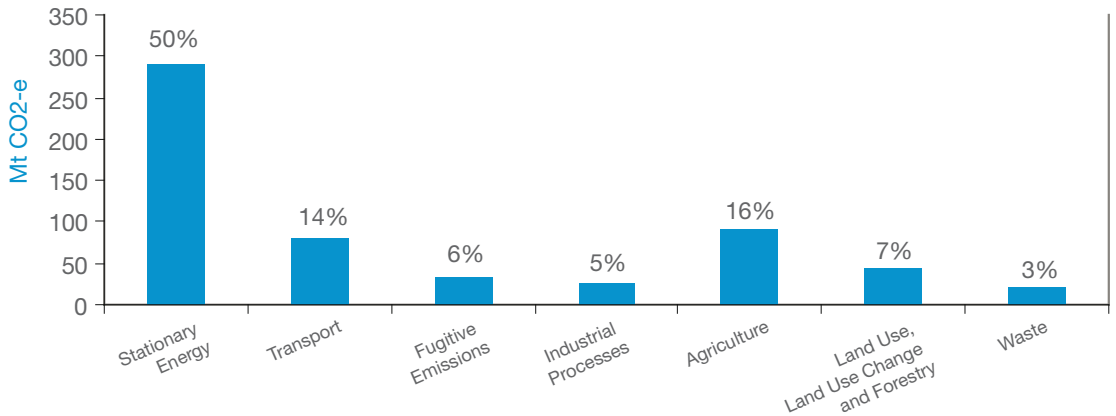
As the Australian economy has grown in recent years, so too has energy consumption. Australia's per capita greenhouse gas emissions due to energy are the third highest of any OECD country and the seventh highest in the world.[51] Much of this energy – including over 75 per cent of electricity generation – comes from black and brown coal.[52]

Renewable energy sources currently comprise only five percent of Australia's energy consumption. However, in line with the Australian Government's Mandatory Renewable Energy Target – and provided the right investments in renewable energy infrastructure are made early – renewable energy will comprise 20 per cent of generation by 2020.[53]

The Energy Users Association of Australia estimates that an additional 12,000 megawatts of renewable energy capacity in the form of biomass, wind, and hydro will be required for Australia by 2020, at an estimated cost of just under $58 billion over that time.[54] Electricity demand is projected to increase by 27 per cent between 2006 and 2020 – and more than 130 new generation and expansion projects are in the pipeline across Australia to address this increasing demand.[55] However, the industry maintains that these projects are progressing slowly as the market waits for direction on carbon pricing.

The Carbon Pollution Reduction Scheme should provide significant opportunities for investment and innovation in greener power generation and storage, including further expansion of solar, tidal, geothermal and wind power generation technologies. First mover advantage may accrue to those innovative firms quick to take up these new forms of power generation. This does not imply that alternative energy generation will replace existing coal-fired baseload generation in the short-term. However, incumbents must adapt – and do so quickly – to the new carbon-constrained economy.[56]

Figure 4: Greenhouse emitting sectors in Australia, 2006



Source: Department of Climate Change 2006, National Greenhouse Inventory 2006.

Geothermal energy was proposed in a number of submissions to Infrastructure Australia as a promising commercial source of renewable energy.

Pacific Hydro estimates that unlocking the geothermal potential of the Great Artesian Basin in central Australia could provide up to 25 per cent of Australia's baseload power for 100 years, while stimulating investment of approximately $9 billion and creating up to 1,000 jobs in central Australia.[57]

However, the Australian Geothermal Energy Association suggests that there are regulatory impediments to developing the geothermal industry in Australia.

> The biggest problem is the bureaucracy created overnight for geothermal … it takes six months to get permission under the geothermal acts in South Australia … which is something we do every day for minerals. Victoria is the worst of all places to work. ...[To drill a] geothermal hole to 500m … you have to lodge copious documents to get permission from all sorts of people … Under the mining act, one bit of paper [is all that is required] for five year's work … [bureaucracy] kills everything and blows the cost out.[58]

A number of submissions also suggested tidal power. For example, Tidal Energy Australia proposed a 40 megawatt tidal power station on the lower Ord River near Wyndham in the eastern Kimberley.[59]

Solar is also a potentially important generator of renewable energy and could play a significant role in energy generation in locations such as the Pilbara in WA, south-east Queensland, northern NSW, ACT and southern NSW.[60]

Wind farms are an excellent renewable energy source and could potentially generate new investment opportunities for regional communities.[61] In this regard, Infrastructure Australia received submissions highlighting the delays and uncertainty surrounding approvals, such as environmental and heritage issues, which are constraining the development of wind farms in regional Australia.

Many submissions to Infrastructure Australia highlighted specific renewable energy projects. Unfortunately there was not enough robust economic analysis to support major investment. This is a concern given the increasing importance all Australian governments (most notably through the Mandatory Renewable Energy Target) are ascribing to renewable energy.

The lack of access to the National Electricity Market and the lack of transmission infrastructure linking the new energy sources in central Australia to areas of high demand are cited as major impediments to the development of renewable energy sources. Submissions to Infrastructure Australia proposed an electricity transmission line connecting the extremities of the east coast electrical grid, routed through the outback, to open up abundant solar, geothermal and wind resources.[62]

d) Carbon Capture and Storage

The Australian Coal Association and the Victorian Government submission to Infrastructure Australia suggests that Carbon Capture and Storage may play an important role in Australia's transition to a low-emissions economy, while promoting economic growth, energy security and the environmentally sustainable use of Australia's fossil fuels.

The infrastructure task of deploying Carbon Capture and Storage would be considerable. It involves transforming over 80 per cent of Australia's current electricity generation capacity through investment in new generation facilities capable of capturing their greenhouse gas emissions. This includes the retrofit of existing power stations, construction of hundreds of kilometres of transport pipeline infrastructure and the development of large-scale storage sites. Significant government and private sector investment would be required to support the early deployment of commercial-scale carbon capture and storage plants. The Australian Coal Association advises that the construction of three to four commercial-scale carbon capture and storage demonstration plants could be operational from 2015, but would require substantial industry and government investment of up to $2 to $3 billion per plant.

e) Transport infrastructure

To date, there are few signs that Australia's transport and transport infrastructure policies have recognised the constraints posed by reducing Australian and global greenhouse emissions, long term increases in oil prices expected to accompany peak oil pressures and the adaptations required to cope with unavoidable climate changes.[63]

The transport sector contributed 13.7% of Australia's net emissions in 2006. Road transport was responsible for 87% of these emissions, or 12.0% of Australia's total emissions.[64] Vehicle fuel efficiency measures such as 'greening' national and state vehicle taxation such as Fringe Benefits Tax, stamp duty and registration charges could further reduce the emissions impact of private vehicles. The Carbon Pollution Reduction Scheme will also provide price signals to encourage people towards lower emission transport options.[65]

Fuel efficient vehicles

Carbon dioxide standards for new cars have been a successful way to reduce emissions.

Despite vehicle emission standards, Australia's greenhouse gas emissions from the transport sector have been projected to be 45% more than the 1990 level by 2010, and 65% more by 2020.[66]

Australia has had new vehicle emission standards in place since the early 1970s and these have been progressively tightened over the past 30 years.

Australia currently has a range of measures in place that influence vehicle fuel efficiency and reduce greenhouse gas emissions for passenger transport. These include the Green Car Innovation Fund to support innovation in the light vehicle sector commencing in 2011; fuel consumption labelling for light vehicles up to 3.5 tonnes; and the Green Vehicle Guide providing model-specific information to consumers on the fuel efficiency and greenhouse emissions of all light vehicles.[67]

Public Transport

Traffic congestion is a large contributor to transport emissions, with an estimated $43 billion required by 2025 to improve the efficiency of road travel in urban centres.[68]

Increasing public transport use in Australian cities will be a significant mechanism in helping achieve emissions reductions (Figure 5).[69]

It is clear that government at all levels, including the Australian Government, needs to provide much greater investment in new public transport infrastructure, in order to expand current transport systems and ensure that existing infrastructure and public transport is utilised effectively and efficiently to mitigate effects on climate change.

As the Garnaut Climate Change Review suggests, Australia needs an effective national transport system and consistent transport planning or risk continuing the trend of favouring road infrastructure over rail, cycling and walking infrastructure.[70]

Freight Transport

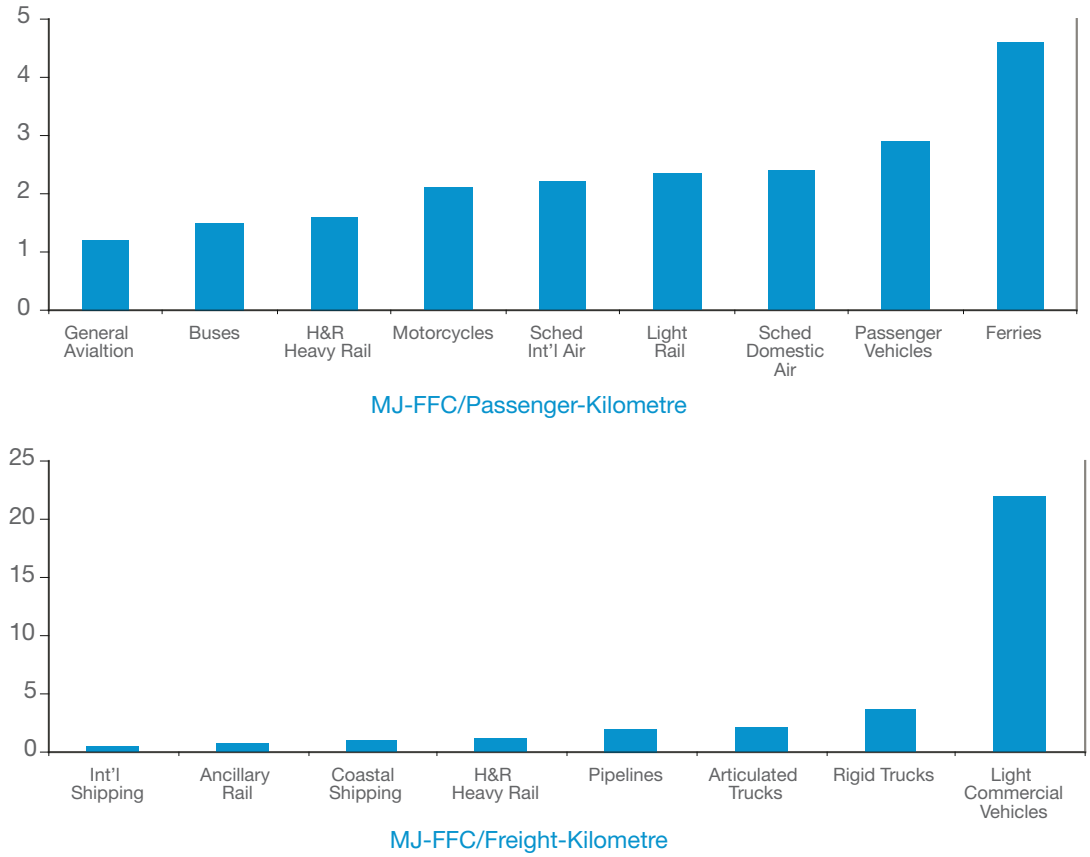
Strong growth in light commercial vehicles and articulated trucks means that they are projected to account for over half of the emissions growth to 2020.[71]

Rail freight needs significant investment to transfer the movement of goods from high emissions road transport to lower emissions rail transport, easing congestion on our roads, improving air quality in our cities, and reducing overall greenhouse gas emissions from transport.[72]

The development of the national transport policy framework under the COAG National Reform Agenda (including reform of heavy vehicle pricing) should help to end the 'silo' approach that has beset much heavy vehicle infrastructure planning in the past.

There is also a role for state and national investment in moving freight from road to rail – a necessary measure to reduce emissions from this sector. Infrastructure Partnerships Australia estimates an investment gap of $13 billion to increase rail capacity in support of this modal shift.[73] Depending on the details of the application of the Carbon Pollution Reduction Scheme and the incentives it contains, this level of public investment may not be required.

Figure 5: Energy intensity of the passenger and freight tasks in Australia (MJ-FFC = megajoule on a full fuel cycle)



Source: Australasian Railway Association 2008, *Australian Rail Transport Facts*, http://www.ara.net.au/publications.htm

f) Water infrastructure

One impact of climate change is increasing pressure on Australia's urban water supplies, which are already under strain from population and economic growth, and prolonged drought. But the impact is not likely to be reduced rainfall in all cities. Rainfall in some areas could increase, but be much more variable over time and involve more extreme weather events. The lack of certainty over impacts and the likelihood of increasing variability in rainfall makes effective planning and management of water systems very difficult.

Water supplies in Australia's most populous eastern, south-west and south-east regions could potentially diminish further due to climate change-induced declines in rainfall and increased evaporation as a result of higher temperatures.[74] However, as noted above, overall projections are not necessarily transferable to all locations.

For example, Sydney's catchments may get wetter on average, but face longer dry periods and rainfall which is significantly more variable. The Garnaut Climate Change Review estimates that the cost of supplying urban water will increase by 34 per cent by 2100 with no climate change mitigation, with significant investment in water supply infrastructure necessary under a 'business as usual' scenario.[75] Water prices in Sydney will increase by 39% in real terms over the next four years. Similar rises are likely to be seen in other cities.

New water supply infrastructure – including desalination plants and water recycling systems – is already under construction or in the pipeline in most cities.

Efficient and sustainable pricing arrangements are increasingly important as governments across the country invest in urban water supply augmentation and in rural water projects.

Part 3 – Location specific infrastructure challenges

Infrastructure Australia has identified four location specific challenges:

1. Supporting our cities;
2. Boosting exports;
3. Supporting indigenous communities; and
4. Supporting rural and regional communities.

3.1 Supporting our cities

Australia is one of the most urbanised countries in the world. More than four out of five people live in urban communities. Our cities are still growing, with the proportion of the national population living in our major cities projected to increase over the coming decades. However, it is the scale of growth that is striking, with the populations of capital cities expected to almost double in size over the next 50 years.

Economic growth has accompanied the increases in population. Our cities are prosperous, with capital cities contributing to 78 percent of the nation's economic growth between 2001 and 2006.

However, the rapid growth and development of major cities in Australia has imposed complex planning and governance challenges on scales never experienced in this country before. What makes our cities more productive, liveable and sustainable has become a matter of national importance.

What makes one city more successful or more competitive than another, or how they should be organised to promote social inclusion and environmental sustainability, are now fundamental questions of national productivity and well-being.

A large number of submissions to Infrastructure Australia raised infrastructure issues in the context of cities, including urban congestion, secure and sustainable water supply, rising energy demands, and the provision of community and social services. These submissions indicated that from south-east Queensland through to Melbourne, in Perth and more recently in Adelaide, rapid growth in population and economic activity is placing real pressure on city infrastructure and quality of life.

Such issues include:

- Population growth occurring at a rate faster than that planned or predicted in most states and local government areas, leading to current and potential future shortages in appropriately zoned land for urban growth and economic activities, transport network capacity, water supply and energy peak load capacity
- The growing costs of urban congestion
- Loss of urban amenity
- Significant differences in accessibility within cities, leading to social exclusion, car dependency and vulnerability to rising oil prices, and hindering economic development by limiting employment and investment opportunities

- An inherent conflict between sustainability and housing affordability – with pressure to release land for new 'affordable' housing in outer suburban developments (rather than promoting higher density within existing areas, infill developments and redevelopments) creating new dormitory suburbs with high energy, water and other infrastructure needs. In addition, these suburbs are usually poorly serviced by social infrastructure and public transport and have high levels of car dependency.

The national importance of our cities

Cities are the conduits of the services economy. In Australia, the services sector already accounts for more than 75 per cent of economic activity, 85 per cent of employment and 20 per cent of exports.[76] The services sector is the fastest growing source of high value jobs in the developed world, including Australia. Services contribute an increasing share of GDP.[77] The vast bulk of that activity occurs in our cities.

The services sector includes financial and insurance services, health and human services, education services, government services, transport and logistics, environmental services, medical and scientific research, legal and business services, advertising and marketing, hospitality, sport and entertainment, information technology and communications, and engineering and construction services. The services sector also includes knowledge-based expert services in the mining, agriculture and manufacturing industries. In an increasingly globalised economy, cities compete with one another to attract talented and creative people, for major investments and to be the location of corporations and events. They compete for major investments.

Economists have identified the attributes of cities that are competitive in facilitating the services sector and stimulating increased productivity in services. Competitive cities attract creative and talented people – people whom demographers argue select a location to live before choosing a job. Competitive cities foster innovation and create an environment where knowledge and expertise is shared among organisations and across previously separated sectors and disciplines such as academia and business, or researchers and marketers. Competitive cities need to be attractive, amenable and dynamic places. They need to promote the cross-pollination of ideas and be interesting, pleasant places to live.

Competitive cities are also connected cities. They connect people who live in the city with each other, their employers and the attractions that the city has to offer. They also connect the city to regional centres and to other major cities, domestically and internationally. Increasingly, there is a direct link between the amenity or livability of Australia's major cities and the future growth prospects of the services economy. Future national growth and productivity is dependent upon the physical infrastructure that enables cities to function.

Infrastructure Australia's view is that Australia's major cities are more critical than ever before to Australia's future prosperity. Coordinated action is required to secure the future productivity, sustainability and quality of life in our major cities.

Some of the specific challenges faced by cities include:

a) Integrated land use and infrastructure planning
b) Secure water supply
c) Better use of existing infrastructure
d) Reliable urban public transport networks
e) An efficient freight network

a) Integrated land use and infrastructure planning

Planning for infrastructure in Australian cities needs to be fully integrated with city land use planning to manage forecast population growth and facilitate economic activities. New housing in outer suburban areas is often poorly served by public transport, contributing to car dependency, vulnerability to rising petrol prices and poor relative accessibility to jobs and services. The upfront 'affordability' of this new housing can be more than offset by the increased cost of living caused by high transport costs.

Denser urban populations can decrease infrastructure costs per capita considerably, while improving productivity, sustainability and amenity. In particular, transit-oriented developments can deliver substantial benefits in avoiding major transport extensions to outer areas and by reducing road congestion. However, it cannot be assumed that existing infrastructure will automatically cope with urban consolidation and with the technology requirements and processes associated with environmental sustainability. Significant investment is needed to transform existing infrastructure to ensure that it matches the changing demands of higher density developments and environmental sustainability.

The design of new outer suburban housing estates, urban infill, industrial and business developments can be improved to reduce energy costs and water use. Building design standards that ensure high sustainability values will, over time, reduce the city's per capita call on energy, waste and water. In addition, the days of needing to separate residential development from commercial land use are now gone, with only the most incompatible industrial uses needing to be clearly separated. This provides greater opportunities for people to live, work and play in close proximity, thereby reducing the need to travel.

For example, the significant capital costs associated with urban rail projects emphasise the need to integrate land use planning with the planning for the rail system. Increasing densities around rail stations can increase the economic and other benefits that might flow from the considerable public investment in urban rail projects. However, this is an area where governments have a mixed record. While there are examples of higher density development around stations, in many cases residential and commercial/retail densities remain low. Much more can be done to increase densities around transport nodes. A strong, pro-active approach needs to be taken to integrate land use, zoning and planning policies more effectively.

b) A secure water supply

A combination of increasing population, extended drought and climate change is threatening the long term water supply for most Australian cities. Already, water restrictions have become a fact of life in most cities, impacting on the amenity of city dwellers and creating uncertainty for businesses dependent upon a secure water supply.

State governments have developed water supply strategies to deal with this new reality and include:

- Desalination plants
- Water reuse and recycling plants
- Waste reduction works (such as channel lining and leak repair)
- New pipelines to develop and extend water grids, allowing greater flexibility among catchments and users
- New storage dams.

As the population in our cities continues to grow, and as climate change reduces certainty of rainfall, securing water supply for Australia's city dwellers and businesses is one of the nation's greatest challenges.

With the demand for water being rationed through regulation (water restrictions), the question arises as to whether water pricing and governance reform can be used to manage demand and attract private investment in water infrastructure. At present private ownership occurs at the plant level – most water treatment plants in Sydney are privately owned. In NSW, there is now a regulatory provision for the private sector to access public sector infrastructure to provide services, such as sewer mining. There may also be the potential for the private sector to enter into provision of bulk water supplies and the provision of retail services.

c) Better use of existing infrastructure

Passenger and freight trips are growing faster than transport network capacity, leading to increased urban congestion. In December 2006, COAG was advised that congestion in Australia's capital cities was costing the economy $9.4 billion each year, growing to $20.4 billion in 2020.

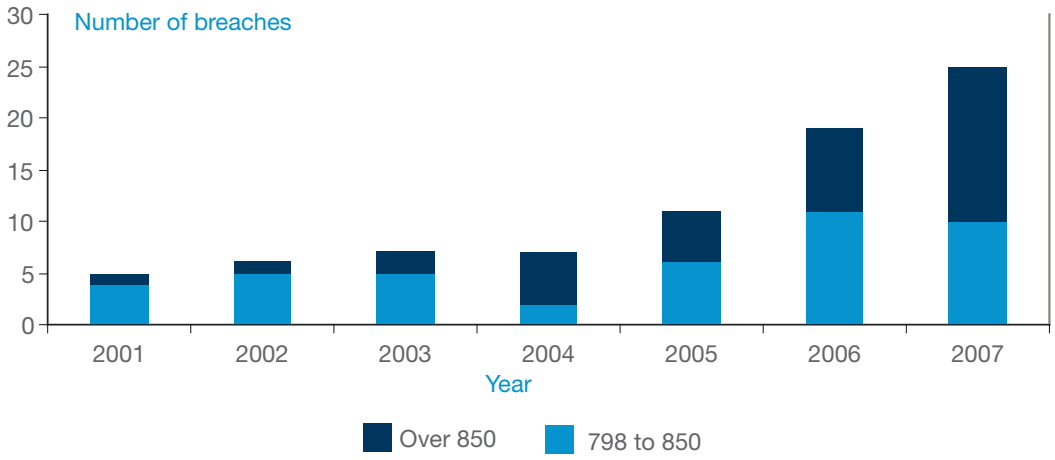
Improving efficiency and reducing congestion will make a significant contribution to the competitiveness of Australia's major cities – and therefore national productivity. However, major road projects that seek to primarily provide increased road space for commuter journeys to central activity areas are ultimately inefficient and unsustainable in light of population forecasts. Such projects also run the risk of 'competing' with public transport solutions which have much greater spatial capacity and efficiency.

Demand management policies and intelligent transport technology can increase the efficiency of use and 'create' more capacity from existing networks as well as capacity to cope with congestion in our cities.

d) Reliable public transport networks

Public transport systems are an important part of the nation's transport system. In the capital cities, large numbers of people use public transport for their journeys to work and education. Without these networks and services, levels of congestion on our roads would be much higher and the central business areas of our major cities would struggle to function.

Figure 6: Train overcrowding: load breaches on Melbourne's AM peak period train 2001 to 2007



Source: East-West Link Needs Assessment 2008, *Investing in Transport*, April.

However, even today public transport systems are showing their own signs of congestion given the increasing demand across the country. Indeed, there has been a recent model shift to public transport across Australia, variously attributed to rising CBD employment, traffic congestion, high petrol prices and environmental concerns.

As with the road network, public transport systems are now operating with capacity constraints due to burgeoning demand. Patronage on a number of Australia's rail systems has increased considerably over the last few years. For example, in Melbourne, patronage on the rail system grew by 39 per cent between 2004-05 and 2007-08.[78]

Melbourne and Sydney trains now report severe overcrowding and people left stranded on station platforms, with operators having increasing difficulty in finding more train paths within timetable and network constraints to add more services (Figure 6).

In the case of Sydney, this also has implications for national rail freight because freight trains often share the same rail networks as passenger trains.

As our cities have grown, providing adequate mass transit solutions for these types of journeys means extending our public transport systems to new, outer suburbs.

Many submissions to Infrastructure Australia proposed rail or busway extensions to new, high growth, under-serviced areas. While submissions included a large range of public transport solutions to problems of urban congestion in different Australian cities, submissions also lamented the Australian Government's relatively small role in urban transport investment and strategy to date. Submissions urged that the critical role played by Australia's major cities in the national economy, and the critical role played by urban mass transit systems, should be backed by national strategies and investments.

In considering the potential roles for public transport in the future and the challenges facing the development of new public transport infrastructure, a number of issues require consideration.

Capacity

In some cities, most notably Sydney, the existing rail network is operating at capacity. If not at capacity now, major parts of Australia's urban rail networks will be at capacity in the foreseeable future. While various measures have been – and are being – taken to maximise the capacity and use of existing networks, these measures will not provide the step change in capacity required to accommodate forecast growth in passenger numbers.

In large measure, Australian cities have drawn upon the investment in rail networks made in the early to mid twentieth century. Major new investment is now needed to sustain our cities over the next several decades and beyond. Increased network capacity is required to meet population-driven patronage growth and to provide the scope for significant mode shift from private vehicles to public transport.

Governance

Simply investing in more capacity is not the only requirement to improve public transport in Australia. Public transport is not administered and managed in Australian cities as well as in many cities overseas. With more emphasis on public transport in the future, and with more funds set to be invested, governments need to ensure that public transport meets best practice and is as efficient as possible.

Submissions to Infrastructure Australia highlighted the need for governance reform and efficiencies in the way public transport is planned and managed. However, while not everyone agrees on what constitutes the best model, there tends to be agreement that public transport and land use planning should be integrated.

Public transport administration in Australia could benefit from a more outward-looking approach including cooperation and communication with other agencies and governments when planning for the future – particularly in areas such as land use, road network plans, retail and commercial developments – to ensure that public transport is better integrated with other urban planning activities.

With the Commonwealth signalling that it might invest in urban transport systems as a means to boost national productivity, now is the time for nationwide reform to improve public transport governance.

Pricing

There is continuing debate among governments and the wider community about the extent to which public transport services, including rail, bus and ferry, should be subsidised and whether private and public transport in our cities should be priced differently. These debates need to be resolved in the near term to provide a sound policy basis for investment in urban public transport networks.

Cost

New public transport projects of the kind required to deliver a step-change in capacity and service tend to be large and expensive, particularly for rail. This is especially the case in established urban areas, where new heavy rail lines will almost certainly involve significant tunneling. For example, the soon to be opened Epping to Chatswood rail line in Sydney has cost around $200 million per kilometre to construct.[79]

While such figures are significant, they do not automatically lead to a conclusion that such projects should not proceed. Alternatives means of addressing urban transport demand can be equally or more expensive. For example, recent projects in Australia suggest that four to six lane tunnelled motorways are likely to cost around $500 to $600 million per kilometre to construct.[80] Concerns about growth in greenhouse gases and related concerns about energy security and cost also raise questions about the strategic durability of investment in urban motorways.

These costs and issues highlight the importance of careful project evaluation for public transport projects.

Procurement

Experience here and overseas suggests that it can take 10 to 15 years to take a major rail project from concept to opening.[81] Other major projects, such as road and energy projects, can take a similar period to develop. There is substantial scope to reduce these times through better operational and service planning, and improved environmental assessment and delivery processes. Even so, the long lead times for major projects strongly indicate that key planning and investment needs to be made in the short term to avoid significant congestion, environmental and other costs in the medium term.

Rail infrastructure projects present particular complexities, especially operational complexities. If not fully understood and managed, these complexities can lead to unintended problems and can affect a project's costs and benefits by affecting the demand for rail services and requiring subsequent additional works away from the original project to 'fix up' the operational problems.

Transitions to new technology

The public transport sector is experiencing ongoing technological change. In particular for rail, significant developments have been made in the adoption of automated 'metro' style railways. These are very high capacity systems (50,000 people per hour compared with 2,500 per hour per freeway lane) that can provide very high standards of service including high frequency, speed and reliability. Light rail systems are also being introduced that significantly increase levels of service compared with older train systems.

The strategic policy choice facing Australian governments is whether, and under what circumstances, new urban rail systems should adopt such technologies. However, a move towards these technologies raises many issues. To avoid a repetition of the rail gauge problem from the nineteenth century, decisions on these matters need to be made with national input and intergovernmental collaboration. The network that exists today represents more than 40 years of consistent long term planning and investment. An equivalent national commitment to such planning and investment is required in Australia if new technologies are to be applied to the public transport sector.

However, even if a decision is taken to make such a strategic shift, the existing rail networks will be a fundamental part of Australia's urban transport networks for decades to come. Sensible investment in the capacity of those systems and in life-cycle replacement of assets will continue to be required.

e) An efficient freight network

Freight is extremely important to the economy and our standard of living. In Australia, the vast majority of freight movements within cities are by road. Forecasts vary in detail, but most agree that Australia's freight task will continue to grow faster than economic growth. There are likely to be many more trucks on our city streets and many more small commercial vehicles such as vans.

As the urban freight task grows, Australia's major cities will need to take action to ensure that the task is managed efficiently and with minimal impact on neighbourhoods and communities.

Capacity

The transport network needs to be well-connected and of sufficient capacity to allow efficient urban freight and commercial vehicle movements to and from and around cities in a way that provides alternatives to increasing congestion.

While there is currently very limited freight-only road or rail infrastructure in urban areas, freight movements within cities are growing rapidly. The burgeoning services sector is also driving an increase in the number of light commercial vehicles on city roads – as tradespeople, sales representatives, couriers, delivery vehicles and others criss-cross the city.

Most freight trips on city roads do not leave city boundaries. For this reason, it has proven difficult to achieve any major shift in freight from road to rail within cities, as the relatively short trips among disparate city locations give road a strong competitive edge.

Submissions to Infrastructure Australia show that much freight gravitates towards arterial routes, including those linking industrial and commercial precincts. In some instances, these routes form part of the connections to sea ports and airports. Efficiency on these routes can be enhanced by:

- Removing gaps in the networks used by freight (which also assists in reducing truck movements on residential streets and freight trains on passenger networks)
- Reducing congestion caused by private motor vehicles.

Shuttles

The use of rail shuttles from major container ports located close to city centres to inland terminals would also reduce road congestion and increase efficiency. Rail shuttles require dedicated rail links or, at the very least, guaranteed high levels of access to rail links from container ports to intermodal freight terminals. Situations have arisen in the past where ideal locations for such terminals have been lost due to land use decisions that are incompatible such a use. Firm decisions are needed to determine and protect locations for future intermodal terminals to ensure that the freight network has room to grow and that the right rail links can be planned and delivered.

Getting rail shuttles to work efficiently has proven problematic in the past. This is partly due to inadequate infrastructure links, but also to access at the ports, access to rail and the reliability of train paths. These problems must be solved if port rail shuttles are to play a part in solving freight inefficiencies and helping to deal with freight growth.

Amenity impact

Major road freight routes in some Australian cities are clogged, driving up business costs and harming productivity at the most basic level. When major freight routes clog up, truck drivers look for alternatives. When combined with a lack of fully connected freight routes, this leads to an increasing incidence of freight vehicles using streets and roads that are not designed as major freight routes. Apart from being inefficient, this destroys the amenity of suburbs and residential/retail precincts.

There are two distinct advantages in solving these issues. First, it achieves major productivity improvements through increasing freight efficiency. Secondly, it enhances the competitiveness of cities by preserving and restoring the amenity of suburbs and precincts that are often located in high value inner suburban areas.

3.2 Boosting exports

From European settlement, Australia's remoteness from the then developed world set the limits of the nation's economic potential. Today, Australia's status as an island nation with long-distance trade links still defines and drives the nature of much economic activity. Australia's 'international gateways' – sea ports and airports and the links to them – remain critical to our national competitiveness and economic success.

Australia's participation in the global economy through international trade is dependent upon agriculture and natural resources (Figure 7). In 2007, exports of primary products were $101 billion, just under 50 per cent of all exports. In the case of imports, manufactured items comprised $145 billion or 55 per cent of all imports in 2007, with Australia increasingly reliant on overseas rather than domestic manufactured items (Figure 8).[82]

a) Sea ports

Australia's sea ports have evolved to specialise in either exporting bulk products such as coal and iron ore or in importing manufactured products that are mostly containerised (except for motor vehicles). Recent growth in export and import demand has placed strain on both types of sea ports, requiring investment and expansion to respond to rising demand and to lift the nation's capacity to exploit opportunities in international trade.

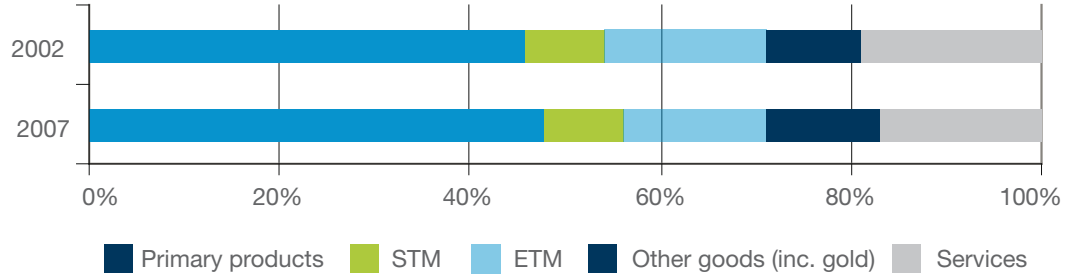
Australia has approximately 70 trading ports (Figure 9), ranging from large capital city ports (that handle all types of cargo, including containerised cargo, break-bulk and bulk cargoes), smaller community ports and regional ports (that tend to specialise in items such as bulk commodities).

The recent resources boom has increased the demand for Australia's natural resources, such as coal and iron ore, to fuel rapid economic growth and industrialisation in countries such as China and India – although Japan continues to be a major market for Australian resources (Figure 10).

The increase in the export value of resources has been largely driven by commodity price increases rather than volume, as Australia's resource companies undertake the medium to long term projects needed to expand production to meet demand. However, bottlenecks at some of Australia's bulk commodity ports have also been identified as limiting growth in commodity export volumes.

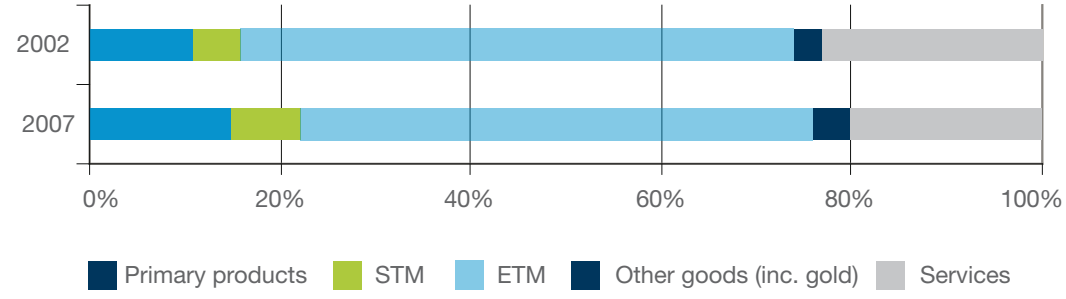
Ships queuing off the coast at Newcastle or in Queensland's Dalrymple Bay have often been cited as examples of infrastructure bottlenecks limiting Australia's economic growth during the resources boom. However, the exact causes of these bottlenecks are is not always clear. This makes it difficult to determine whether investment is best directed at landside links such as improved rail connections or berth capacity.

Figure 7: Broad composition of exports, 2002 and 2007



Source: Australian Government, Department of Foreign Affairs and Trade 2007, Composition of Trade 2007
NB: STM – Simply Transformed Manufacturers; ETM – Elaborately Transformed Manufacturers.

Figure 8: Broad composition of imports 2002 and 2007



Source: Australian Government, Department of Foreign Affairs and Trade 2007, *Composition of Trade 2007*

It is also difficult to determine if there is market failure or whether governments should allow private sector investors to take the lead in finding solutions.

Unlike some other forms of transport infrastructure, ports can be profitable and many are privately managed or are Government Trading Enterprises. In principle, there is no need for taxpayer funding for port precincts. However, there are significant issues facing ports that may require action by governments. These issues include planning, approval processes, supply chain coordination and the provision, pricing and regulation of infrastructure. In relation to planning, a critical issue is that any port will place strong demands on adjacent land side infrastructure. This means that governments must ensure that planning decisions and processes encompass more than just the port or dockside area, and deal with issues arising in inland links.

Should the Commonwealth and other jurisdictions elect to fund or partially fund developments in bulk commodity ports (such as the proposals above), appropriate governance arrangements must be put in place as a prerequisite. In its submission to Infrastructure Australia, Oakajee Port and Rail Ltd proposed an integrated governance structure for the Oakajee Port development in Western Australia underpinned by four key mechanisms:

Figure 9: Sea ports of Australia

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

- Open access regime to ensure fair and equitable access to infrastructure
- Regime to guide capacity and expansion planning and equitable access terms
- Governance framework to provide and facilitate coordination of all elements of the supply chain and provide clarity for customers
- A logistics association to engage all stakeholders in the supply chain.[83]

The recent Greiner report into the Hunter Valley coal industry also identified significant efficiencies to be gained through new governance and planning arrangements that aim to streamline the supply chain by improving cooperative planning by the many coal companies operating in the region.

Australia's ports have also tended to develop individually and not as part of a coordinated national freight plan. Ports under state or territory control have generally been developed on the basis of state-based freight strategies. When viewed from the perspective of national productivity, this may not maximise the benefits to Australia from the operation of these ports. A national approach to the development of port policies and prioritisation of projects may help to boost productivity.

The intense focus on resources has tended to divert attention from strong growth in services and merchandise exports. As noted earlier, manufactured products dominate on the import side.

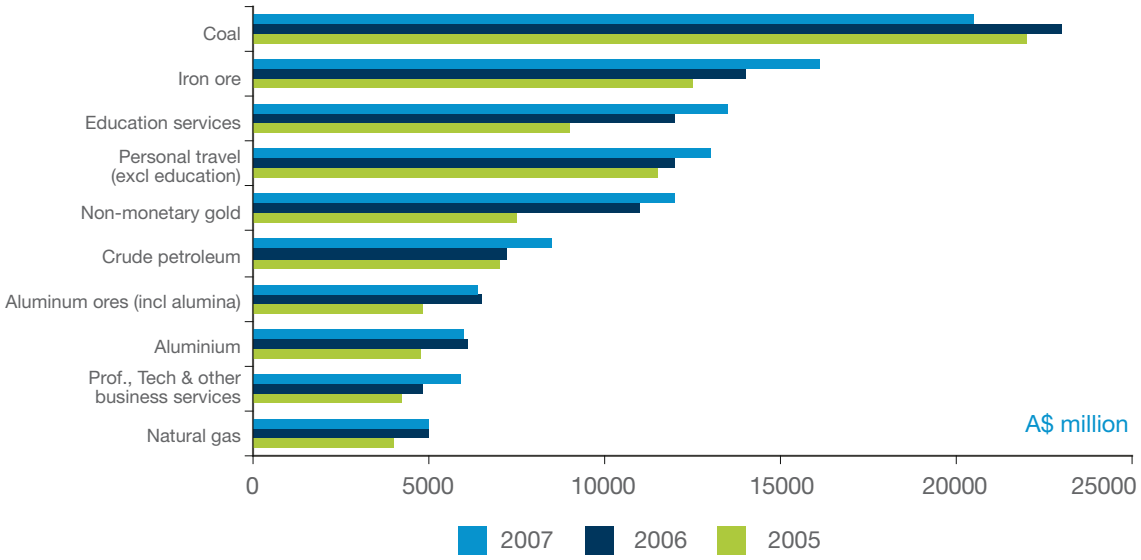
The majority of manufactured import cargo (containers and vehicles) comes through the major capital city ports of Melbourne, Sydney, Brisbane and Fremantle. While these ports have had to develop quickly to meet the rapid growth in imports, berthside and channel deepening developments have not been matched by landside capacity planning.

Consequently, all three of Australia's largest container ports – Melbourne, Sydney and Brisbane – face significant landside congestion and capacity constraints that are threatening future growth. In Melbourne, land constraints are forcing the relocation of nearby facilities, such as the wholesale fruit and vegetable market, and nearby residential suburbs are suffering from increased movements by large trucks. In Sydney, inadequate road links are threatening capacity and similar local amenity issues are emerging. In Brisbane, road congestion near the port is already at a critical point. In Perth, congestion around Freemantle is one of the drivers for the construction of a new port to the south.

This situation raises questions about the adequacy of port planning and governance arrangements for Australia's main city ports. Port capacity is more than a function of berth capacity, channel depths and the hectares available for container stacking: it is also a function of the efficiency of road and rail connections in and out of the port. Australia's large city ports are located in inner urban areas, where additional land will not be available for future expansion. Critically, there is also a misalignment between state and local government planning, which may result in residential developments being permitted close to port precincts.

These issues mean that better connections are needed to efficiently move containers in and out of the port area, connecting to inland ports or intermodal terminals located away from the port precinct but close to industry. Governance arrangements for ports often do not extend to these critical questions of inland logistical integration. If changes are not made to improve such integration, Australia's major city ports will struggle to find the additional capacity needed to accommodate future growth in containerised freight.

Figure 10: Australia's principal exports



Source: Australian Government, Department of Foreign Affairs and Trade 2007, *Composition of Trade 2007*

Because of their scale and institutional characteristics, port authorities are well positioned to play a role in the development of the relevant logistics chains. A consistent national approach may be required to expand the role of port authorities. The recent review of Port Botany land transport interfaces in NSW identified and progressed some of these issues.[84]

There is a growing appreciation of the importance of connectivity between rail systems and ports. In particular, some concerns have been expressed that Australia's major cities do not have sufficient intermodal road/rail terminal capacity to address the expected growth in port traffic and that the development of effective intermodal terminal networks should be a national priority.

Recent Australian studies have shown the importance of examining supply chains when considering freight infrastructure issues at Australia's ports.[85] Often there are multiple participants in these chains, including parties with commercial tensions, and the level of coordination among the participants affects productivity.

The implications for port-related infrastructure include the desirability of identifying and addressing causal bottlenecks, the importance of complementary features in the design and operation of infrastructure within the supply chain, and the potential for gains to transport users and the economy of switching resources among modes as appropriate.

b) Airports

Australia's international airports are critical to national productivity both in terms of moving people and freight. The growth of the services sector and a huge worldwide increase in personal mobility has seen all major Australian airports report large increases in passenger volumes.

Over the past 20 years, passenger numbers have grown by 5.8 per cent per annum compared to annual population growth of 1.3 per cent.[86] The Bureau of Infrastructure, Transport and Regional Economics predicts that airport passenger numbers will continue to grow at a rate of 4 per cent per annum, more than doubling the number of passenger movements in the 20 years to 2025-26.[87]

Reform of the ownership and management structure of Australia's major airports commenced in the late 1990s and by 2002, all airports controlled by the Federal Airports Corporation were under long term lease to the private sector. Accordingly, recent investments in Australia's major airports have been undertaken by private owners / managers, including:[88]

- Adelaide airport has constructed a $260 million multi-user terminal, which opened in October 2005
- Brisbane airport has committed around $2.5 billion over the next 10 years to construct a parallel runway and northern access road, and to expand international and domestic terminals
- Gold Coast airport spent $25 million over 2006 and 2007 to extend the runway and further develop auxiliary services
- Melbourne airport has three infrastructure developments underway totalling over $300 million (gate expansion, inbound and outbound baggage services and passenger processing)
- Perth airport has announced a $1 billion infrastructure development over the next five to seven years that will deliver a new terminal dedicated to regional Western Australian air services and new international and domestic terminal facilities
- Sydney airport commenced a $550 million upgrade and expansion of the international terminal in October 2007.

From a national infrastructure investment perspective, the market is operating efficiently and providing the investment necessary to respond to growing demand. The Australian Government is also currently undertaking a comprehensive review of aviation policy, which will address – amongst other things – some of the operational issues affecting airports. However, it is clear that runway capacity limitations, pressure from nearby residents for tougher operating curfews and growing congestion on road and rail connections to airports are all threats to the future operation and capacity of airports.

Road and rail transport connections to airports that are efficient and reliable will remain significant challenges for Australia's cities. Brisbane has already announced a tolled Airport Link to relieve congestion. In Sydney, further projects are proposed to improve airport connectivity at Kingsford Smith Airport, including the expansion of the M5 motorway.

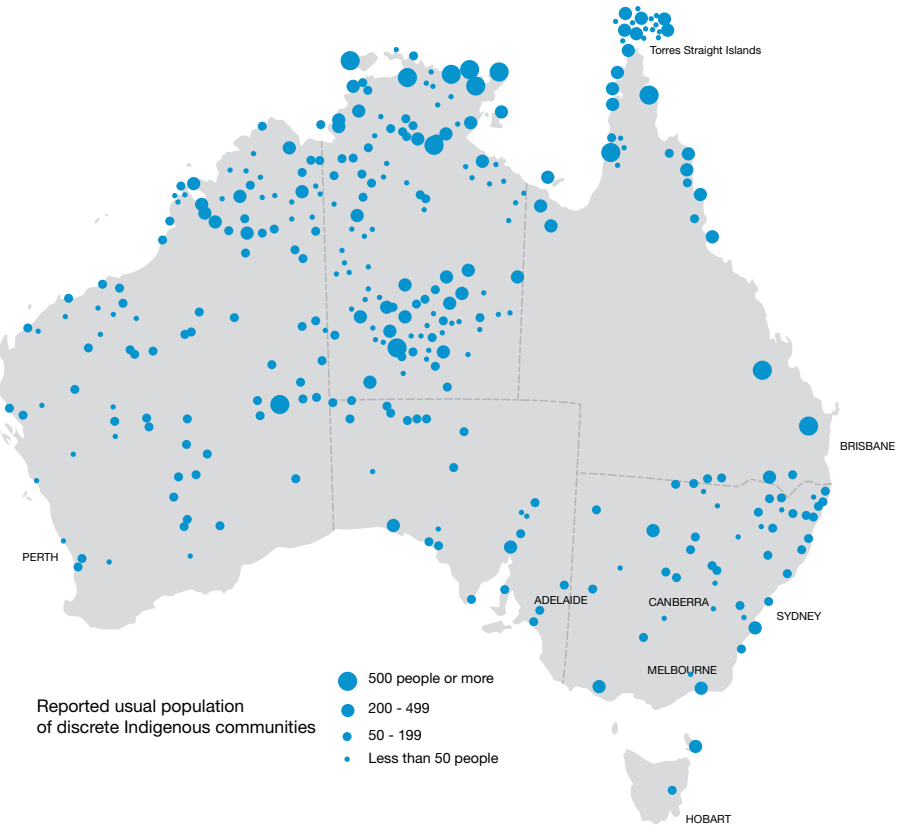
3.3 Supporting indigenous communities

There is agreement among many in Australia that the roads, public transport, telecommunications, water supply and electricity infrastructure in Indigenous communities are inadequate and that, in many cases, this inadequacy is impeding economic and social progress.[89] Part of this gap is a result of the remote location of many Indigenous communities (Figure 11).

[The] living conditions, governance and a range of other outcomes for indigenous people can be significantly improved if these communities receive services such as power, water, sewerage, roads, waste management etc in the same manner as Australians who live in other communities, towns and cities.[90]

As the Chairman of the Productivity Commission, Mr Gary Banks, noted in a speech to the Economic and Social Outlook Conference in March 2008, many programs for Indigenous communities have been designed without clear objectives, have lacked real

Figure 11: Discrete indigenous communities, 2006



Source: Australian Bureau of Statistics 2006, *Housing and Infrastructure in Aboriginal and Torres Strait Islander Communities, Australia*, ABS Cat No. 4710.0

consultation, and have not been adequately reviewed to gauge their effectiveness.[91] The Northern Territory Emergency Response (NTER) and the COAG National Reform Agenda's focus on 'Closing the Gap' are two mechanisms through which Australian governments are beginning to make progress in improving the lives of Indigenous Australians.

COAG "Closing the gap" program and Bilateral Agreement on Indigenous Affairs

On 2 October 2008, COAG announced the 'Closing the Gap' program. This program sets six targets to narrow the gap between Indigenous and non-Indigenous life expectancy, childhood mortality rates, early childhood education, literacy and numeracy, high school retention rates and employment outcomes. Announcing the program, COAG acknowledged the need to "maximise the contribution that private and community sector initiatives in education, employment, health and housing can make to the success of the overall strategy".[92]

In July 2006, the COAG Bilateral Agreement on Indigenous Affairs recognised the need to normalise the provision of local government services to Indigenous communities, including access and internal roads.

Northern Territory Intervention

On 21 June 2007, the NTER commenced, putting in place immediate measures relating to the safety of children in Aboriginal communities in the Northern Territory, with a longer term aim of improving life in these communities.[93] To date, the NTER has made little progress in making 'urgent repairs and upgrades' to infrastructure including sewerage, water, fencing and roads. The recent NTER review notes that these repairs have been done on an ad hoc basis and that there has been some community disquiet that capable local contractors were not engaged to undertake these infrastructure upgrades / repairs.[94] This comment points to the need for a coordinated approach between national, state and territory, and local governments in providing essential infrastructure for Indigenous communities. The NTER review notes that this could be achieved through local and regional partnership agreements.[95]

In its submission to the NTER review in August 2008, the Northern Territory Government identified a backlog in infrastructure and services that is impeding the implementation of programs and initiatives being developed at the national level, including the NTER.[96] The Northern Territory Government indicated that:

> …further investment in supporting infrastructure such as roads, Indigenous essential services and information technology are…critical for sustained improvements in health, education and well being for Indigenous Territorians.[97]

The Northern Territory Government estimated that the additional investment required to provide the necessary transport and telecommunications infrastructure to support the NTER would be around $1 billion.[98]

a) Transport

The transport needs of Indigenous Australians can be complicated by the often remote location of settlements in the Northern Territory, Queensland and Western Australia.

Road access is vital for the supply of essential goods and services, and to connect Indigenous communities to schools, health services, employment and other facilities. However, access to roads can be limited by closures or vehicle weight restrictions during the wet season in northern Australia. The Northern Territory

Government estimates that it would cost more than $500 million over 10 years to provide the required road access to remote Indigenous communities in the Territory.[99] The Western Australian Government estimates that a 10 year road program to service Indigenous communities would cost around $101 million.[100]

While over 88 per cent of Indigenous communities report roads as their main form of transport, for Aboriginal people living in or close to urban centres, public transport access is also a key infrastructure requirement.[101] In its submission to the NTER review, the Tangentyere Council, which is responsible for part of Alice Springs and surrounds, stated that the Alice Springs public transport system "does not go near or into town camps", making it difficult for town camp children to get to school (although it also noted that the Northern Territory Government does plan to start these services by 2010).[102]

The prevalence of an urban bias in public investment in transport is reflected in worse health outcomes and poorer access to health services among Indigenous people, particularly (but not limited to) those living in remote communities.[103]

b) Energy and water

The provision of water infrastructure to provide sufficient and safe drinking supplies is critical to Indigenous communities. According to the 2006 Community Housing and Infrastructure Needs Survey (CHINS), 58 per cent of Indigenous communities rely on bores as their main source of water. A small number of communities rely on carted water, a very small number have no organised water supply and the remainder of communities are connected to town water supply.[104]

With a majority of Indigenous communities relying on bores and other untreated sources of water, a significant number of communities have limited access to treated drinking water.[105] In the 72 Indigenous communities serviced by the Northern Territory Government, reticulated microbiological quality has not consistently conformed to the Australian Drinking Water Guidelines.[106]

In relation to electricity, the CHINS reports that 88 per cent of indigenous communities have access to an organised electricity supply. Many communities reported that they had experienced interruptions to supply due to storms and equipment breakdowns.[107]

The Western Australian Government has identified the regularisation of remote community essential services – water and energy – as the key infrastructure priority for closing the Indigenous infrastructure gap, with an estimated 10 year funding requirement of around $1.5 billion ($417 million in capital upgrades and operational costs of around $113 per annum).[108] This approach is supported by the Western Australia Local Government Association, which also suggests that infrastructure investment will require cooperative and coordinated planning across the three tiers of government.

The Northern Territory Government estimates that additional Australian Government funding of $24 million is required for known electricity and water supply works as a result of the NTER, particularly where the NTER has brought forward increased demand on marginal water supplies and sources.[109]

Many submissions made to Infrastructure Australia argue that renewable energy such as solar, geothermal, tidal and wind could be used in remote communities to provide sustainable options and reduce the dependency on diesel powered generators. Currently, the Northern Territory Government is developing an Energy Source Strategy for Indigenous communities. The strategy will consider a number of energy source options, including renewable energy, and will also cover demand management and the reduction of greenhouse gases. As part of this strategy, the Northern Territory Government is seeking funding from Infrastructure Australia to undertake a feasibility study of renewable energy options for Indigenous communities. This study would include consideration of the establishment of regional grids to allow smaller power stations to be decommissioned and support for outstation community power needs.

c) Communications

Indigenous communities, many of which lack access to public telephones, require access to culturally-appropriate services to enhance their overall welfare. Education and health outcomes are drivers for 'closing the gap' in these communities and for fostering economic and social development. The use of telecommunications to support these services is particularly important for Indigenous communities.

On 5 September 2008, the Regional Telecommunications Independent Review Committee presented a number of recommendations to the Australian Government to improve communications in remote Indigenous communities.[110] Infrastructure Australia supports these recommendations, including those urging the Australian Government to:

- Expand the implementation and maintenance of community phones, including pre-paid options for people in remote Indigenous communities
- Work with state, territory and local governments to implement identified telecommunications solutions to deliver services of significance to remote Indigenous communities. These services include appropriate culturally targeted awareness initiatives, education initiatives and technology support to improve broadband take-up and use.

The Community Housing and Infrastructure Needs Survey found that "…access to the internet within indigenous communities is becoming vital to ensure delivery of services, particularly in education and health…".[111] High speed broadband access would allow remote populations to access government and other services, provide opportunities for children to access virtual education courses, and assist in the provision of remote employment by improving the viability of small business ventures.[112]

3.3 Supporting indigenous communities

Perhaps the key concern expressed in state and territory submissions to Infrastructure Australia is that the proposed National Broadband Network may not extend broadband coverage to regional and remote regions of Australia, specifically Indigenous communities in the Northern Territory, Western Australia and Queensland.

In these areas, sparsely located communities of very small numbers of people make it costly to establish the infrastructure.

One community suggestion made to Infrastructure Australia is that telecommunications infrastructure could be improved in Indigenous communities if a communications tower and high speed connections (with 'filter') were provided. This would allow video calls to be made cheaply from community to community, rather than the current arrangement where communities stay in touch through road trips – often travelling on poor roads in unsafe cars.[113] The same submission also suggests that computers could be provided to communities once a communications tower had been built. These suggestions may deserve greater attention by the Australian Government.

On 30 October 2008, Prime Minister Kevin Rudd launched the Australian Employment Covenant – an industry-led initiative that aims to provide employment for 50,000 Indigenous Australians.[114] The Covenant represents a major commitment to providing Indigenous Australians with long term employment and to 'closing the gap' in employment between Indigenous and non-Indigenous Australians.[115]

Infrastructure needs and shortfalls in Indigenous communities are not well quantified and funding is often not delivered in a coordinated manner. The Queensland Government has developed infrastructure plans for each of its remote Indigenous communities and Western Australia has also begun to develop guidelines on infrastructure provision in to these communities. These plans and guidelines could be used as models to develop community infrastructure plans for every remote Indigenous community in Australia.

Most importantly, Indigenous Australians must be included in planning to address their infrastructure needs. Too many programs – including the NTER – have been imposed upon Indigenous Australians with little respect for culture and country. Any infrastructure provision in Indigenous communities must also be well planned and coordinated across all spheres of government.

3.4 Supporting rural and regional communities

Australia's population is largely based in major cities, but much of the infrastructure and industry that supports our economy is located in our rural and regional areas. The Australian Bureau of Statistics classifies the Australian population into five 'remoteness classes'. These classes cut across state and local government boundaries, giving a better understanding of the patterns of socio-economic experience across Australia.

Many of Australia's regional and remote communities have faced reduced access to services over the last twenty years as a result of shrinking populations, significant distances for service provision and rationalisations by service providers. This has had – and continues to have – an impact on the quality of life in these communities.

If the projected impacts of climate change occur, the viability of agriculture in many areas of Australia will be adversely affected – as will the viability of communities that support and are supported by primary production.[116] The potential exists for significant dislocation and reductions in prosperity in some regional areas as a result.

Access to infrastructure, infrastructure-related services and quality of life

Access to infrastructure varies across the 'remoteness classes' in Australia. In the energy sector, Australia's response to climate change represents an opportunity for regional areas, particularly in the realm of renewable energy generation. A leading energy consultant suggested in its submission to Infrastructure Australia that power generation using geothermal, solar, wind and gas resources could be located in rural and regional Australia and would have the potential to satisfy growing demands for low carbon power.[117] However, new investment in transmission infrastructure will be required to connect these new generators, as well as increased investment in fast response back-up capacity for intermittent generators such as wind farms.

Land transport is the lifeblood of many regional and remote communities. Importantly, this infrastructure supports the movement of goods and people to and from the country's major urban centres. However, regional road and rail infrastructure is facing considerable pressures across the country in response to increasing economic activity within regional communities.

In Tasmania, for example, regional roads (which will need to cope with increasing freight over the next decade) are a weak link in the state's export chain and are generally not fit to support road freight productivity reforms. Infrastructure deficiencies, compounded by a maintenance backlog, mean that many roads require major investment.

A significant issue facing the Northern Territory is the lack of sealed roads servicing growing cattle and mining operations in regional areas (particularly at places such as Macarthur River, Frances Creek and in the Tanami and Granites). Demands on these roads are forecast to increase considerably over the next four to five years. While AusLink funding will address some inadequacies, significant deficiencies still need to be addressed in the short term to ensure that the road transport network properly supports the Territory's mining and pastoral industries.

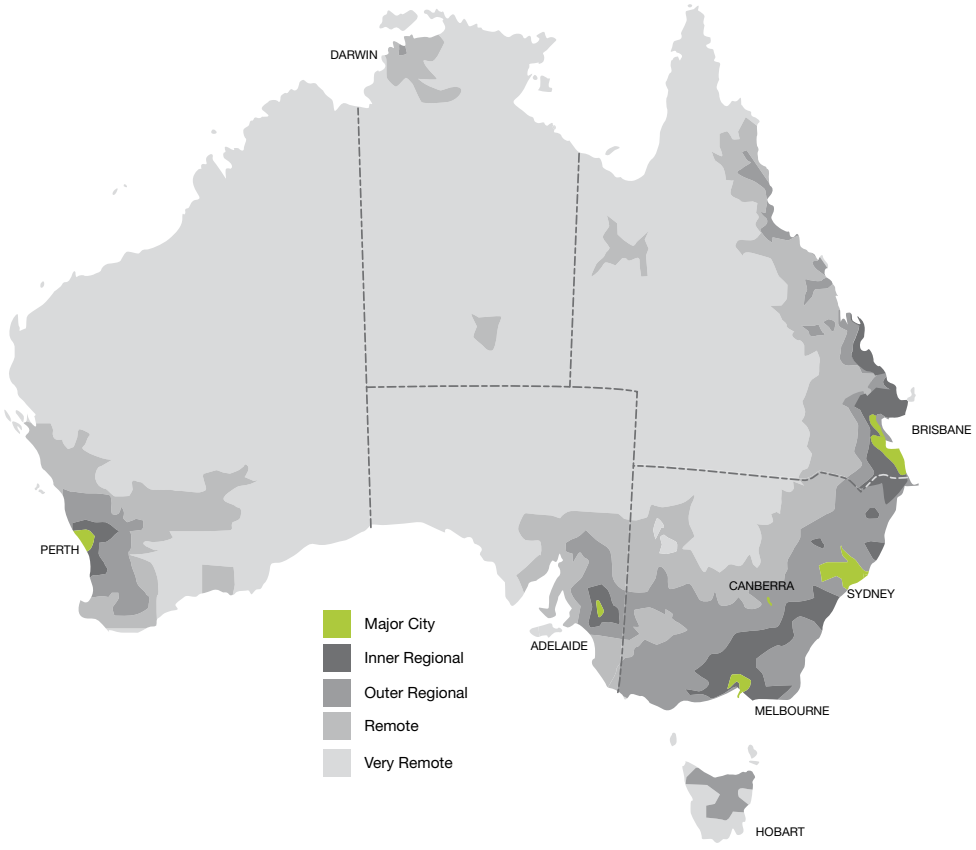
In the communications sector, the failure to keep pace with developments in urban areas, rather than a decline in service, marks the gap between regional and remote areas and major cities. There are major differences in access to high speed broadband services in regional areas compared with urban areas, with a significantly lower rate of internet access in regional areas (Figure 12).

The inability to access fast, affordable broadband in significant parts of Australia will hinder the achievement of important economic, social and environmental goals. In particular, regional businesses stand to lose a great deal.[118]

The Australian Government's Regional Telecommunications Independent Review[119] and the NSW Government's Rural and Regional Taskforce[120] have identified the costs of inadequate regional communications as:

- Diminished business competitiveness, which affect the ability of businesses to attract and retain investment
- Reduced access to education and training
- The increasing difficulty of attracting and retaining professionals to certain regions, particularly in an environment of acute skills shortages
- Inequity of access to services, particularly in relation to the increasing electronic delivery of government services.

Figure 12: The five remoteness classes in Australia, 2006



Source: BITRE 2008, *About Australia's regions*, June, Figure 1, p. 3, http://www.bitre.gov.au/publications/38/Files/RegStats_2008.pdf

The National Broadband Network should address some of these issues, but vast areas of the country will still have limited Internet access. This gap in telecommunications infrastructure has consequences for economic development, service delivery and community cohesion. A study by the Commonwealth Department of Communications, Information Technology and the Arts showed that "wired communities contribute to increased bonding capital and Information Communications Technology acts as an added resource for strengthening community ties...by allowing individuals to overcome the barriers of limited time, distance, accessibility and cost to achieve a common goal."[121]

At a more basic level, much of the infrastructure in remote areas and communities is at capacity or is outmoded technology. Extending telecommunications infrastructure beyond the existing Telstra network to small, remotely located communities is prohibitively expensive. High capital costs impede investment by Telstra and other private players, especially where the return on investment may not be clearly defined. However, without new telecommunications infrastructure, communities and businesses will not have access to the same coverage and level of performance that is available in other areas of the country.

The Regional Telecommunications Independent Review raised a number of issues in its report to the Australian Government,[122] including the adequacy of mobile telecommunications in regional Australia, the importance of access to broadband services, and the adequacy of the current Universal Service Obligation. The report proposes a new regulatory framework to replace the current Universal Service Obligation framework and guarantee access to broadband and mobile services for all Australians.

The recommendations by the Regional Telecommunications Independent Review Committee are based on the belief that competitive markets are best able to deliver telecommunications services. The Committee also argues that government interventions should be limited to where action is necessary to ensure service availability.

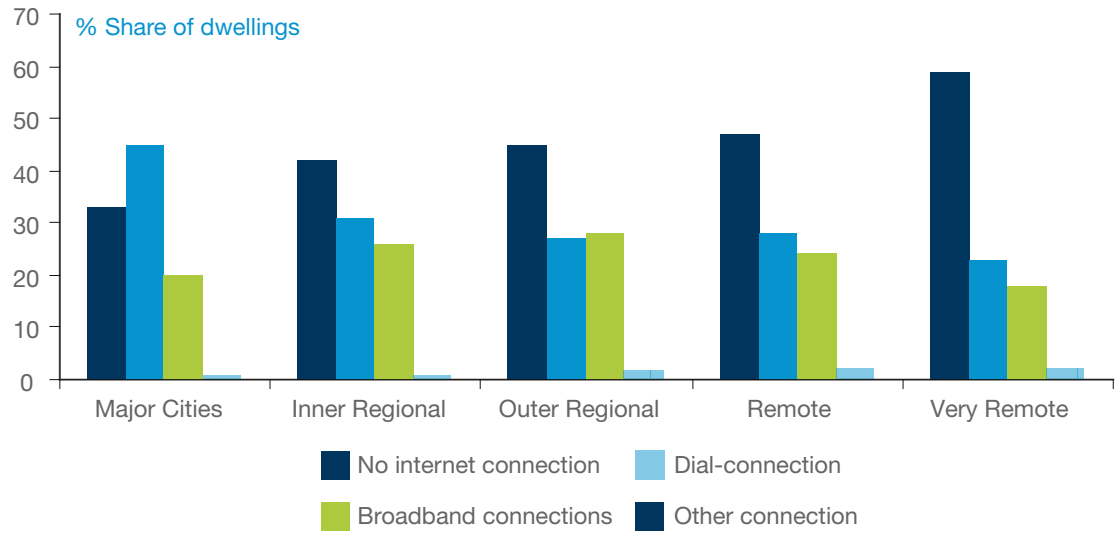
Security of supply and quality of life

Australia's rural and regional communities face similar challenges to urban areas in terms of the security of supply of water and energy. The challenge is significantly more acute for water than energy because local communities are usually responsible for their own water supplies. Approaches to pricing and allocation of revenues often compromise the ability to manage water effectively in regional areas. Prices are often not set to recover full costs and revenues collected are often not used to maintain water systems.

The challenge of providing water infrastructure in regional areas is considerable. For example, NSW, has estimated that $9.4 billion in capital expenditure is required over the next 30 years to upgrade infrastructure and replace aging assets in regional areas to meet current health and environmental standards, cater for population growth and mitigate the effects of climate change ($7.3 billion of these costs will be recovered through user charges).

Other jurisdictions – including South Australia, the Northern Territory and Western Australia – have also indicated that extensive upgrades of regional water supply and wastewater treatment systems are required to support expected population and economic growth. The value of these projects runs into the billions.

Figure 13: Internet access in Australia, 2008



Source: BITRE 2008, *Patterns of Internet Access in Australia*, June

The responses available to rural and regional communities to ensure security of domestic water supply are significantly constrained in comparison with urban areas. Rural and regional communities typically have limited capacity to fund (or even source) alternative supplies such as desalination. They often have inadequate sources of water for treatment to potable standards. With rainfall declining in rural and regional Australia more than in the major cities; this is likely to have consequences for irrigation and farming methods.[123]

Because most rural and regional areas are not facing population growth on the same scale as urban centres, the security of supply is unlikely to be put at risk by existing physical infrastructure. Instead, regional areas are more likely to have to compete with urban areas for access to the available supply, particularly in the energy sector.

Part 4 – Meeting the challenges

4.1 Themes for meeting the challenges

The following themes are Infrastructure Australia's response to the national and location-specific challenges and steer a course for solutions to meet the gaps, deficiencies and bottlenecks in our nation's infrastructure.

a) A national broadband network

The most pressing challenge facing the Australian communications sector is the relatively disparity in access to affordable broadband, particularly in regional and some parts of urban Australia.

The benefits of a fast and accessible national broadband network to Australia's international competitiveness are almost impossible to overstate. The technology now exists to enable Australians to send and receive information, education and entertainment almost instantly both within Australia and overseas.

This means that Australia can generate and access more knowledge and services in less time and with less effort than ever before – and get them to market almost instantly. The connectivity it could offer business and households promises an economic and social stimulus of great potential, particularly for regional Australia.

Infrastructure Australia supports the investment of $4.7 billion from the Building Australia Fund to develop the National Broadband network.

b) Creation of a true national energy market

Despite being 10 years since the creation of the national electricity market, Australia continues to have an energy market that is characterised by limited inter-connector capacity and significant price divergences between regions.

In addition, out dated regulations and cost sharing models are restricting the ability to include smaller generators in the network, and inhibiting the development of renewable energy sources.

Infrastructure Australia believes that acceleration and implementation of current reforms and encouraging investment in infrastructure will enhance the operation of competitive national markets in both electricity and gas whilst creating opportunities for the development of renewable energy sources.

c) Competitive international gateways

Australia's international trade has grown as globalisation increasingly drives the internationalisation of Australian business. This has placed greater demand on Australia's international gateways – our sea ports and airports – as well as the supply chains that operate behind them.

To prosper in our increasingly connected global economy, the challenge is for Australia's trade gateways, ports and associated land side infrastructure to be increasingly efficient, flexible and modern to remain competitive and boost exports.

These challenges can be met by governance reforms, strategic planning and adequate investments in landside infrastructure and terminals, co-ordination in port precinct and land transport planning, as well as, consistent nation-wide protocols and procedures in relevant logistics chains including information exchange.

d) A national rail freight network

The challenge for rail freight operating in conjunction with our international gateways and inter-modal terminals is to increase its efficiency and competitiveness. The outlook for rail freight indicates that significant growth in rail freight volumes is both likely and necessary. This is due in part to rising freight demand and in part to improving Australia's ability to minimise transport sector greenhouse gas emissions and anticipate potential rises in energy costs. Providing for this demand will require significant investment.

Currently the interaction between freight and passenger rail creates operational conflicts. Growth in both freight and passenger rail demand will increase these conflicts, to the likely detriment of the freight sector. The issue will be further highlighted by growth in port capacity.

While increasing rail freight has long been an ambition of governments, operating conditions are not uniform across Australia, leading to inefficiencies.

Infrastructure Australia notes that a national framework for all rail freight networks, not just inter-state networks, would improve planning, investment and decision making of rail capacity and supporting inter-modal terminals.

e) Adaptable and secure water supplies

The severe and sustained drought and the impact of climate change pose a major challenge for the management of existing sources of water. Adaptability and security of water supplies are urgent issues for urban, regional and rural areas.

The challenges for water security are significant. To date, they have largely been met by increases in supply and water restrictions. However, most jurisdictions are beginning to implement market and regulatory reforms in pursuit of more cost reflective pricing.

Infrastructure Australia recommends that the water sector is one where cost reflective pricing, particularly in urban areas, will provide the majority of the signals and incentives needed to ensure that adequate infrastructure is built and maintained.

f) Transforming our cities

With the majority of our population and businesses located in urban areas, our cities are hubs of economic activity that link Australia to the global economy. Australia therefore relies heavily on the productivity of its cities to sustain national prosperity. Nonetheless, our urban areas face major pressures such as growing populations and changing demographics; increasing demands for better environmental management, amenity and affordability; ageing or inadequate infrastructure; and urban congestion.

Infrastructure Australia notes that the development and coordination of urban action plans; significant investment in public transport networks; improved governance incorporating stronger industry and community participation; and integrated long-term strategies to manage land use planning, density, population and urban congestion; will help ensure the sustainability, liveability and productivity of Australia's cities into the future.

g) Providing essential indigenous services

The central challenge facing many indigenous communities is the poor quality and availability of local infrastructure –transport, communications, water supply, electricity and housing. This is impeding the progress of these communities. A large part of this challenge stems from the remote locations of these communities.

Infrastructure Australia believes that the development of indigenous community infrastructure plans, in coordination and collaboration with indigenous communities, will help to realise substantial benefits in employment, education and standards of living. This opportunity may be realised through improved allocation of funding under existing infrastructure investment programs.

4.2 Infrastructure proposals for prioritisation

Infrastructure Australia has identified a number of themes for strategic investment priorities. To identify the priorities, Infrastructure Australia argues that efficient investment in new capacity and making the best use of existing capacity are critical factors in raising the economy's productive capacity. Infrastructure Australia is also mindful of the fact that where governments invest in infrastructure assets, it is essential that they seek to achieve maximum economic and social benefits, determined through rigorous cost-benefit analysis.

Infrastructure Australia received over 600 submissions requesting funding support for specific projects. While the many of these came from state and territory governments, a significant number of projects were received from other public and private sector organisations. Infrastructure Australia is very grateful to those individuals and organisations who worked hard to provide materials to meet tight deadlines.

The majority of submissions made some assessment of the strategic fit or profile of projects against Infrastructure Australia's seven strategic priorities. However, a majority of the projects submitted to Infrastructure Australia had very little or no supporting economic analysis to demonstrate the case for funding. Of those with economic analysis, the supporting evidence material provided to Infrastructure Australia was weak in many cases.

In addition, in many cases the information provided was a preliminary (or 'rapid') economic analysis, based on a partial analysis of impacts, often applied to project corridors or strategic models rather than detailed project specifications based on engineering work. Such an approach is sensible in aiding project development, but firm project decisions can only be based on a full economic analysis of a detailed project proposal.

The prioritisation methodology that is being used by Infrastructure Australia to prioritise specific infrastructure projects is a three phase process incorporating:

1. **Profiling** – assesses the compatibility of projects to Infrastructure Australia's strategic priorities
2. **Appraisal** – adopts 'monetised' cost benefit analysis as its core tool. This is complemented by 'non-monetised' effects. Together, a picture of the wider economic, environmental and social merits of each project can be determined
3. **Selection** – integrates the profiling and appraisal assessments with other data and information. This enables the national productivity impact of individual initiatives to be compared. It also enables a complete picture to be developed of the national productivity impact of the entire range of initiatives across all sectors.

To guide infrastructure Australia's analysis, the Infrastructure Coordinator has used internal and external experts to:

- Consider the rating of strategic fit supplied in the project submissions and moderate the ratings to ensure comparability between projects; and
- Consider the supporting information that underpins the economic cost-benefit assessment of each project. Experts have made an initial assessment of the robustness of the economic analysis on the basis of information supplied to Infrastructure Australia in the submissions and have moderated the benefit-cost ratio to ensure a degree of broad comparability.

The Infrastructure Coordinator has made an interim analysis of the projects submitted to Infrastructure Australia. This analysis has directly informed which projects will be subjected to further analysis and these projects are outlined in Table 5. Infrastructure Australia will continue to work with governments and relevant bodies to finalise a prioritised list.

Finally, it should be noted that many projects submitted to Infrastructure Australia do not appear in Table 5. Projects with a comparatively low Benefit Cost Ratio (BCR) or with no cost benefit assessment evidence have not been included in this table. It is stressed that if the BCR rises following more detailed analysis, or if analysis is provided in due course, Infrastructure Australia will consider these projects on their merits in future assessment processes.

Table 5: Projects for further analysis

	Initiative	Locality	Submitter	Approx Capital Cost by proponent
Freight Rail	Adelaide Urban freight – Goldwood and Torres Junctions	Adelaide	SA	$415m
	East-West Rail freight corridor	VIC/SA/WA	ARTC	$554m
	Gippsland Coal Industries transport Infrastructure	Vic	VIC	$NA
	Hunter Valley Corridor Rail Strategy	NSW	ARTC	$1.68b
	Mount Isa Rail Corridor Upgrades	Mt Isa to Townsville	QLD	$1b
	North-South Rail freight corridor	VIC/NSW/QLD	ARTC	$7.2b
	Northern Sydney Rail Freight Corridor	NSW	NSW	$4.075b
	Newcastle-Dubbo Rail Freight link	NSW	DoITARS	$24m
Urban Rail / Bus or Urban Rail / Road	Brisbane Inner City Rail Capacity Upgrade	Brisbane	QLD	$14b
	CBD Metro	Sydney	NSW	$4.8b
	Extension of Passenger Rail Services to Seaford	Adelaide	SA	$456m
	Geelong Growth Package	Geelong	VIC	$94.6m
	Gold Coast Rapid Transport	Gold Coast	QLD	$850m
	Light Rail for the ACT	Canberra	ACT	$2.95b
	Melton Duplication and Electrification to Bacchus Marsh	Melbourne	VIC	$NA
	Northbridge rail cutting link	Perth	WA	$263m
	Regional Rail Express Line	Melbourne	VIC	$3.8b
	East-West rail Tunnel	Melbourne	VIC	$3.5b
	Southern Cross Platform 15 & 16 Activation	Melbourne	VIC	$155m
	West Metro	Sydney	NSW	$8.1b
	Gawler Rail line re-sleepering and electrification (formerly Adelaide's Future Public Transport Network)	Adelaide	SA	$2.19b
	North-South Corridor – Darlington Transport Project	Adelaide	SA	$750m
	Eastern Busway (Stage 2)	Brisbane	QLD	$680m
	Eastern Busway (Stage 3)	Brisbane	QLD	$140m
	Darra to Ipswich Transport Corridor	Brisbane/Ipswich	QLD	$3.8b
	Very Fast Train (VFT)	VIC/ACT/NSW	ACT	$32-59b

	Initiative	Locality	Submitter	Approx Capital Cost by proponent
Freight Road	Abbot Point and State Development Area bypass	Bowen	QLD	$400m
	Alternative to West Gate – Road Tunnel, Geelong Road to Port of Melbourne	Melbourne	VIC	$3.5b
	Donnybrook Intermodal Hub	Melbourne	VIC	$290m
Freight Road	Expanded Higher Mass Limits	Central Queensland	QLD	$750m
	Frankford – Birralee – Batman freight corridor	Frankford	TAS	$160m
	Green Triangle Project – Freight Network and Rail/Port Connections	South western Vic and South eastern SA	VIC	$390m
	Green Triangle Project	South western Vic and South eastern SA	SA	$136m
	Improved Access for Higher Prod. Freight Vehicles	Parts of SA	SA	$385m
	Peak Downs Highway Heavy Vehicles Route	Mackay to Bowen	QLD	$315m
	Picton Road	Illawarra Region	Illawarra Development Council	$135m
	Port of Brisbane Motorway	Brisbane	QLD	$730m
	Port of Mackay Multi-Modal Access Road	Mackay	QLD	$300m
	Toowoomba Bypass	Toowoomba	QLD	$1.341b
	West Coast Freight Analysis	West Tasmania	TAS	$NA
	Parts of transport system in Tasmania	Parts of Tasmania	TAS	$432m
Urban Road	Kingsford Smith Drive (Brisbane City to Australia TradeCoast)	Brisbane	Brisbane City Council	$570.6m
	Eastern Brisbane Suburbs Roads	Brisbane	Brisbane City Council	$482.1m
	North East Connector Road	Melbourne	VIC	$2.1b
	F3 – M2 Link	Sydney	NSW	$4.75b
	Gateway Upgrade North: Nudgee Road interchange to the Bruce Highway	Brisbane	QLD	$1.8b
	Gateway Upgrade South: Mt Gravatt Capalaba to Pacific Motorway	Brisbane	QLD	$1.1b
	Melbourne Grade Separations	Melbourne	VIC	$327m

4.2 Infrastructure proposals for prioritisation

	Initiative	Locality	Submitter	Approx Capital Cost by proponent
Urban Road	M4 Extension	Sydney	NSW	$5.7b stage 1 $4b stage 2
	M5 Expansion including surface road links	Sydney	NSW	$2b
	Majura Parkway (Stage 2)	Canberra	ACT	$250m
	Mornington Peninsula Connector Road	Melbourne	VIC	$700m
	Northern Link road tunnel	Brisbane	Brisbane City Council	$2b
	Northern Connector (North-South Corridor)	Adelaide	SA	$2.2b
	Sir Donald Bradman Drive Upgrade – access to Adelaide Airport	Adelaide	SA	$48.8m
	Perth Airport Transport Links	Perth	WA	$525m
	South West Brisbane Industrial Gateway roads	Brisbane	Brisbane City Council	$327.6m
Regional Road	Brooker Highway	Tasmania	TAS	$56m
	Bruce Highway Upgrade (Brisbane to Cairns)	East coast QLD	QLD	$4.310b
	Bruce Highway Upgrade (Cooroy to Curra)	Gympie	QLD	$6.3b
	F3 to Branxton Link	Lower Hunter	NSW	$1.1727b
	Pacific Highway Upgrades	north coast NSW	NSW	$6.67b
	Princes Highway Upgrades	south coast NSW	NSW	$1.03b
	NT Development Roads	Parts of NT	NT	$1.655m
	Bald Hill Road interchange (SA)	Mt Barker	Mt Barker Council	$25m
	King Street (Glenelg – Holdfast Bay) bridge replacement	Adelaide	Holdfast Bay Council	$7.2m
Other transport initiatives	Advanced Train Management System	National	ARTC	$518m
	Fully Controlled Motorways	Brisbane	QLD	$570m
Road Maintenance	Increased road maintenance for regional freight networks	Parts of SA	SA	$65m

Initiative		Locality	Submitter	Approx Capital Cost by proponent
Ports/Airports	Port of Hastings	Hastings	VIC	$58.8m
	Abbot Point multi-purpose harbour	Abbot Point	QLD	$1.75b
	Darwin Port	Darwin	NT	$292-363m
	Bell Bay Port	Bell Bay	TAS	$150m
	Oakajee Port and common use infrastructure	Geraldton	WA	$3.5b
	Darwin Airport – terminal and apron expansion	Darwin	Darwin Airport	$30m
Energy	Pilbara Power	Pilbara	Worley Parsons	$1.15b
	ACT Solar	ACT	ACT	$119m
	Southern energy supply	ACT	ACT	$28.2m
	Hoskinstown to Fyshwick Looping	ACT	ACT	$92m
Water	Cotter Dam upgrade	ACT	ACT	$119m
	Darwin Water capacity and consumption	Darwin	NT	$240m
	Ord River expansion	WA	WA	$391m
	Regional Water Reform Initiatives	Parts of NSW	NSW	$95m initially plus $1.3b over 10 years
	Murrumbidgee Googong water transfer	ACT	ACT	$70m
	Adelaide's long term water security (Desal)	Adelaide	SA	$2.477b
Communications	Fibre optic cable from SA to Darwin	SA/NT	NT	$70m
	Extending broadband to NT remote communities	Parts of NT	NT	$200m
	VicFibre Link	Parts of Vic	VIC	$57.4m
	Broadbanding SA regions	Parts of SA	SA	$41.8m
Indigenous/ Housing	Aboriginal Community Water Supply and Sewerage capital works program	Parts of NSW	NSW	$30m
	NT indigenous Essential Services Requirements	Parts of NT	NT	$40.4m
	Pilbara housing and indigenous infrastructure	Parts of WA	WA	$2.101b
	Remote road and indigenous employment program	Parts of QLD	QLD	$46.5m
Other	Health Capital Projects	ACT	ACT	$1b

4.3 Creating an infrastructure priority list

In order to finalise the Infrastructure Priority List, Infrastructure Australia proposes to:

- Subject the data underpinning the assessment of strategic fit to further detailed scrutiny;
- Request the development of comprehensive economic analysis of specified projects, where only a rapid economic analysis is available at this stage;
- Ask submitting organisations to provide comprehensive economic analysis of specified projects immediately, if currently available;
- Request and scrutinise the detailed demand modelling underpinning the projects; and
- Subject the economic modelling methodology to further scrutiny.

Infrastructure Australia does not propose to seek this information for all projects immediately.

Infrastructure Australia intends to publish the Infrastructure Priority List in March 2009.

4.4 Financing for infrastructure priorities

Projects submitted for prioritisation have generally requested funding from the Commonwealth, and in particular the Building Australia Fund.

Given limited resources in the Building Australia Fund and other Commonwealth funding sources it is important to consider the full range of funding options before determining whether a project rated highly on the Infrastructure Priority List is suitable for funding by the Commonwealth. This not only includes other arms of government, but also, importantly, whether the private sector should fund the project.

It is also important to consider ways of facilitating the participation of private sector funds, such as superannuation, in infrastructure investment.

Even if projects are not funded by government, governments can play a valuable role in investment through facilitating the planning and other approval processes, by providing the demand for services and by implementing appropriate regulatory regimes.

A funding decision making framework

A number of threshold issues need to be addressed before allocating funding for a project of national significance. These include:

a) Should the project be financed by the public sector in whole or in part?

b) Is the Commonwealth the appropriate level of government to fund the project?

c) What is the appropriate source of Commonwealth funds?

d) What form of financing should Commonwealth funding take?

e) What conditions should be attached to any funding provided by the Commonwealth?

a) Should the project be financed by the public sector?

Projects should first be assessed against whether they are best financed by the private or public sectors. Important considerations for private sector provision include whether the project is commercially viable without government funding assistance and can the private sector deliver value for money in achieving public objectives.

Under the draft National PPP (public private partnership) guidelines, all projects with a capital value over $50 million will consider a PPP option.

These guidelines will ensure value for money is achieved in determining the method of procurement. Under public private partnerships (PPPs) value for money is normally tested by comparing the outputs and costs of the private sector proposal (including the higher cost of private capital) against the outputs and costs of delivery by the public sector (the public sector comparator). The following project characteristics are the key value for money drivers for PPP delivery:[124]

- **Complex risk profile and opportunity for risk transfer.** More rigorous risk evaluation and transfer to the private sector of those risks it is best able to manage, including those associated with providing the specified services, asset ownership and whole-of-life asset management;
- **Whole-of-life costing.** Full integration, under the responsibility of one party, of up-front design and construction costs with ongoing service delivery, operational, maintenance and refurbishment costs. This delivers improved efficiency through whole-of-life costing as design and construction become fully integrated up-front with operations and asset management;
- **Innovation.** As the PPP approach focuses on output specifications, this provides a wider opportunity to use competition as an incentive for private parties to develop innovative solutions in meeting these service specifications;
- **Measurable outputs.** The nature of the services enable output specifications and a performance based contract;
- **Asset utilisation.** Reducing costs to government through potential third party utilisation and through more efficient design to meet performance (e.g. service delivery) specifications;
- **Better integration of design, construction and operational requirements.** Ongoing operational, maintenance and refurbishment responsibilities costs become a single private party's responsibility for the length of the contract period; and
- **Competitive process.** A competitive market exists and the use of a competitive process helps to encourage the private party to develop innovative means of service delivery while meeting government cost objectives.

Private sector financing does not preclude public sector funding participation in funding arrangements. Indeed in order to achieve public policy objectives some degree of public funding may be required for the project to earn a commercial rate of return.

Facilitating the participation of private sector funding sources such as superannuation investment into infrastructure investment has a number of dimensions including: streamlining tendering and bidding processes (through such processes as the development of National PPP guidelines); reducing regulatory uncertainty; and increasing the flow of infrastructure investment opportunities.

One possible model for increasing infrastructure opportunities could be to lease on a long term basis existing public infrastructure assets into an investment vehicle. The assets are in turn operated and maintained in return for payments by government or consumers. The gains from the lease can then be reinvested in other infrastructure projects that can again be leased to the private sector.

b) Is the Commonwealth the appropriate level of government to fund the project?

Consideration should be given to whether the project is a funding responsibility of the Commonwealth. There is the risk that without a clear framework for this issue Commonwealth funding will simply displace State infrastructure spending that would otherwise have occurred.

Projects are being subject to rigorous cost/benefit analysis and assessed for national significance against Infrastructure Australia's strategic priorities.

Additional factors that can be taken into account when considering Commonwealth funding of a project include whether:

- The project is an activity that is normally funded by the Commonwealth;
- The project is closely linked to a current or emerging national objective or expenditure priority of the Commonwealth, for example, addressing Indigenous disadvantage and social inclusion;
- The project has 'national public good' characteristics (where the benefits of the involvement extend nationwide). For example, given the increasing internationalisation of the Australian economy over recent decades factors which impact on our national competitiveness such as poor infrastructure provision is increasingly an area of national importance;
- The project has 'spillover' benefits that extend beyond the boundaries of a single State;
- The project has a particularly strong impact on aggregate demand or sensitivity to the economic cycle, consistent with the Commonwealth's macro-economic management responsibilities; and
- The project addresses a need for harmonisation between the States to reduce barriers to the movement of capital and labour.

Commonwealth funding does not have to be all or nothing – Commonwealth funding for projects is often provided in partnership with the states and territories. For example, the Australian Government, in programs such as AusLink, negotiates state and territory funding on a project by project basis. States and territories, which are the owners of the infrastructure and receive significant economic benefits from projects, can reasonably be expected to make major contributions to projects.

Displacement could be addressed by making funding contingent on the states and territories maintaining a certain level of infrastructure spending. This may prove to be difficult to operationalise in practice, however, because of difficulties in measuring the likely growth path of state and territory infrastructure without the additional Commonwealth funding.

c) What is the appropriate source of Commonwealth funds?

The Commonwealth has a range of funding programs and established funds that could be sourced to provide infrastructure spending.

Decisions about the appropriate source of Commonwealth funding are best made at the Government level because this often involves judgement by government against competing objectives. An important consideration is to ensure that alternative Commonwealth funding programs are working in a mutually supportive manner. For example, in cases where a project is already receiving funding from another source it will be important to determine the rationale for the Commonwealth funding and why supplementary funding from the Building Australia Fund is required.

Should funding from the Building Australia Fund be directed to projects in receipt of other Commonwealth funds consideration would need to be given to how accountability and transparency of funding can best be achieved.

Infrastructure Australia has an important role in the assessment process for projects being funded from the Building Australia Fund . Under the Nation-building Funds Bill 2008, Infrastructure Australia will advise the relevant Minister whether projects being put forward for funding from the Building Australia Fund meet certain evaluation criteria. The evaluation criteria seek to ensure that projects financed from the Building Australia Fund are consistent with the nation-building objectives and are in line with Government's overarching principles that projects financed from the Funds should:

- Address national infrastructure priorities;
- Demonstrate high benefits and effective use of resources;
- Efficiently address infrastructure needs; and
- Demonstrate they achieve established standards in implementation and management.[125]

d) What form of financing should Commonwealth funding take?

Commonwealth funding could take a number of forms including a direct grant, loans such as debentures, and equity injections. The form of assistance will depend on the nature of the project and the objectives of the government assistance.

An advantage of loans and equity injections is that they allow the Government to exercise an element of long term influence over the project. However, holding a long term financial exposure to a project may give rise to financial and governance risks to the Commonwealth and will need to be carefully managed. A disadvantage of concessional loans and equity payments is that they tie up large amounts of funding compared to direct grants.

However, because loans and equity payment have the prospect of earning a rate of return (as well as return of principal) they provide a longer term source of finance for the fund. Grant funding can be more targeted than loans or equity injections.

Grants are also generally more transparent in terms of the amount of government assistance and remove the potential risk of moral hazard over the life of the project.

The impact on the Commonwealth Budget will vary depending on the form of financing. The form of Commonwealth financing should be primarily determined by the funding requirements of the specific project rather than impacts on the various Commonwealth budget aggregates. The form of financing has the potential to impact on project operations and the efficiency by which Government project objectives are achieved.

e) What conditions should be attached to any funding provided by the Commonwealth?

It is important that funded projects do not substitute for viable reforms that could be introduced to address capacity constraints and other issues. In addition, it may be necessary to introduce complimentary policy and regulatory reforms to ensure that the investment is achieving its national productivity and other objectives.

Infrastructure Australia's framework requires proponents putting forward investment proposals to analyse a full range of necessary policy, regulatory and competition reforms required to address the problem which the project is attempting resolve. Through this assessment, projects demonstrate they are the most efficient way to address infrastructure needs and are not substituting for viable reforms to relevant markets or pricing (e.g. market based solutions must have been examined).

The report has identified a range of reforms which will go a long way to addressing infrastructure issues identified in the transport, telecommunications, water and energy sectors. Without these reforms investments will not realise the full national productivity benefits that they are intended to deliver.

It is clear from the variable results achieved in major infrastructure delivery around Australia that lessons from the past are not always taken on board. It may be necessary to require jurisdictions to demonstrate that highly competent delivery teams and robust governance structures will be used and that effective project management and governance is being maintained during delivery.

Part 5 – Looking ahead

5.1 Looking ahead

Infrastructure Australia's long term goal is to improve the quality of decision making in infrastructure in Australia. The Infrastructure Priority List is only the first step in this process. Improving decision making from a national perspective requires a joint effort between all tiers of government and Infrastructure Australia.

In June 2008, Infrastructure Australia published a framework for infrastructure decision making. While aware that implementing the framework presents many challenges and cannot be achieved in the short term, Infrastructure Australia notes four key structural weaknesses in submissions requesting funding for projects:

1. The quality of problem definition is poor. A number of projects had excellent analysis of the nature and causes of the problem and the costs of inaction on the economy, society or the environment. However, this analysis was absent in most cases, making it difficult to assess the scale of the problem or to identify the most pressing problems.
2. Consideration of different interventions or solutions are rare. Only one project on the list uses soft infrastructure management to address the identified problem – notably, its economic return was very high. Genuine consideration of different options is a fundamental step in identifying the best solutions for Australia: this should be a substantial part of all business cases in future.
3. Many of the projects proposed are isolated from city, corridor or network planning. Long term planning is essential in infrastructure sectors; in future, Infrastructure Australia is likely to request an explanation of how individual projects support these efforts.
4. The quality of economic analysis is absent or weak in places. In addition, an inevitable result of the different approaches taken by different organisations is that methodologies are difficult to compare. Greater commonality between methodologies would help comparisons and also help states and territories to deal with often complex analytical issues (such as the assessment of Wider Economic Benefits).

Not surprisingly, given the 2008 timetable, most of the projects submitted are already being considered. These projects are not always of the highest quality: over 20 projects on the list would destroy value (according to the information supplied to Infrastructure Australia). While Infrastructure Australia's methodology will ensure that the best projects from the list are prioritised, Infrastructure Australia also seeks to improve the quality of projects in future.

To ensure that subsequent rounds of the Infrastructure Priority List are based on a more robust and high quality list of projects, Infrastructure Australia proposes to:

- Publish more detailed guidelines, expanding on the Infrastructure Australia decision making framework to give states, territories and other organisations a clear process to follow;
- Publish detailed guidance on the type of evidence required to demonstrate a project's strategic fit; and
- Work with the various jurisdictions, the Australian Transport Council and other sector bodies to produce national guidelines for project appraisal.

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