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Submissions may address any key issues related to the Infrastructure Australia agenda and/or in specific response to the topics raised in the discussion papers.

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Submission title: Australia's Infrastructure Requirements

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No. of pages: 15

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Please indicate if your submission:

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☒ Issues Paper 1 — Australia's Future Infrastructure Requirements

☐ Issues Paper 2 – Public Private Partnerships

AND/OR

☒ General (Includes information on the following areas)

- ☒ Water Infrastructure
- ☒ Transport Infrastructure
- ☒ Climate Change
- ☐ Public Private Partnerships
- ☐ Infrastructure Audit
- ☐ Infrastructure Law
- ☐ Other, please state:
- ☒ Telecommunications Infrastructure
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1. Introduction

Engineers Australia is the peak body for engineering practitioners in Australia, representing all disciplines and branches of engineering. Membership is approximately 86,000 Australia wide and Engineers Australia is the largest and most diverse professional engineering association in Australia. All Engineers Australia members are bound by a common commitment to promote engineering and to facilitate its practice for the common good.

This Submission is based upon Engineers Australia's long standing policy interests in Australian infrastructure and in sustainable development. Engineers Australia believes that infrastructure is one of the keys to Australian productivity growth which in turn underpins Australia's long term economic prosperity and high standard of living. For some time Engineers Australia has been advocating that there has been significant underinvestment in new infrastructure and that there has been insufficient attention to maintaining and renewing existing infrastructure. These views have been encapsulated in Engineers Australia's Infrastructure Report Cards, which were first published in 1999. The picture that emerges from the Infrastructure Report Cards is that the condition of Australia's overall infrastructure is adequate for its purpose, with a few jurisdictions having somewhat better outcomes. Engineers Australia believes that mere infrastructure adequacy is not conducive to productivity growth and reflects a historical reactive approach to infrastructure investment instead of the proactive approach required to produce productivity growth.

Funding infrastructure investment has been problematic in all Australian jurisdictions for at least the past decade, if not two. Long infrastructure asset lives and the need to avoid budget deficits have meant that Governments have overlooked the productivity enhancing qualities of optimising infrastructure. The scope for private sector investment in infrastructure development has been downplayed and confined to a few specific projects, even though the evidence contained in official engineering construction figures shows that the balance of activity has swung from a heavy public sector bias in infrastructure activity in the 1980's to near parity in recent years. As well, many infrastructure assets are now operated on accepted user-pays bases, creating the commercial environment to support greater private sector infrastructure participation.

Part of the problem is that Government infrastructure assets have not been treated in the way that a major business entity would be expected to account for its capital assets. With some exceptions, little information is available about the current depreciated value of different infrastructure asset types, where these assets are located, the recurrent and capital operating costs of these assets, including maintenance, and the remaining economic lives of assets. The result is that most infrastructure investment is undertaken as crisis management to address the latest calamity and/or pressure. Engineers Australia believes that all owners of infrastructure assets critical to the growth of the economy, and to the maintenance of Australian living standards, should be transparently accountable for their on-going operations in line with well known and accepted business principles.

Engineers Australia firmly believes that these issues must be addressed. The infrastructure priorities that Infrastructure Australia releases to the Federal Government should incorporate leveraging greater private sector funding and participation in infrastructure investment and operations and leveraging significantly improved investments and accountability by State and Territory governments in infrastructure investment. There is also a need to consider leveraging Australia's superannuation funds through government backed infrastructure bonds or securities.

Since 1989, Engineers Australia has had in place sustainable development principles to guide its members in the conduct of their engineering practice. Sustainable development is an integral component of Engineers Australia's code of ethics that is adhered to by all members. Engineers

Australia has also formally endorsed a Sustainability Charter and a comprehensive policy on Australia's energy future and climate change. Engineers Australia believes that sustainable development can only be achieved when embraced by mainstream policies and programs.

2. Identifying the problems

Infrastructure underpins the delivery of essential services, drives economic and productivity growth and is a major determinant of the high standard of living that Australians enjoy. Engineers Australia believes that key parameters of the national infrastructure system must be transparently measured and monitored, and infrastructure policies must be based on clear understanding of the demands for and supplies of infrastructure services in a holistic framework.

There is substantial agreement about the broad relationship between infrastructure and economic and productivity growth, even though the precise relationship is not as clearly understood[1]. What is clear, however, is that effective management of the nation's infrastructure depends on knowing what assets exist, their effective lives, their condition, their service delivery capacity and their capital and recurrent maintenance requirements.

In 1999, Engineers Australia initiated its first Infrastructure Report Card[2] because it had become concerned about the state of Australian infrastructure. Engineers Australia has produced National Infrastructure Report Cards for 2000, 2001 and 2005 covering all key types of economic infrastructure[3]. The Report Cards assembled a wide range of statistical, qualitative and planning data, to reflect on the fitness of infrastructure for current and anticipated purposes using the criteria of asset condition, committed investment for maintenance and asset renewal, regulatory appropriateness and compliance, and planning processes. Table 1 summarises the Australia wide assessments.

The rating system used in Table 1 is as follows:

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

[1] S Shanks and P Barnes, Econometric Modelling of Infrastructure and Productivity, Productivity Commission Research Memorandum 08.01, January 2008, www.pc.gov.au
[2] www.infrastructurereportcard.org.au
[3] Infrastructure Report Cards were also produced for New South Wales, 2003; Victoria, 2005; Queensland, 2004; South Australia, 2005; Western Australia, 2005; Tasmania, 2005; Northern Territory, 2005 and the Australian Capital Territory, 2005.

TABLE 1
ENGINEERS AUSTRALIA INFRASTRUCTURE REPORT CARD ASSESSMENTS

INFRASTRUCTURE CATEGORY	AUSTRALIA 2005	AUSTRALIA 2001	AUSTRALIA 1999
NATIONAL ROADS	C+	C	C
STATE ROADS	C+	C-	C-
LOCAL ROADS	C-	D	D
ROADS OVERALL	C	C-	C-
RAIL	C-	D-	D-
ELECTRICITY	C+	B-	
GAS	C+	C	
PORTS	C+	B	
WASTEWATER	C+	C-	D-
POTABLE WATER	B-	C-	C-
STORMWATER	C-	D	
IRRIGATION	C-	D-	
WATER OVERALL	C	D+	C-
AIRPORTS	B	B	
OVERALL ASSESSMENT	C+	C	D+

Over six years, Australian infrastructure has progressed from an overall assessment that is a little better than poor to a little better than just adequate. During this period, concerns about infrastructure policies and investment levels have increased. Improvements in some areas have been better than in others and there appear to be direct links between the extent of improvement and information availability.

Engineers Australia is far from convinced that infrastructure operation and management in Australia is based on appropriate evidence. The Infrastructure Report Card process showed that data are fragmented, if available at all. There has also been a reluctance by governments to differentiate between new investment and the investment needed to maintain existing infrastructure assets. There has also been a reluctance to publish forward infrastructure priorities and plans that can provide the signals necessary for greater private sector participation, as well as demonstrating their own commitment to on-going infrastructure investment.

In recent years, most States and Territories have produced an Infrastructure Strategy or Plan and some have attempted to deal with the dearth of infrastructure information by developing more rigorous infrastructure statements as part of annual budget information[4]. Some historical data on the value of State owned assets, limited information on maintenance expenditure and efforts to differentiate between infrastructure, land and plant and equipment expenditures have been attempted. These are important improvements and are openly acknowledged as works in progress by the jurisdictions concerned. However, not all jurisdictions are pursuing these improvements.

[4] For example in NSW, The Infrastructure Statement, is Budget Paper No 4 and provides an overview of the State's policy, including the State's Asset Management Process, a current dollar valuation of total State owned assets and the direct recurrent expenditure on maintenance on a global basis. While considerable effort has clearly been devoted to improving the presentation of the capital expenditure program, administration and capital items are still mixed in together, there is no differentiation between capital expenditure to restore the serviceability of existing assets and capital expenditure to acquire new assets and it is not possible to formulate an overview of the circumstances relating to specific infrastructure asset classes. NSW leads other jurisdictions in efforts to improve the standard of infrastructure reporting, but still has a long way to go.

Infrastructure provision in most jurisdictions has not been continuous but has varied widely from year to year. This reflects the low priority that infrastructure has been accorded, fragmented planning, and the reactive approach that has become characteristic in many areas. In several key examples, infrastructure assets were successfully constructed, but subsequent commercial operations failed because underlying demand projections proved to be unduly optimistic and not reflective of actual demand.

Engineers Australia believes that Australia must develop an empirical basis for its infrastructure planning and investment. While it is not feasible to delay critical investment decisions, it is essential that priority projects be supported by the best available data, that supporting evidence include robust consideration of alternatives and be considered in a holistic framework rather than in prevailing silos. In cases where data deficiencies necessitate resort to complementary measures and judgments show that the projects concerned are high priority, Engineers Australia believes that project approval should be contingent on the sponsoring agency and/or government improving the data base for the project so that infrastructure management and future project investment decisions are based on sound information.

3. Transport Infrastructure

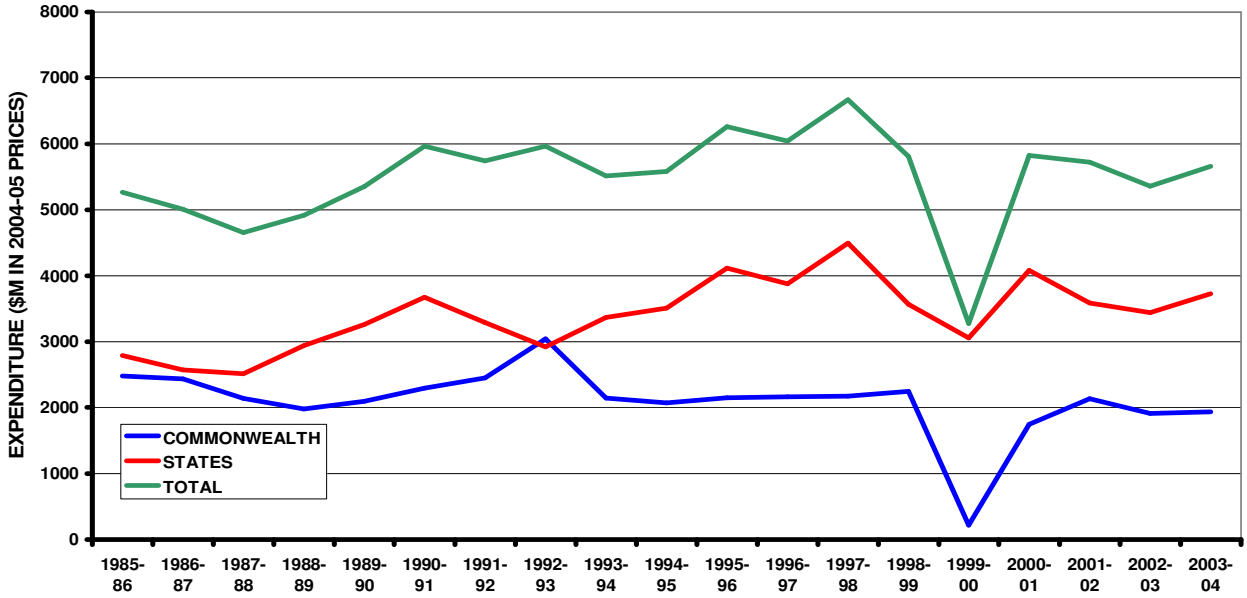
Engineers Australia's Infrastructure Report Cards show that there has been some improvement in the status of National and State roads since 1999. There has also been an improvement in rail infrastructure, but the state of Australian ports infrastructure has deteriorated. The overall rating, however, is still only adequate at best. In comparison, governments claim that there has been considerable progress in addressing transport infrastructure problems, notably through initiatives such as AusLink by the Commonwealth Government. However, it is not yet clear that this progress has been sufficient to resolve the problems that have been identified. The issues of particular concern to Engineers Australia are:

- Transport planning is not holistic. Road and rail transport policies have continued to be developed in historical silos, particularly in the States and Territories. Freight and passenger transport are considered apart and the Commonwealth is not involved in urban mass transit. The AusLink framework has improved complementary consideration of road and rail, but remains oriented to project based solutions in an entitlement framework, is not supported by balanced funding decisions and appears to have an excess focus on road freight rather than a comprehensive land transport focus.
- There are serious flaws in land infrastructure access charging policies that are inconsistent with competitive neutrality between road and rail as alternatives. The biases perpetuate the status quo, generating additional pressures for investment in roads and compromise the integrity of existing roads through overuse.
- Investment in urban public transport systems has lagged well behind progress in comparable cities in other parts of the world. This exposes residents and businesses to large and increasing congestion costs, adverse pollution related health impacts and long term rises in fuel costs. Rather than increasing, patronage of existing public transport services is falling in Australia as infrastructure deteriorates and service standards fall. Where new services are introduced, they fail to keep up with the increase in demand for commuter journeys.
- Investment in transport infrastructure has not increased commensurate with the problems identified as governments have allowed existing infrastructure capacity to be absorbed by increasing demand, well beyond any concept of eliminating excess capacity. There has also been a failure to distinguish between investment in tangible assets that increase productive capacity over the long term and general government expenditure.

- 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.

Engineers Australia believes that the evidence suggests that investment in road funding is insufficient. No distinction is drawn between new road construction, improvements to existing roads and general road maintenance. AusLink allocations recognise the neglect of road maintenance in the form of large allocations for road improvements and black spot remediation but substantiating data are not made public if, indeed, it is available.

FIGURE 1: ROAD EXPENDITURES BY COMMONWEALTH AND STATE AND TERRITORY GOVERNMENTS



Engineers Australia believes that AusLink provides an improved framework for transport infrastructure investment planning. But it is not clear that the deliberative framework and the financial support for AusLink have come up to expectations given the issues identified in the White Paper. Figure 1 shows the trends in Commonwealth and State and Territory road expenditure compiled from Bureau of Infrastructure, Transport and Regional Economics figures[5]. "Real" road expenditure by the Commonwealth Government trended downwards from the early 1990's until the commencement of AusLink. The average yearly AusLink allocation between 2004-05 to 2008-09 is $3,177.8 million[6] suggesting a substantial increase in annual investment. However, when allocations to rail projects and road construction inflation are taken into account, the average annual investment is substantially less at $2,590.3 million[7]. This is less that the annual Commonwealth investment in 1992-93. Corresponding road investment by the States and Territories increased up to the millennium but has since flattened out at levels commensurate with the early to mid 1990's. The combined impact of the two trends is that since the millennium, there is less investment on Australian roads than in 1990.

[5] Bureau of Infrastructure, Transport and Regional Economics, Australian Transport Statistics Yearbook, 2007, 2008,pp51-2
[6] Land Transport Funding Allocations Consolidated, www.auslink.gov.au
[7] The rail projects are clearly identified in the AusLink allocations. The data in Figure 1 are in constant 2004-05 prices. The Bureau of Infrastructure, Transport and Regional Economics has published an ABS road construction index which shows that from 2004-05 to 2005-06 prices increased by 5.9% and from 2005-06 to 2006-07 by 5.0%. Based on these movements it was assumed that the average inflation over the AusLink period was 5.0% per annum. This was applied to the average allocation in each of the 5 years to estimate the figure cited.

There are flaws in Australia's land transport infrastructure pricing formula, which are not conducive to modal competitive neutrality. The "pay as you go" approach used to set road charges is not conducive to holistic transport infrastructure planning and investment because it is fundamentally different from the methodology used to assess rail access charges. Road charges do not recognise a return to historical capital embodied in roads, whereas rail charges do. There has been extensive debate on this issue, but no agreement because the difference between the two methodologies is fundamental. There are also issues with the way the "pay as you go" method is applied, with the result that the heaviest trucks traveling on long journeys are significantly undercharged for their road use, encouraging an expansion in this form of transport with commensurate disincentives for rail freight. As well as different methodologies for road and access charges, different criteria are used to evaluate the economic merits of road and rail infrastructure investment.

Engineers Australia believes that Australia cannot claim to have a reasonable land transport policy while these arrangements persist. The demands for road improvements continue to escalate as the relative shares of road freight rise and of rail freight fall. Under-pricing the heaviest road transport freight carriers means the proportion of freight handled by them will rise and will reduce the asset life of road pavements, compounding the problem[8]. The apparent recognition of the importance of rail competition in the AusLink arrangements is not supported by infrastructure access pricing policy or by the level of financial investment provided. Planning and financial allocations have become reactive to perceived pressure points with the result that the existing modal mix is perpetuated. Engineers Australia is convinced that pro-active, integrated transport infrastructure planning based on modal competitive neutrality is essential.

The Commonwealth Government has not become involved in passenger transport arrangements in Australia's capital cities and State and Territory Governments have been unable and/or unwilling to deal with the rise in urban passenger movements. Overall, in Australia's capital cities only 9.4% of passenger kilometres in 2003-04 were by public transport, a fall from 9.7% in 1990-91. Sydney had the highest share at 13.1%, followed by Brisbane 8.3%, Melbourne 7.8%, Perth 7.2% and Adelaide 5.2%[9]. In contrast, 54.2% of New York commuters use public transport, in Chicago 25.4%, in Philadelphia 26.4%, in Washington DC 38.9%, in San Francisco 30.3% and in Boston 31.6%[10]. About 87% of the trips into central London in the morning peak are by [public transport. The low patronage of public transport in Australian cities contributes to increased congestion on urban roads and its estimated $9.4 billion cost in 2005. By 2020, urban congestion costs are projected to increase to $20.4 billion[11].

Urban road congestion is a serious drain on Australia's economic potential. Engineers Australia believes that this situation cannot continue and urges Infrastructure Australia to consider this matter. Transport infrastructure policy cannot focus solely on freight. Urban congestion means that there is contention between different road uses. Public transport services are an alternative to building more and bigger roads and as such, should be part of an integrated approach to transport infrastructure planning.

The transport sector is responsible for 13.7% of Australia's greenhouse gas emissions and emissions have increased by 27.4% since 1990[12]. Greenhouse gas emissions are projected to

[8] Business Council of Australia, Reforming and Restoring Australia's Infrastructure, Report by Port Jackson Partners, 2005, p33
[9] Estimated as the percentage of passenger kilometres traveled by rail, bus, light rail and ferry from Bureau of Infrastructure, Transport and Regional Economics, op cit, pp38-42
[10] http://en.wikepedia.org/wiki/Public_transport
[11] Bureau of Transport and Regional Economics, Estimating Urban Traffic and Congestion Cost Trends for Australian Cities, Working Paper 71, 2007, www.bitre.gov.au
[12] Department of Climate Change, National Greenhouse Gas Inventory 2006, www.climatechange.gov.au

increase by a further 15.8% relative to 1990 by 2020 unless steps are taken to reduce emissions[13]. The Government's Green Paper on a Carbon Pollution Reduction Scheme proposes that the transport sector be included in emissions trading with some temporary transitional measures. It is clear from stated Government policies and international developments that constraints on carbon emissions are unavoidable. Engineers Australia believes that these constraints should inform infrastructure planning in the transport sector.

Australia ceased to be a net exporter of oil and petroleum products in 2002. Since then, Australia's oil and petroleum imports have become an increasing share of total imports. In 2002-03, oil and petroleum imports were 7.9% of the value of total imports. By 2007-08, this had grown to 14.5%[14]. ABARE projections suggest that this trend will continue well into the future[15]. Infrastructure assets, particularly transport assets, have very long lives. There are growing concerns that global oil reserves will peak in the near future. While supply will not necessarily be affected as quickly, peak oil pressures will be felt in the form of long term price increases and the extent of these pressures could be amplified by adverse movements in exchange rates. There are serious implications not just for the transport sector but for the entire Australian economy. Transport and transport infrastructure planning must take these pressures fully into account.

Consolidated information about Australia's ports infrastructure is not available. The closest approximation is the engineering construction statistics produced by the ABS[16]. These show that for most of the past two decades, the real value of engineering construction work done has been static but since 2003-04 engineering construction activity has expanded significantly. Most of this increase originated in private sector activity in support of the minerals export boom. Public sector activity has been virtually unchanged since 1988-89 and represents less than 1% of public sector engineering construction work. Undoubtedly the export boom has exacerbated the problem of Australia's ports but the statistics show that the cause of the problem has been long term under-investment and this is reflected in Engineers Australia Infrastructure Report Card rating.

A further issue to consider is the advent of climate change and the consequent need to reform design standards and codes and reassess existing infrastructure where it ceases to perform to the original design intent based on changed conditions. In the coastal areas, it is likely that protective infrastructure will need upgrading, particularly in response to sea level rise. This will include such infrastructure as sea walls, breakwaters, drainage, port and boating facilities, amongst others.

In summary, noting that key projects such as completing the duplication of the Pacific Highway should be expedited, Engineers Australia believes that Infrastructure Australia should set its initial transport priorities in line with the directions implied by a comprehensive land transport framework for Australia in a carbon constrained world. Particular emphases should include:

- An eastern states north-south rail freight transport line with the potential for dual freight-passenger transport, if not immediately, then as a future development. Associated modal inter-changes should be identified and be part of the project pipeline.
- Easing urban traffic congestion by initiating a renewed focus on public transport through leveraged private and public sector investment.

[13] Australian Greenhouse Office, Transport Sector Greenhouse Gas Emissions Projections 2006
[14] ABS, International Merchandise Imports, Australia, Cat No 5439.0, August 2008, www.abs.gov.au
[15] ABARE, Australian Energy, National and State Projections to 2029-30, December 2006
[16] ABS, Engineering Construction Activity, March 2008, Cat No 8762.0, www.abs.gov.au

4. Water, Sewerage and Drainage

Many parts of Australia have experienced their worst single and multi-year droughts on record over the last decade. These recent climate conditions have severely stressed our water supply systems and the communities that depend on them. There is currently billions of dollars being invested in large infrastructure projects to address the current concerns over water supply (particularly to our major urban centres).

Water infrastructure over Australia's 220 year history has generally been ignored until crises loom. In some instances this had resulted in:

- poor decisions that are not adequately planned;
- options that are chosen for political appearances;
- interaction with other components is not being properly investigated.

The often long planning and construction times required to deliver major water infrastructure means that the benefits are derived after the initiating event (e.g. drought or flood).

A national review of water resource planning and specifically the adequacy of drought response plans is urgently required. Australia's water infrastructure needs to be properly planned, integrated and have its performance and operation properly assessed.

Water, sewerage and drainage infrastructure policies are based on an out-moded approach. Water as such is not priced, instead the infrastructure used to collect, store and distribute water is priced. Although there has been significant progress under the National Water Initiative and competition policy to establish water prices reflective of water use and that provide returns on capital employed, water charges are maintained at lower than economic levels by a plethora of regulatory arrangements using a variety of contrived methodologies. Sewerage and stormwater have been treated as waste disposal problems to be resolved as quickly as possible. Sewage disposal typically has treated effluent as a waste product rather than a valuable commodity that should be recycled, with the result that a large proportion of urban sewage is dumped into the sea with minimal treatment causing environmental problems. Stormwater is also typically treated as a problem rather than as an opportunity.

This policy approach results in revenue streams that do not reflect the historical investment in the systems being used and that are inadequate to support reinvestment (exacerbated by dividend withdrawals by government owners). As well, the asset base has deteriorated over time, creating investment pressure points when systems fail or where they reach appoint where they cannot be allowed to deteriorate further. Sewerage disposal systems are heavily dependent on large amounts of water to transport waste and there is a general failure of water recycling. Policy responsibilities for potable water, sewerage treatment and storm-water disposal reside in different agencies and/or operate to different norms.

Engineers Australia believes that the most appropriate approach to water and waste-water policy, including associated infrastructure planning is integrated water cycle management combined with full economic pricing, including scarcity pricing of water. In urban areas, integrated urban water cycle management involves coordinated planning (of all developments and not just water), sustainable management of resources, including land and water and the application of water sensitive urban design principles in the context of integrated management of all water sources in the relevant catchments.

Engineers Australia strongly supports the work of the National Water Commission on the objectives set out in the National Water Initiative. The Commission also advocates integrated water cycle management as the basis for water planning[17] and notes in its 2007 Biennial Assessment and its 2008 progress report to COAG, that while parties to the National Water Initiative were making progress in the implementation of water planning processes agreed under the Initiative, no Australian jurisdiction yet has an effective water planning system[18].

Engineers Australia believes that many of the tools necessary to resolve water and wastewater problems are currently available to of State and Territory Governments. Economic pricing of water, economic based regulations, more consistent, transparent and economically based approaches to the management of existing infrastructure assets and investment in new ones, robust attitudes and approaches to water reuse, and an open-minded approach to all possible approaches to manage the demand for water and supply of water of different qualities are required. Unless there is significant change on these issues, there is a risk that additional national funding will simply perpetuate outmoded and uneconomic methods.

Engineers Australia believes that projects that may warrant attention by Infrastructure Australia should be projects that can demonstrate to others the value of total water cycle management for sustainable development of water and waste water resources.

5. Electricity

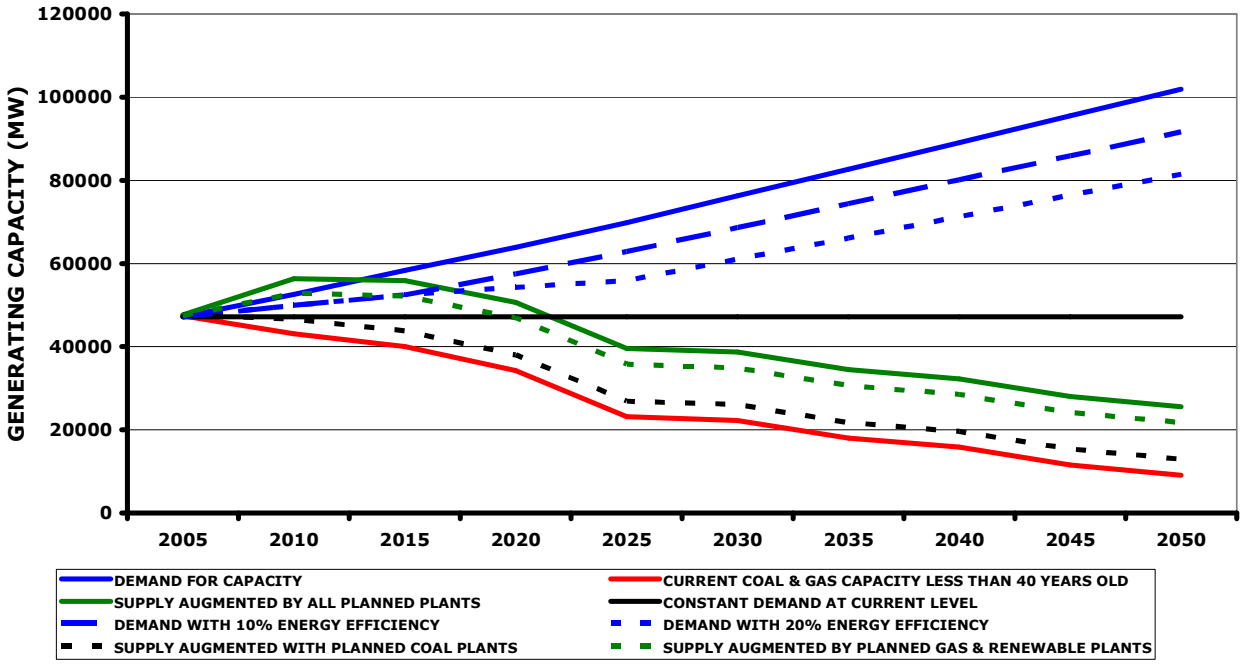
Engineers Australia's assessment of electricity infrastructure shows a deterioration over time due to persistent transmission limitations, failure to deal with growth in peak demand, the continued inability of the National Electricity Market to function as a national market rather than linked regional markets and on-going questions about industry sustainability, particularly greenhouse gas emissions. This assessment was made in 2005 even though there had been significant investment since the previous assessment in 2001.

Documentation available from State and Territory Governments[19] and from the Energy Supply Association of Australia[20] indicates that the main focus of new investment has been for additional transmission and distribution capacity and for peak generating capacity. Since 2001, additional investment in base load generating capacity has been marginal and the reservations expressed by Engineers Australia in its 2001 Infrastructure Report Card about the higher investment required to sustain aging infrastructure has continuing relevance.

The age of base load generating capacity and growth in the demand for electricity are the key determinants of future infrastructure investment requirements. Typical electricity plants have economic lives of 40 years which, depending on economic circumstances, can be extended for short periods by renovating some components. This is demonstrated in Figure 2[21].

[17] NWC, Integrated Urban Planning, www.nwc.gov.au
[18] NWC, Water Planning in Australia: National Water Commission Position, 28 April 2008, www.nwc.gov.au
[19] Mainly State and Territory Budget Statements and infrastructure planning documents
[20] Energy Supply Association of Australia, ElectricityGas Australia 2008, www.esaa.com.au
[21] Details of the methodology used are in Andre Kaspura, Energy security influenced by age of power plants in The Magazine of Engineers Australia, Vo 80 No 9 September 2008, p44

FIGURE 2: THE DEMAND AND SUPPLY OF ELECTRICITY GENERATING CAPACITY IN AUSTRALIA ACCOUNTING FOR PLANT AGE



Existing electricity generating capacity will decrease as plants age and are retired. This is shown by the red line in Figure 2, but additional capacity will come on line as new plants under construction and planned are completed. The resulting enhanced capacity is shown as the solid green line. Converting ABARE projections in electricity demand to demand for generating capacity is shown by the blue line. About 2012, there is likely to be a balance between the demand for and supply of generating capacity. The construction period for new power plants is 4-6 years which means that unless immediate decisions are made to invest further in generating infrastructure, electricity supplies will become increasingly reliant on generating plants that have already reached their economic age. Energy efficiency programs will help to reduce the demand for additional capacity but cannot fully offset growing demand. Australia lags behind many comparable countries in its approach to energy efficiency and Engineers Australia strongly recommends that Infrastructure Australia draw to Government attention the potential of energy efficiency to limit the additional investment needed in generating capacity.

Electricity industry reform has overcome problems of over-capacity and has placed downwards pressures on wholesale prices. However, there are major issues that are still to be addressed. The most important of these is the unchecked growth in demand for electricity at peak times. Unless and until this problem is effectively resolved, there is a serious risk that peak load requirements will lead to unnecessary investment in electricity generating infrastructure and complementary transmission infrastructure. There appears to be a reluctance by energy ministers to deal with this problem, although smart metering has been under discussion for almost a decade. One issue is the conflict between policy decision makers also being generation infrastructure owners. Engineers Australia believes that that an efficient centralised electricity system is essential to Australia's future prosperity, but this requires the completion of all currently identified industry reforms.

Engineers Australia believes that there are important limitations in Australia's electricity infrastructure planning arrangements. These arrangements are geared to the supply of centralised

electricity, but neglect the important contribution that distributed electricity supply can make. Distributed electricity supply (including household and business level solar hot water and PV generation systems and cogeneration systems for commercial and industrial buildings) is treated as a reduction in demand by the managers of centralised grids. This does not encourage distributed electricity supply as an alternative to centralised supply in appropriate circumstances and ignores the savings in energy use and greenhouse emissions achieved through concerted economic application of distributed supply[22]. The result has been slow take up of distributed options and the use of cogeneration falling, even though it is more economic and lower in emissions in many cases. As with energy efficiency, lessening dependence on centralised electricity grids alleviates the pressure for additional infrastructure investment in generating and transmission capacity.

The National Electricity Market is geared to selling electricity. The revenues of generators, of transmission line owners and of electricity retailers are dependent on sales volumes. Planning arrangements mean that there is no effective competition between centralised and distributed electricity supply. Similarly, there are no incentives for stakeholders to promote energy efficiency. Engineers Australia believes that efficient management of the National Electricity Market, while essential, is not a holistic approach to the management of all electricity options. Unless energy efficiency and distributed electricity options are more fully utilised in Australia, there is a serious risk of over-investment in electricity infrastructure.

The competitive characteristics of the National Electricity Market have changed the way that new investment in generating plants occurs. Historically, investment in electricity generating plants was determined by governments aiming to achieve social and economic development objectives. Typically plants built had very large capacities; 1500 MW or more. Since the National Electricity Market began, operations the largest generating plant built has been much smaller (Callide C in Queensland in 2001at 900 MW and most have been smaller than 500 MW) avoiding the excess capacity that was widespread before the formation of the electricity market.

According to the International Energy Agency[23], economic fundamentals are now the determinants of power station investment decisions and this has meant that nearly all investment has been in peaking plants rather than base load because there has been a long term downwards trend in wholesale electricity prices. The reluctance to build additional base load capacity has seen existing plants age. In due course these old large capacity plants will be retired, and more numerous smaller plants are likely to replace them. A key factor in this context will be maintaining a stable and relatively predictable investment environment. This in turn, is dependent on the decisions to be made by the Federal Government on climate change mitigation policies before the end of this year.

As well as indicating the extent of infrastructure needed in electricity generation in Australia, Figure 2 shows the opportunity available to transform the character of electricity generation over the next 5-10 years. Engineers Australia believes that if Infrastructure Australia is disposed to recommend electricity generation projects to Government, that these should be plants using technologies leading to lower emissions. The Government has already committed to a Mandatory Renewable Energy Target and large scale projects that assist the realisation of this objective would serve as important directional beacons. Similarly, the Government has indicated a strong commitment to carbon capture and storage technologies (CCS). There has been much discussion of CCS in Australia over the past decade but very little progress. If Australia is to use CCS technology to shore up future coal exports, a much greater sense of urgency on CCS is essential.

[22] See for example the progress achieved by Woking Borough in the UK (www.woking.gov.uk/environment/climate) and now being implemented by the City of London (www.london.gov.uk)
[23] See Lynne Chester, op cit, p6 and IEA, Lessons from Liberalised Electricity Markets, Paris 2005, Ch 6, www.iea.org

6. Telecommunications

The Engineers Australia 2007 Telecommunications Infrastructure Report Card was released on 13 December 2007. Engineers Australia believes that Australia's telecommunications infrastructure is a vital component of effective economic activity and growth, has a fundamental impact on the Australian community's standard of living and is a strong influence on national productivity growth. Telecommunications infrastructure provides the means for business to communicate with suppliers, customers and employees and allows local business to access Australia's and the world's marketplace. Individuals are able to broaden their communications networks and their access to information.

Prior to 2000, "real" engineering construction work on telecommunication facilities grew by 5.7% per annum and accounted for over 20% of all infrastructure-related engineering construction work. Since then the level of "real" engineering construction work undertaken has remained high (averaging over $4,000 million per annum), but growth has been flat. As a result the telecommunication share of infrastructure work has fallen to about 15%.

The Report Card examined the quantity of fixed infrastructure for telecommunications transmission, whether there was an adequate level of access to that fixed infrastructure by customers, and the availability of infrastructure for mobile communications. Report Card assessments for fixed telecommunications infrastructure are summarised in Figure 4 and for mobile telecommunications infrastructure in Figure 4.

Figure 3

Engineers Australia Fixed Infrastructure Ranking

New South Wales		Victoria		Queensland		Western Australia		South Australia		Tasmania		Northern Territory		Australian Capital Territory	
Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank
Sydney	B	Melbourne	B	Brisbane	B	Perth	C	Adelaide	D	Greater Hobart	D	Darwin	D	Canberra	C
Hunter	E	Barwon	D	Moreton	C	South West	F	Outer Adelaide	D	Southern	D	Northern Territory - Bal	F		
Illawarra	D	Western District	D	Wide Bay-Burnett	D	Lower Great Southern	F	Yorke and Lower North	F	Northern	F				
Richmond-Tweed	D	Central Highlands	E	Darling Downs	D	Upper Great Southern	F	Murray Lands	D	Mersey-Lyell	F				
Mid-North Coast	D	Wimmera	F	South West	E	Midlands	F	South East	E						
Northern	D	Mallee	F	Fitzroy	E	South Eastern	F	Eyre	F						
North Western	E	Loddon	E	Central West	E	Central	F	Northern	F						
Central West	D	Goulburn	D	Mackay	E	Pilbara	F								
South Eastern	D	Ovens-Murray	E	Northern	E	Kimberley	F								
Murrumbidgee	D	East Gippsland	D	Far North	E										
Murray	E	Gippsland	D	North West	E										
Far West	F														

Notes	
1	Within each state or territory, regions are sorted in order of ascending Statistical Division number (not shown)
2	The area covered by each of the Statistical Divisions (including those containing capitals) are shown in the maps included with the detailed infrastructure analysis of each state and territory

Figure 4

Engineers Australia Mobile Infrastructure Ranking

New South Wales		Victoria		Queensland		Western Australia		South Australia		Tasmania		Northern Territory		Australian Capital Territory	
Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank	Statistical Division	Rank
Sydney	B	Melbourne	B	Brisbane	B	Perth	C	Adelaide	C	Greater Hobart	E	Darwin	E	Canberra	D
Hunter	D	Barwon	D	Moreton	C	South West	D	Outer Adelaide	D	Southern	E	Northern Territory - Bal	F		
Illawarra	D	Western District	E	Wide Bay-Burnett	E	Lower Great Southern	E	Yorke and Lower North	E	Northern	E				
Richmond-Tweed	E	Central Highlands	E	Darling Downs	E	Upper Great Southern	E	Murray Lands	E	Mersey-Lyell	E				
Mid-North Coast	E	Wimmera	E	South West	F	Midlands	E	South East	E						
Northern	D	Mallee	E	Fitzroy	E	South Eastern	E	Eyre	F						
North Western	E	Loddon	E	Central West	F	Central	E	Northern	E						
Central West	E	Goulburn	E	Mackay	E	Pilbara	E								
South Eastern	D	Ovens-Murray	E	Northern	E	Kimberley	F								
Murrumbidgee	E	East Gippsland	E	Far North	E										
Murray	E	Gippsland	E	North West	F										
Far West	F														

Notes	
1	Within each state or territory, regions are sorted in order of ascending Statistical Division number (not shown)
2	The area covered by each of the Statistical Divisions (including those containing capitals) are shown in the maps included with the detailed infrastructure analysis of each state and territory

Unsurprisingly, the Report Card found Australia's telecommunications infrastructure is heavily concentrated in Eastern Australia, particularly in and between capital cities. Fixed and mobile infrastructure is readily available in some areas, but in other areas is not provided due to lack of profitability for infrastructure providers. Fixed telecommunications infrastructure was assessed as "good" in Sydney, Melbourne and Brisbane, but in the remaining capital cities assessments ranged from "adequate" in Perth and Canberra to "poor" in the remaining capital cities. The assessments for regions beyond capital cities were typically "poor," "very poor" or "inadequate" with the exception of the Moreton region in Queensland. The assessments of mobile telecommunications infrastructure followed a similar pattern.

Engineers Australia believes that a key factor underlying this situation is the absence of a comprehensive national telecommunications infrastructure strategic plan or long term vision. The development of a national strategy or vision could encourage infrastructure providers to be more proactive in identifying and appraising future infrastructure projects. This is particularly relevant for areas that are poorly served. In general, the market for telecommunications services in rural and remote parts of Australia cannot commercially support duplication of (or in some cases, any) infrastructure. Providing the benefits of competition (or any service in some cases) requires a government funding contribution. In this instance, government funding can be justified on the basis of benefits to the economy and community that are derived from the availability of telecommunications

7. Funding Australian Infrastructure

Historically infrastructure in Australia has been funded from public investment and more recently, through public-private-partnerships (PPPs). It is clear from Government announcements that both mechanisms are expected to play major roles in Australia's infrastructure roll-out in the immediate

future. Greater attention must be given to the third "p" in PPPs so that this form of infrastructure provision is treated as a true partnership and not simply as a means of risk transfer. Recently a leading industry figure[24] pointed out that one of the consequences of the current global financial crisis was likely to be significantly less credit available for private sector participation in infrastructure investment. The suggestion made was that more Government investment may be required than was previously anticipated.

Engineers Australia believes this warning cannot be taken lightly and it may well be necessary for Government to contemplate increasing investment in infrastructure. However, Engineers Australia believes that the financial circumstances warrant more imaginative financial solutions. Australia is one of the few developed nations with compulsory superannuation. The Australian Prudential Regulatory Authority reports that in the June Quarter 2008 the flow of contributions to Australian superannuation funds was $7.4 billion and total fund holdings had risen to $1.17 trillion.

Engineers Australia believes that Infrastructure Australia should consider proposing to Government that Government backed infrastructure bonds or securities may be an alternative funding vehicle. Infrastructure bonds or securities can be used directly by investors, both government and private sectors, to provide the funds necessary for projects to proceed. Infrastructure bonds or securities can be structured in a way that is amenable for trading in the short term, providing a mechanism that bridges the gap between the short term requirements of individuals and their superannuation funds and the longer term funding requirements of infrastructure assets.

8. The Availability of Essential Skills

Recent analysis of the Australian Census by Engineers Australia has shown that in the five years between the 2001 and 2006, the number of engineers in the Australian engineering profession has fallen by about 6,600 individuals, with more engineers having left the workforce than having joined it. By the 2011 Census, Engineers Australia conservatively estimates that up to 70,000 engineers may retire from the workforce. New graduates from universities and TAFE could number 45,000 over the same period.

Engineers Australia believes that the future Australian skills base will not cover retirements, let alone increased demand for engineering expertise driven by growth in the Australian economy and Australia's transition to a climate friendly, knowledge based economy. Already Australia relies on immigration to provide about half its annual inflow to the engineering profession. Unless both short term and long term policies to address this issue are implemented soon Australia faces a growing dependence on overseas engineers at a time when the international competition for these skills is increasing.

Some policies will take some time to be effective. These include policies to:

- Build greater interest among primary and secondary school students in science, mathematics and engineering through exposure to applications of these disciplines to their daily lives and through interaction with engineers and scientists.
- Provide incentives for the retention of science and mathematics teachers (who have the highest turnover of all teachers) and to encourage more individuals to become qualified to teach these subjects.

[24] Wal King, Chief Executive Officer, Leighton Holdings Limited and President, Australian Constructors Association, "Building the Vision-Infrastructure to Underpin our Export Economy", presented at Infrastructure 21, Australian Davos Connection, Brisbane, 7 October 2008

- Encourage more year 12 students to complete year 12 studies with a particular emphasis on studies in enabling science and mathematics courses and on raising retention rates for boys to parity with girls.
- Reduce the cost of studying engineering at universities to individuals by providing more scholarships and HECS exemptions both by Government and by industry.
- Increase the number of opportunities to study engineering at universities and TAFEs.
- Improve post graduate program support in science, mathematics and engineering to ensure an improved flow of teachers in these disciplines to schools and to ensure that the teaching base for engineering in TAFEs and universities is sufficient for future requirements. This should include removing fees for overseas doctoral students.
- Correct the gender bias towards men in engineering by creating enhanced opportunities for women to study engineering and to enter and remain in the engineering profession.

Other policies can be effective in the short term, including:

- Policies and programs involving government, community and professional organisations to establish a technical, experience based resource for teachers and schools to encourage and support the teaching of science, mathematics and engineering.
- Policies and programs to assist skilled trades people, engineering associates and engineering technologists to upgrade their skills and to articulate to higher levels of responsibility.
- Retain engineering skills in the workforce, particularly those with family responsibilities and older engineers contemplating retirement but willing to stay on with revised responsibilities.

Infrastructure Australia needs to factor skills availability into its decisions on priority projects. Engineers Australia believes that the onus should be on project proponents to explain how they will source necessary skills in the prioritising process. Should the necessary skills become difficult to source, project costs could rise significantly and could potentially change benefit-cost ratios. As project proponents can be expected to include State and Territory Governments, as well as large infrastructure businesses in the private sector, which have an option to suggest short term ways to alleviate skills shortages.