Progress

Heavy duty

The crucial role of infrastructure planning in Australia's move toward sustainability.

National infrastructure has a direct bearing on the sustainability of the nation and our region, immediately determining industrial and economic activity, urban development and community dynamics. Today, the huge resource demands, the large associated environmental 'footprint' and long turnover times for key infrastructure mean that sensitive, long-term planning is more critical than ever before.

The built environment is considered Australia's largest asset. Given that it's where we live, where 95% of the population works and where more than 90% of the nation's GDP is generated, the technologies available for its design, planning, construction and operation will always be fundamental to the productivity and competitiveness of the economy, the quality of life of people and the ecological sustainability of the continent.[1]

Over 50% of greenhouse emissions in Australia originate from the built environment and related infrastructure, with emission levels currently growing the fastest in the building and transport sectors. Therefore, possibly the greatest challenge Australia faces to achieving the necessary deep cuts in greenhouse emissions arises from the fact that the existing built environment and its infrastructure can take as long as 100 years to upgrade.

Besides that, there are major economic implications for Australia from infrastructure decisions – infrastructure and built environment development is the nation's largest industry. According to CSIRO Sustainable Built Environment 'an increasingly large part of Australia's $100 billion-a-year infrastructure investment is spent on ageing structures like bridges, sewerage and water systems'.

The economic implications of these efficiencies are immense: according to CSIRO, a 10% reduction in construction costs will lead to a 3% growth in Australia's GDP. A 10% cut in infrastructure costs equates to 6.5% GDP growth. An

increasing part of CSIRO Sustainable Built Environment's research and development effort, therefore, is now directed to providing engineers, urban planners, architects and developers with numerous new ways to manage, retrofit and re-design Australia's infrastructure more efficiently.

A major challenge to sustainability is that current planning and design strategies for infrastructure and built environment developments have significantly increased the amount of resources consumed for specific projects. This is essentially progress, but in a counter-sustainable direction, and a trend being addressed by efficiency assessments.

Reflecting the latency problem with infrastructure planning and effect calculations, CSIRO's Dr Barney Foran argued in a recent submission for the Business Council of Australia that '[one of the barriers to sustainability is that] we do not understand that technological inertias give long lead times for a better technology to replace a lesser one.'

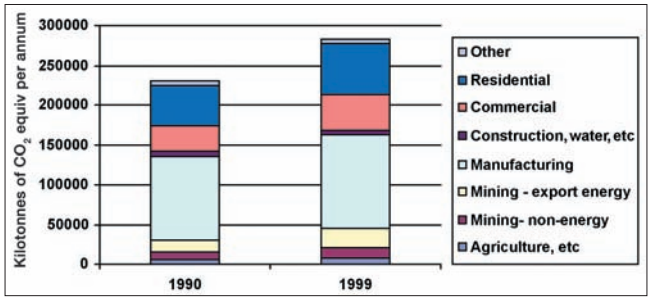
Sustainability principles, therefore, need to be at the heart of decision making and long-term planning – especially for major infrastructure projects that will have over 100-year lifetimes. The size and duration of infrastructure developments demand that they should now be much more critically thought through for efficiency and function than ever before.

Public transport infrastructure investment appears to pay off in the longer term. istockphoto

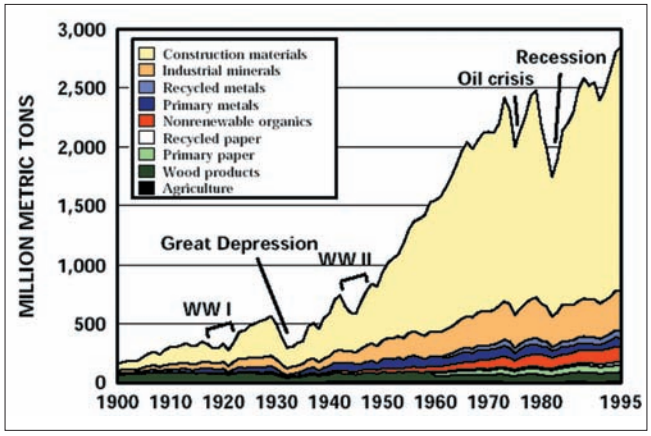
A new planning era unfolds

Many of the main planning decisions about Australia's cities and associated infrastructure were made at a time with a very different outlook from today's. As we enter a new century it is interesting to reflect on how much has changed. Fifty-five years ago, for instance, when a decision was made to build the Snowy Mountain Hydro Scheme, it was not accepted that long-term ecological damage would result from fundamentally altering the natural flow of rivers.

Similarly, since the 1950s, Australia's cities have been largely planned for the car, meaning our road infrastructure is extensive and car use is encouraged. It's long been believed that building roads is good for the economy of cities while public transport is generally a financial drain. That way of thinking, however, is being turned on its head.



A breakdown of Australian stationary energy-related greenhouse gas emissions, 1990 and 1999 by energy use sector. Australian Greenhouse Office.



US consumption of materials Courtesy of The Planning Institute of Australia

Cities that came out best in their analysis, such as Zurich, Copenhagen, Stockholm – all very wealthy capitals – are spending only 4 or 5% of their wealth on transport, and yet they're the cities putting their money into public transport.

A report to the World Bank[2] prepared by Professor Peter Newman and Associate Professor Jeffrey Kenworthy of Murdoch University in Perth found that cities that emphasise public transport use, walking, and cycling, are financially better off and actually spend less of their wealth on transport costs. Those cities pouring money into freeways, by contrast, use up to 17% of their wealth on transport costs. Cities that came out best in their analysis, such as Zurich, Copenhagen, Stockholm – all very wealthy capitals – are spending only 4 or 5% of their wealth on transport, and yet they're the cities putting their money into public transport.

It's also the case that in the last century larger scale infrastructure was assumed to be better economically, whether it be dams, wastewater treatment plants or power stations. Today that is no longer conventional wisdom either. The World Commission on Dams in 2000, for

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The interplay of infrastructure issues. AusCID

example, showed that big dams are often economically inefficient. This has led a current, growing globally, shift to micro-hydro generators.

In fact, because smaller scale infrastructure is now emerging as more efficient, and more profitable, there is a wider, historic shift occurring in the energy sector toward energy efficiency and smaller-scale distributed renewable energy networks, along with complementary changes to regulatory frameworks.

This change is the subject of *Small is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size* voted one of the three 'books of the year' for 2002 by the *Economist* magazine. Authors Amory Lovins et al. detail this historic shift:

'… as one industry team stated in 1992, 'From the beginning of [the 20th] century until the early 1970s demand grew, plants grew, and the vertically integrated utilities costs declined. Looking back on the 1990s, it is now obvious that a reversal [in this trend] has actually occurred.

'In 1976 the concept of largely 'distributed' or decentralised electricity production was heretical, in the 1990s, it became important, by 2000, it was the subject of cover stories in such leading publications as the *Wall Street Journal*, The *Economist*, and The *New York Times*, and by 2002, it was emerging as the winner in the marketplace.'

One of the many benefits of renewable distributed energy systems, such as wind and solar energy, is that they are much less vulnerable to sabotage. Our current, centralised energy and water facilities present targets that are highly vulnerable to attack.

Climate change impacts

One other significant difference today, compared to when most of Australia's major infrastructure choices were made, is that climate change is increasingly being seen as a reality, meaning the deep environmental 'footprint' of infrastructure has much more immediate bearing.

Australia's ex-Environment Minister, Dr David Kemp, at the launch of *Climate Change: An Australian Guide to the Science and Potential Impacts*,[3] summed up the current understanding when he said that the question was no longer 'Will the climate change?' but rather 'How will it change?', and then 'What can we collectively do to reduce the threat?'

Both David Kemp and Foreign Minister Alexander Downer have stated publicly that 60% reductions in greenhouse emissions will be required this century. Robin Batterham, Australia's Chief Scientist, is also calling for an 80% reduction by the end of the century.

Senator Robert Hill, recently discussing the 'footprint' of Parliament House in Canberra, summed up the potential for future lost opportunities if we ignore the significant long-term implications of infrastructure planning:

'Across Lake Burley Griffin is one of Australia's most famous buildings – Parliament House. Built at considerable cost to the Australian taxpayer, it was officially opened in 1988. Since 1989, efforts have been made to reduce energy consumption in Parliament House, resulting in a 41% reduction in energy use with the flow-on effect of reducing greenhouse gas emissions by more than 20 000 tonnes annually. This has also brought about a saving of more than $2 million a year in running costs. But the new wave of environmental thinking would have us question why these measures weren't incorporated in the design of the building in the first place, and what other opportunities for energy saving design features were missed? It's a simple example of how the environment is still considered an add-on option as opposed to being central to the way we do business.'

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The wider and now immediate impacts of infrastructure have provided impetus for the Federal Government designating 2004 the Year of the Built Environment. On 8 August 2003, the Minister for Environment and Heritage announced a House of Representatives inquiry into sustainable cities. The inquiry has inspired a significant response, with submissions from numerous bodies of note. Several new multi-stakeholder groups – such as the Australian Green Building Council and the Australian Green Development Forum – have formed in the last two years,

Dams and weirs are major infrastructure carrying apparent economic benefit, but also, in some cases, far reaching environmental effects. CSIRO Land and Water

demonstrating a broad consensus on the need for change in our thinking and practice in infrastructure development.

Similarly, peak bodies such as Engineers Australia and the Australian Council of Infrastructure and Development (AusCID) have published significant reports calling for the same shift.[4]

AusCID is the formal industry body representing over 90 major Australian companies, firms and banks that are responsible for over $60 billion of Australia's infrastructure. In May 2003, it published the landmark Sustainability Framework report assessing Australia's infrastructure priorities.[5]

A longer-term view is needed

The CEO of AusCID, Dennis O'Neill, summed up AusCID's position, saying, 'In 2001, AusCID participated with Engineers, Australia, in the preparation of the 2001 Infrastructure Report Card. The results of this analysis showed the inadequate status of some of Australia's infrastructure, a critical foundation stone of the nation's economic, environmental and social performance.'

AusCID estimates the cost of making good the under-performing infrastructure identified in the 2001 National Report Card at around $150 billion. Of particular concern are water, energy and land transport infrastructure. The Report Card showed that Australian infrastructure delivery and performance were generally unsustainable, 'even within a limited interpretation of that term … Australia cannot afford to waste investment opportunities over the next 25–50 years.'

AusCID is strongly of the view that infrastructure assets and services need to be provided on a 'whole of asset-life' perspective (rather than periodic re-assessments) to optimise capital and maintenance outcomes, allocate delivery and operational risks sensibly, and deliver better value for taxpayers.

Better environmental and social outcomes are also essential. It is increasingly necessary to account for the external, indirect, environmental and social 'costs' of infrastructure delivery, such as raw resource demands, reduced emissions and waste, security, increased operational efficiency, better safety, and improved amenity. Increased stakeholder contribution through the life of an infrastructure facility to the identification and monitoring of agreed sustainability indicators is highly desirable.'

The early 21st century may see the end of centralised electricity grids. istockphoto

The *Sustainability Framework for the Future of Australia's Infrastructure Handbook 2003* is AusCID's contribution to developing a new framework for the future development of national infrastructure. The handbook attempts, as Dennis O'Neill stated, 'to present a comprehensive case for sustainable development of infrastructure as a driver for innovation, and in line with AusCID's strategic goals, namely:

1. A nationally coordinated infrastructure strategy, including a National Infrastructure Advisory Council to articulate a 25-year strategy and a 50-year vision;
2. Integrated planning of land use, new works, maintenance and project management;
3. Accelerated application of private capital for infrastructure investment in lieu of undesirable levels of public debt; and
4. Acceptance of sustainable infrastructure as a core component in any socially responsible investment (SRI) portfolio.'

AusCID further points out that critical, longer-term, sustainable infrastructure planning now faces new and considerable administrative challenges given the ongoing disposal of government infrastructure assets to private interests. Some heavy investment responsibility falls to these private holders – who have profit-driven, short horizons – but yet governments retain responsibility for strategic planning.

According to Dennis O'Neill, 'While governments claim to develop long-term investment strategies, they do not commit the necessary capital to ensure the investment occurs and frequently amend strategies to suit political expedience. Nor can they assure private investment to plug the gap so long as investors shirk unsympathetic taxation and regulatory systems.'

This government–private responsibility for investment in key facilities is complicated. It will require careful steering, constant re-assessment, and perhaps revision, if the nation is to move forward quickly enough on its responsibilities for sustainable infrastructure.

● **Mike Smith**

1 Collis, B. (2002). *Fields of Discovery: Australia's CSIRO*. Allen & Unwin.

2 The database for this study included statistics on over 60 cities globally in developing as well as developed countries. This has been updated in a more recent global study for the International Public Transport Users Association: Kenworthy, J., *et. al.* (2003). Transport Energy Use and Greenhouse Gases in Urban Passenger Transport Systems: A Study of 84 Global Cities.

3 Australian Greenhouse Office (2003). Climate Change An Australian Guide to the Science and Potential Impact.

4 Engineers Australia has published *Towards a Sustainable Energy Future: Setting the Directions and Framework for Change,* (2001), *Sustainable Energy Innovation in the Commercial Buildings Sector*, (2001), and *Sustainable Transport: Responding To the Challenges,* (1999).

5 Australian Council of Infrastructure and Development Sustainability Framework Handbook (2003). (www.auscid.org.au)

More information:
AusCID: http://www.auscid.org.au

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