Symposium Proceedings Summary
Day 1, 30 September 2013
Cutting through the infrastructure impasse: ways and means

Key Points

- The quality of Australia's infrastructure strongly reflects the quality of government.
- There is considerable consensus among policymakers and practitioners regarding the major challenges for effective long term infrastructure planning and management.
- Greater focus and bold leadership is needed on better prioritising infrastructure projects, taking an integrated system-wide perspective to planning, reducing unnecessary regulatory impediments, facilitating more private sector capital and utilising more access charging to fund investment.
- Better network governance such as adopting corporatised frameworks for public assets has the potential to yield major efficiency and transparency benefits.

Themes and objectives

- Efficient and high quality infrastructure is critical to Australia’s ongoing productivity performance and standard of living. However, Australian governments have typically been slow in delivering Australia’s big infrastructure requirements. While there have been some worthwhile advances in the policy and institutional frameworks governing the planning and prioritisation of new projects, there are still unnecessary delays (and excessive costs) in getting projects underway.

- If this is not addressed going forward, there was a strong feeling that this could be diminishing our national confidence in ‘getting things done’ and impeding our ability to meet the important economic challenges ahead.

- Several major contributors to the ‘infrastructure impasse’ were identified, including:
  - **Sub optimal project selection** — There is still much work in improving the way projects are selected, with political influences often supplanting rigorous cost benefit appraisal, especially for some major new infrastructure investments.
- **A need for system-wide thinking** — Planning frameworks often fail to consider infrastructure as a ‘system’. Without properly considering the full range of network interdependencies, relevant infrastructure decisions are more likely to be fragmented, lack proper coordination and be subject to unnecessary political interference.

- **The costs of infrastructure development are too high** — Australian infrastructure costs rate among the highest in the world and this was perceived as contributing significantly to project delays and underinvestment in key areas. High costs were recognised as a favourable by-product of a strong economy and a requirement for more urbanised development but avoidable policy related rigidities were also major factors. This includes complex, lengthy and unpredictable approvals processes for major infrastructure projects.

- **Fiscal constraints need new approaches** — There is a major shift underway in terms of how governments procure infrastructure. Tight budget limitations, a need to safeguard government credit ratings, and high development costs require alternative and novel funding models. This will ideally include ways of facilitating Australia’s large pool of superannuation funds, recycling capital from publicly owned brownfield assets, developing corporate bond markets and rethinking the appetite for government debt finance.

**Reflections and perspectives**

- Discussants raised several central ideas and concepts regarding future infrastructure development and planning.

- A major issue was there appears considerable scope to improve the overall management of public infrastructure assets by treating them in a more integrated way. Many assets (such as roads) have no clear asset owner and are not carried on balance sheet like private assets. Importantly, this contributes to reduced transparency regarding the costs of funding and maintenance, and associated liabilities. Adopting a **corporatised framework** to manage public assets has the potential to yield major governance improvements and promote better allocative decision making.

- Australia’s pool of **superannuation funding** is vast (at $1.6 trillion, the 4th largest in the world), exceeding the size of the national economy. Tapping into this capital was considered fundamental to meeting the country’s future infrastructure requirements and parallels were drawn to higher levels of infrastructure investment made by many overseas pension funds. Some important qualifications were noted however:
  - This included the high level of self-managed superannuation funds in Australia (at around $450 billion), which lacks the aggregate scale to match major infrastructure requirements (although the associated development of a corporate bond market could help).
  - There is also a need to recognise that sufficient liquidity is crucial for super funds to meet their fundamental purpose of providing an income stream for retirees — and this issue will only become more acute as the population ages.

- The ongoing growth of large Asian countries like **China and India** represents the largest external shock confronting Australia. This process, which has drastically raised Australia’s terms of trade from historic averages, has a long way to run. In order to fully capitalise on the strong growth in Asia’s middle classes, there are implications for productivity and infrastructure. In particular, developing a productive and resilient economy is pivotal.

- Further, Sydney and Melbourne, as Australia’s largest and most international cities, need to increase their contribution to national productivity. This will mean improving the way these cities function and their ability to cater for a larger population base. Building new infrastructure will be
needed but a key element will be to introduce appropriate infrastructure pricing. This will clearly need strong political leadership.

- The advent of ‘big data’ is currently receiving considerable attention across many fields. For infrastructure, the sensorisation of networks and the addition of smart systems and processes can enable innovative analytic methods and generate substantial opportunities for driving efficiencies — including in areas we are yet to foresee. The explosion of big data represents an exciting development for infrastructure providers and users which will be pivotal to optimising how networks operate.

**Industry, policy and research implications**

- In light of the major infrastructure issues facing Australia, participants raised some key areas for ongoing policy attention.

- There was a need for ongoing policy and regulatory reform processes, including where asset sales and greater cost reflective pricing were involved, to better inform the public of the potential economic benefits. In effect, this necessitates ‘bringing the community along’ and contesting simplistic arguments against worthwhile reforms. The issues surrounding a second Sydney airport highlight the fraught political environment which typically needs to be managed. It was noted that hypothecating divestment proceeds as part of a recycling capital program has been successful in NSW for tackling community opposition to sensible asset sales.

- Regulatory reform to introduce better price signals for infrastructure services was seen as a major ongoing challenge. There was considerable optimism that a new competition reform agenda would build on crucial infrastructure market development, including for roads, electricity and water, where a more forward looking framework was needed. Some speakers argued the political challenge is not so insurmountable as commuters are understanding the benefits of tolling.

- Infrastructure planning is inherently long term and involves significant capital investment. It thus involves significant risk for government and private sector participants. The industry has moved forward on many of the issues raised during the symposium, but substantial areas for improvement remain. A more system-wide approach, better land use planning, and greater political willpower to take difficult decisions will be essential.
Day 2, 1 October 2013
Improving on the 80/20 rule for infrastructure research

Key Points

- Infrastructure systems are characterised by deep interrelated connections and will require new data, tools and multi-disciplined approaches.

- Big data has the potential to dramatically boost infrastructure network performance and ‘unlock’ new ways of optimising how cities function. “If only Sydney knew what Sydney knows”: capturing and utilising this latent information will be crucial for preserving its global city status.

- Data volumes are growing exponentially and infrastructure providers will increasingly be able to find signals and insight in unstructured and disparate data sources.

- Australia’s freight task is set to increase rapidly over next few decades. Freight networks have often been subject to more state-based rather than system-wide planning. Greater attention is needed to preserve freight corridors as well as the ‘first and last mile’ of freight systems.

- A key part of any freight solution is benchmarking service delivery performance at world’s best practice.

- More demand for roads should not be met simply by building more roads. This was referred to as ‘dumb policy’, and a broad range of mass transit options like high speed rail should be considered.

Reflections and perspectives

- Discussants emphasised that infrastructure shapes society and the economy on a broad scale and at a profoundly deep level. Networks are much more than physical systems and have crucial social dimensions as well.

- Modern infrastructure systems can be considered as ‘hybrid artefacts’ which are part engineering and part agents of socio-economic change. From this perspective, changes in the approach to network design and operation are required — especially to better anticipate perverse outcomes and design more effective and resilient infrastructure systems.

  - Communities and infrastructure adapt and evolve together and there are complex interactions and feedbacks between the two. These interactions have become more pronounced in recent decades as technology (eg mobile crowd sourcing applications) and political changes have fostered individual choice and new markets and devolved institutions and networks.

  - ‘Hard’ systems may show unexpectedly complex dynamics and ‘soft’ systems can quickly respond to disruptions in unpredictable ways. Importantly, because of the reflexive nature of systems, prediction is extremely challenging and may well be impossible.

- A major objective of infrastructure development is to design systems for resilience and growth. It is widely recognised that greater connectivity is a feature of modern networks. This makes
networks more robust but less directly controllable. On the other hand, more centralisation allows greater control but increases the potential for failure.

- A number of dynamic factors affecting the adaptability of networks are particularly important: climate change, population growth, technology advances, changing consumer expectations and economic influences. Again, a better understanding of the prime causal relationships is needed, particularly in terms of the dynamics between human-technical-natural systems.

- **Electric vehicles** are a major area of emerging technology with key infrastructure implications. Widespread take-up of EVs is still many years away due to issues like 'range anxiety' and a requirement for a large (and expensive) charging network. It was emphasised that, due to the existing sunk networks supporting petroleum fuelled vehicles, EVs (or any other alternative energy) will not only have to prove superior but essentially 'blow away' the incumbent technologies. And because petrol vehicles are continually making incremental advances in efficiency, it will likely be some time before there is another dominant car technology.

- Automated driving technologies will also influence road networks. These have considerable potential for making roads safer, optimising existing road capacity in conjunction with smart road technologies and allowing people to be more productive during their travel time, including during peak periods.

- Addressing **traffic congestion** in Australian cities poses a major economic policy challenge. Discussions emphasised that more demand for roads should not be met simply by building more roads. This was referred to as 'dumb policy', and a broad range of mass transit options like high speed rail should be considered. Among other benefits, this could reduce exposure to supply disruptions or price spikes in global oil.

- **Big data** can help cities meet future growth challenges. Discussants highlighted how cities could be transformed by this development as decision makers were able to identify patterns and act on new insights with the objective of optimising infrastructure systems. Because cities are fundamentally complex systems, big data and crowd sourcing can be illuminating in ways never before possible. It was argued that it was hard to think of a better area where academics, industry and government could work together to drive good decisions and promote liveable communities.

- Australia must pursue a **world class freight logistics** network because of the distances between our major population centres and localised remote areas.

- Freight logistics is a complex issue involving technology, land use planning and economic policy perspectives. It is vital to get the price signals right to encourage an efficient expansion of the freight network and to overcome bottlenecks, particularly in Sydney and Brisbane where, for instance, the freight rail network is shared with passenger rail. There are a number of bottlenecks that need to be addressed immediately. One is the freight rail link into the Port of Brisbane and the other is at Port Botany.

- A key part of any solution is benchmarking service delivery performance at world’s best practice — something which is largely absent in policy dialogue. Without monitoring the performance of the freight network it is difficult to make progress to improve productivity and reduce costs. In this regard, the National Heavy Vehicle Regulator has a role to play, ensuring the continued efficiency improvements derived from B-Double and B-Triple trucks and large freight terminal centres at the edges of our major cities.

- Finally, several policy and governance areas were identified to improve freight logistics going forward:
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- the continued and enhanced role of Infrastructure Australia
- finalisation of the National Land Freight Strategy
- improved planning frameworks at state level
- progress of the National Transport Laws
- greater focus on the quality of infrastructure spending.

Day 3, 2 October 2013
Wicked problems – Dynamic solutions

Key Points

• Infrastructure planning is essential to Australia’s future. The process must be better informed by ‘population geography’ (i.e., what is the size of future populations, their age structure and where will they live). Land use planning will help shape cities and ensure efficient settlement practices.

• Better infrastructure planning will be increasingly important to attract capital inflows to address Australia’s future gap of national savings and investment (i.e., current account deficit). ‘No country can expect another country to fund its current account deficit’.

• We tend to think more about what cities are and could be, rather than what they are for.

• Cities are not just places, they are ‘ecosystems’. We need different frameworks for thinking about how cities function and shift focus from mechanical mobility to ‘accessibility’ of services and opportunities.

• Infrastructure utilities must evolve dramatically. ‘Customers want outcomes not products’. There should be more scope for independent signals to enable innovation for meeting customer needs. A single market operator/designer regulatory model will need to adapt.

• Improving the governance of infrastructure networks will be absolutely critical for future infrastructure planning and design. No one governance solution will be optimum for all. A major issue is to enhance the resilience and adaptability of networks, especially in the face of challenges such as climate change, energy security and civic health.

• Disruptions to infrastructure networks and facilities represent a clear and present national security issue. Cyber threats on top of threats to physical security can potentially amplify the level of overall risk. Private ownership of infrastructure is raising concerns about how to address and respond to national threats.

Reflections and perspectives

• Discussants spoke at depth on the need to adopt new frameworks for thinking about cities.
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- We tend to think more about what cities are and could be, rather than what they are for. Another blind spot is an inclination to consider infrastructure as simply ‘hard’ assets and underplay the crucial social dimensions. Accessibility (i.e., the ability for people to interact positively) is central to the role of cities. This needs to be at the forefront of our planning and design frameworks and a trans-disciplinary approach is needed.

- Design thinking needs to take a long term perspective, perhaps in the order of 100 years. While political cycles tend to stand in the way of longer term planning, an overarching vision which could guide future infrastructure thinking would help. Indeed, politicians need to get into a mindset that they have a period of ‘stewardship’ over a country’s infrastructure.

- **Computational techniques** utilising large data sets offer enormous potential for understanding complex systems (e.g., transport flows, spread of infectious diseases). Large evolving synthetic information resources are a particular application of big data. These can offer many layers of services for policymakers (including real time analysis), and it is important that these are responsive to actual evidential policy formulation.

- Modern infrastructure networks are so complex that to develop them efficiently and sustainably with the natural world, new approaches to research, policy, investment and execution will be essential. Knowledge of infrastructure systems in an engineering sense is relatively mature. In contrast, multidisciplinary systems design and governance are less well developed. We need to find ways of bringing together knowledge from different aspects of infrastructure governance which can facilitate effective responses to such factors as:
  - adaptation and mitigation to climate change
  - energy and water security
  - city and national infrastructure
  - public health.

- No one governance solution will be optimal for all. Finding a balance between the responsibilities of local and national authorities will be a major policy challenge.

- There were a range of views regarding how **next generation utilities** are likely to transform in the future and what might be the major challenges for policy and regulatory settings.
  - In electricity markets the development of wind generation and rooftop solar will continue to place pressures on network planning. There will almost certainly be a mix of generation technologies in the foreseeable future (as opposed to one dominant technology). Regulators and policymakers will need to allow for more contestable metering, support for new retail relationships with customers, greater access to customer data and the emergence of storage technologies. This will require responsive and smart regulation.
  - Increased ‘peakiness’ of electricity demand, ageing network infrastructure and tight reliability requirements have also driven significant increases in electricity distribution costs. Grid capacity utilisation has fallen, but not on the hottest and coldest of days. Consumers are highly driven by reliability.
  - The terms ‘utilities’ and ‘infrastructure’ tend to have passive connotations. In the future, providers will need to be more innovative and customer focused.
Considerable discussion centred on the national security risks presented by disruptions to existing and future infrastructure networks. There was a strong consensus that these dangers needed to be elevated in the broader policy and community consciousness. Many relevant ‘tail risks’ are currently underestimated. Some key national security issues were examined including:

- Cyber threats on top of physical dangers to networks were effectively amplifying overall risks. There is currently not enough information on the likelihood or severity of potential cyber dangers. The nexus between the physical and intangible infrastructure should be a core area of risk assessment.

- Infrastructure as a system needs to be considered as part of a larger system like energy. Whole-of-supply-chain risks are pertinent, particularly as resource systems are increasingly global.

- There will always be threats and it is impossible to guarantee networks are 100% safeguarded. However, it is important to ensure that systems are resilient. Increased private sector involvement in infrastructure provision raises different security challenges, including the adequacy of controls and safeguards entrusted to private operators.

- Speakers also emphasised that broader perspectives and active policy attention were necessary on the security implications of infrastructure. It is impossible to achieve acceptable levels of national security without global security. Indeed, we all share a global infrastructure and the sources and consequences of threats are often global.
Day 4, 3 Oct 2013: Infrastructure and private capital. The perfect match – fact or fiction?

**Key Points**

- There are numerous unexplored research challenges which can yield important benefits to infrastructure provision. Major challenges often centre on the interaction between the economics of cities and the economics of infrastructure — especially the way in which infrastructure decisions affect economic outcomes in the long run.

- Getting more infrastructure ‘bang’ from Australia’s superannuation funds is a major factor in financing projects and driving future productivity gains. This requires action on many fronts.
  - The development of an infrastructure bond market,
  - increasing the predictability of policy and regulatory frameworks,
  - introducing more user-charging and minimising undue political interference in infrastructure decisions will all be important.
  - Taxation breaks were not widely considered by many to be a primary policy instrument.

- Increasing costs of infrastructure in Australia are a complex equation and are being driven by various factors. In addition to higher physical infrastructure costs, approval processes, quality and safety standards, and bid costs are escalating cost pressures. Greater policy attention on ensuring tender specifications and scoping requirements are value-focused is needed.

- The Way Forward Session will be reported separately.

**Reflections and perspectives**

- There are many areas where research into infrastructure issues has the potential to yield significant practical policy lessons. Many of these go beyond conventional disciplinary boundaries.

- Infrastructure needs are essentially driven by settlement patterns and, conversely, decisions on infrastructure influence where people live and work. Little research attention has been applied on these respective effects which essentially combine the economics of cities with the economics of infrastructure.

  - Australia’s urban form has changed dramatically in the last 40 years. There has been excess dispersion in our cities as a consequence of two main effects. Tax subsidies for housing and land have encouraged excessive land holdings. Also, there has been a tendency to under-price resources such as roads which are complements to urban dispersion. Policies have then basically fought against this dispersion, principally in the form of land use controls (eg land releases and developer charges).

  - Working Australians have two main assets: their jobs and their houses, both of which are location dependent. Changes in road pricing, for instance an effective congestion charge, will alter house prices and raise transport costs. This will give rise to wealth effects which
effectively alter the net income of jobs and need to be considered alongside the benefits of reduced commuting.

- Policymakers will ideally want to know more about how infrastructure decisions alter economic outcomes in the long run. There is reasonably good data on many of the issues but a tendency to think about them in a siloed form.

- Governments are recognising that it will be increasingly difficult to finance the nation’s infrastructure from their own balance sheet. Harnessing the capital available from Australia's superannuation funds represents an enormous opportunity. Super funds are well suited to large, stable low risk asset investments.

- There are some key challenges and hurdles:
  - Achieving better certainty of returns is important for attracting more private/superannuation investment. Australia's toll roads are small by world standards (sections of roads rather than bigger road networks). Patronage forecasting is more reliable on a network, less reliable on part of a network and much less reliable on a single motorway.
  - There is a fundamental issue with the patchwork of toll roads in Sydney and Brisbane, with unit price differences of up to 40 times. This makes it difficult to forecast patronage and difficult for users to evaluate value.
  - Australian super funds are well placed to increase the level of domestic investments. They have a better understanding of the economic and policy environment. There are also no cross country risks as well as certain withholding tax benefits. However risk correlation with current domestic asset holdings is higher and needs to be considered within the context of overall portfolio risks.

- Many ideas for increasing private capital in infrastructure were floated:
  - promotion of a long term corporate bond market as being essential
  - de-politicising project selection processes
  - introducing greater user charging
  - ensuring regulatory frameworks are clear and predictable
  - promoting a more sophisticated discussion with the community on the benefits of access charging, tolling, privatisation and private sector service provision
  - governments needs to tailor their asset sales to suit the type of buyer, eg super funds seek safe low-risk long-lived assets.

- There is a general consensus that governments are paying too much for infrastructure — that is, costs are being unduly inflated.

- The cost picture is complex, with myriad issues at play:
  - There have been increases in the costs of physical assets, including steel, cement, bitumen, energy etc, and skilled labour. Much of this inflation has been due to the investment phase of the mining boom. There has also been more brownfield project investment in urbanised areas which is more expensive.
Amplifying these cost increases have been various policy-related factors. These involve higher bid costs and regulatory costs, where specifications and standards have essentially crept higher.

The timing of large public capital works has also been questioned, especially in relation to the mining boom. Issues of building 'too much, at the wrong time' raised important issues regarding the macroeconomic effects of government capital programs.

In order to maximise the value of taxpayer spending on infrastructure (particularly in light of major fiscal constraints), each of these issues will require renewed focus. The SMART Infrastructure Facility is currently undertaking a key study into the drivers of Australian infrastructure costs to inform industry and policymakers.

Contact

Garry Bowditch  Chief Executive Officer
garry_bowditch@uow.edu.au