smart
infrastructure facility
UNIVERSITY OF WOLLONGONG

GREEN PAPER

INFRASTRUCTURE IMPERATIVES FOR AUSTRALIA

smart.uow.edu.au

EXECUTIVE SUMMARY

Australia has a good track record of 'getting on with the job' of building infrastructure. However the time has come to better combine our national 'can do' spirit with greater 'smarts' in the key capabilities required by governments to meet future challenges.

Foremost of these challenges is the need to extract more value for each infrastructure dollar invested. Meeting the expectations of the community by providing more infrastructure with less financial resources is fundamentally important to Australia's future.

The strategic horizon of the Green Paper concerns the next 50-100 years. This is the timeframe that should be the focus for all governments in planning for the nation's future and to meet the needs of up to 70 million residents by the end of the century.

SMART believes the infrastructure imperatives and recommended actions set out in the Green Paper articulate the need to adopt important principles and institutional capabilities which have been systematically overlooked by successive governments.

Key to long term infrastructure planning is the role of the customer; they want service outcomes not just more projects. The Green Paper argues that service outcomes should be enshrined in all infrastructure procurement. For example, when a toll is charged for a road, there should be a service standard in place such as a certainty of travel time undertaking. Without service standards a toll is just another tax.

The Green Paper identifies three infrastructure imperatives and contains 18 recommended best practice actions:

- Establish an Australian Infrastructure Market (AIM)
- Enhance Attractiveness of Infrastructure Private Funding
- Overhaul Infrastructure for Radical Innovation and Productivity Growth.

Despite the clear need for additional infrastructure, the immediate challenge for Australia is to invest more efficiently through transparent decision making and higher quality information. Many assets have no clear owner and are not carried on balance sheets like the private sector. This prevents proper operational and financial data being available to decision-makers.

The Green Paper calls for the establishment of an Australian Infrastructure Market (AIM) that will ensure all the different parts of the infrastructure system work together – from markets, land use, planning, approvals, project prioritisation, funding, financing, delivery and operation.

The AIM will enable both the market for projects and the market for infrastructure service outcomes to co-exist. The benefit of this is that buyers (e.g. governments) can seek problem-solving solutions that are focused on ways of achieving a particular service outcome without the presumption of building a new asset. It also invites customer focussed solutions that are more cost effective through better use of existing infrastructure wherever possible.

There are a number of factors required to improve the attractiveness of infrastructure as a long-term investment and to enhance the attractiveness of infrastructure for private funding. These range from addressing infrastructure with high design and construction costs, low asset utilisation owing to poor demand management, reliance on narrow revenue base such as user charges and absence of value capture mechanisms when adjacent land values increase from an infrastructure investment (e.g. around major transport hubs).

Finally the Green Paper calls for an overhaul of infrastructure for radical innovation and productivity growth through the establishment of a national land bank. The identification of critical land corridors for cities and regions is an important and critical action for government. Ensuring land is available to connect cities and regions will benefit the community by enabling optimal design, delivery and minimum project costs into the future. In addition, national standards for knowledge sharing for major infrastructure projects are required to boost performance, lower costs and to ensure learning from the past are embedded in future initiatives.

INTRODUCTION

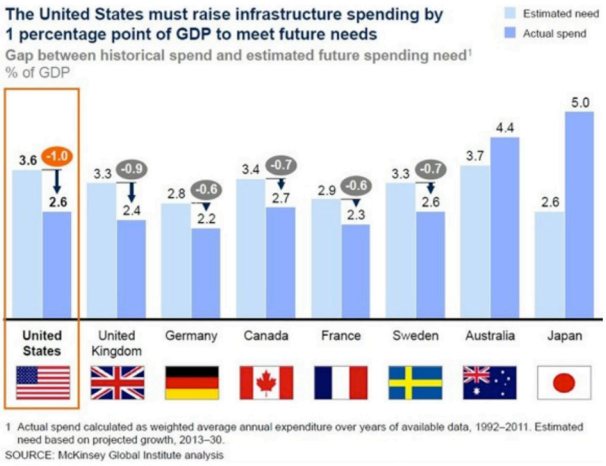
The challenges facing Australia are unique and distinguish it from the rest of the world. Growth and prosperity has been an important characteristic of Australia's narrative since the GFC, with GDP growth rising 13 per cent, compared with Europe contracting two per cent and United States modest growth of about six per cent.

Infrastructure is an important enabler of growth by facilitating the movement and exchange of people, ideas and business. The time has come to recognise that the simple argument, more infrastructure is better in Australia, no longer applies. Australia is being increasingly questioned about the size of its infrastructure spend and the allocation of it.

The simple argument, more infrastructure in Australia is better, no longer applies when productivity growth is a goal.

The McKinsey Global Institute for example (Figure 1) provides estimates of the gap between historical infrastructure spending and future need. It argues Australia and Japan are spending in excess of estimated need, while key OECD nations are underspending. One consequence of this is nations spending in excess of need are likely to experience lower productivity and will be scrutinised for their allocative and technical efficiency of capital. While reforms in some sectors of infrastructure are giving better recognition of economic efficiency considerations for future investment (energy and telecommunications) other areas are in need of more consistent reform (transport and water).

Figure 1: International Comparisons of Historical Infrastructure Spending



Despite the clear need for additional infrastructure, the challenge for Australia is the need to invest more efficiently and consistently over the economic cycle.
When multiple major resource projects are occurring simultaneously the opportunity cost of public infrastructure projects is very high and requires more careful management. This was recently demonstrated with cost escalations of national broadband network and many transport projects.

Competition for scarce resources — such as complex project management skills used for building a motorway — are also needed for major resource projects. The result can be an extraordinary lift in prices and costs. This is why it is important that governments cost their projects properly and are astute about whether to proceed or not.

BOX 1
WHY AUSTRALIA MUST URGENTLY REFORM INFRASTRUCTURE

Long term planning and reform of governance processes for infrastructure has been missing in public policy for a considerable period of time. The consequences of 'short sightedness' have yielded low productivity, high costs and an inability to cut through with structural change to deliver the right infrastructure for Australia.

The strategic horizon for 'Infrastructure Imperatives for Australia' Green Paper concerns the next 50-100 years. This is the timeframe that should be the focus for all governments in planning the nation's future to meet the needs of up to 70 million residents by end of the century.

Wasteful spending on projects has been a recurring problem that has failed to boost productivity and efficiency of the economy. All sectors must take responsibility for this, where projects regularly lack strategic objectives, fail to define the problem they seek to address, and where policymakers are preoccupied with ribbon cutting rather than making sound investment decisions for the nation. Together with opaque decision processes this has permitted poor and at times random decision making to persist.

The lack of planning has left Australia's major cities with a legacy of escalating congestion and exorbitant costs to address infrastructure problems. The mismatch between land use planning and transport infrastructure provision have fed back on each other with dispersed settlement patterns requiring more roads, rail, schools and hospitals than might otherwise be needed; and lack of provision of land corridors has added to costs of providing transport infrastructure. This unvirtuous cycle demands too much inefficient use of capital, and is failing to meet the needs of business and the community.

With the slowing in demand and lower prices for resources, Australia is confronted with an adjustment task to sustain living standards in a less favourable international environment. The time has come for urgent reform and better planning of infrastructure so Australia can get more for its infrastructure dollar and take advantage of the economic opportunities that present it.

In addition to the economic structural adjustment task, Australia must also look ahead to the impact of strong population growth and ageing. Over the next half-century, the long-term population projections of the ABS indicate that Australia will need to accommodate an additional 26 million people.

The population pressure points are evident in all the major cities with Melbourne, Perth, Brisbane and Sydney being particularly significant. For example, Sydney's population will almost double and Perth, Brisbane and Melbourne will more than double by 2061. All these additional people in both major metropolitan and regional centres will require jobs, housing and health and transportation services.

Compounding the challenges of a much larger population is the fact that it is also aging rapidly. The proportion of people aged over 85 years is currently two per cent of the population, and this is expected to treble by 2101. The consequences of this need to be addressed for public service delivery and the infrastructure networks required for older Australians.

The key to Australia's infrastructure success in the future will be competitive markets, transparent governance processes informed by high quality information on infrastructure need, and incentives to be customer focussed through service outcomes. The basic building blocks for the future include establishing the right institutions, governance arrangements and practical logistics planning such as reservation of land corridors to ensure both quality of life and international competitiveness of the nation.

The purpose of this Green Paper is to help set the framework for Australia to respond to the challenges and seize the opportunities that come from the Asian Century.

Managing the very high opportunity cost of major infrastructure projects in Australia is critical and is a focus of the Green Paper.

While there are obvious shortfalls in infrastructure, this is most evident in major cities with congestion, delays and loss of amenity. Australia needs to ensure it directs its next dollar of investment to achieving greater productivity, value for money and align project outcomes with services and community expectations.

The quality of Australia's infrastructure plan relies on its ability to minimise the high opportunity cost of major public projects.

While there are large demands for more and better infrastructure from the community, no government will be able to fulfil these requirements. Fiscal limitations of government set very clear boundaries on what can be done. Dealing with increased scarcity of public capital is key and the need for greater prioritisation of projects and capital expenditures is critical. The quality of Australia's infrastructure plan will be increasingly important in attracting and retaining foreign capital.

The task ahead for Australia and the purpose of this Green Paper is to reframe the infrastructure challenge so it deals with the contemporary reality of the situation. Australia must extract more from its infrastructure, and approach the task without biases coloured by the past. Future infrastructure decisions must be more carefully assessed in a transparent and rigorous way, recognising community buy-in and commercial hurdles are critical for private capital to be involved.

Jurisdictions need to be frank about their infrastructure successes and failures; and demonstrate they are capable of learning lessons from the past and transfer best practice.

Australia is a vast continent with a small population. This makes the infrastructure reform all the more urgent. The Australian Federation is not a mere alliance of many separate parts. The infrastructure of this country must seek to unify the nation with the ceaseless flow of people, goods and services, ideas and communication. Australia's next most important infrastructure project is to build an institutional structure that delivers national infrastructure solutions for national problems. This is critical to the efficient and effective mobilisation of resources and growth.

BUILD COMMUNITY CONFIDENCE: INFRASTRUCTURE IS PERSONAL

Community participation and confidence in the infrastructure planning and delivery process is of critical importance. Cogently connecting major decisions with the betterment of people's lives will help prevent inappropriate political influence and lift confidence that proper planning against clear objectives is taking place. Together this can help unlock the infrastructure impasse and attract new funding sources and much needed innovation.

Infrastructure assets and services have a very privileged and intimate role to play in our society, because they provide the platform for conducting modern life. For example water for living, energy for growth and employment and technology for connection and coordination. Shifting the focus of infrastructure from its physical attributes to the services it is intended to deliver is a critical reform that will require a different procurement approach and culture of planning within government. The dividend of this reform, however, will better reflect the community's expectations and help justify the investment and disruption caused during construction.

Australia has an alarming lack of information, data and no culture of review (benchmarking) for its infrastructure. There is an urgent need to build a body of evidence that will inform future infrastructure policy and decisions of past lessons and successes.

The reality is that while infrastructure can be partnered with the private sector, when there is a failure or breakdown the community will almost always turn, as a last resort, to the government to fix it. Hence the partnership between the government and the private sector must be robust and directed at maintaining strong community confidence.

The increasing reliance on private investors to fund public infrastructure places an even greater imperative on governments to have the ability to interact, negotiate and secure outcomes in the best interest of the community. This requires strong institutional architecture, including anti-corruption agencies. Governments need to be open and transparent about the relationship with private sector participants and the value such participants provide to overall infrastructure development.

Jurisdictions need to be frank about success and failure; and to demonstrate they are capable of learning lessons from the past and can transfer best practice from other jurisdictions.

Australia has an alarming lack of information, data and no culture of review (benchmarking) of the performance of its infrastructure. There is an urgent need to build a body of evidence that will inform future infrastructure policy and decisions of past lessons and successes.

Public trust and confidence within a jurisdiction appears to improve when there is demonstrable success of a previous project. Jurisdictions should recognise public trust and confidence is cumulative, and every project successfully delivered builds trust one-step at a time. Therefore, infrastructure planning must ensure a very high level of competence in delivery, and genuine and in-depth consultation occurs to take account of the diversity of opinion and need in the community. It is also necessary mechanisms be in place to help assist those affected in an unfavorable way from an infrastructure intervention. Fairness of treatment of those that lose and moderating the excesses of gain can be important towards building trust and confidence in the infrastructure planning and delivery process.

Public infrastructure in the eyes of the community expects a very high level of accountability and transparency. Of course government must ensure that legitimate commercial-in-confidence considerations are protected but this should not be used as a means of impeding the ability of the community to have an appropriate degree of scrutiny.

The Infrastructure Imperatives & Recommended Best Practice Actions

Set out below is the infrastructure imperatives identified as critical for Australia. No one imperative is a solution in itself and the reform and change agenda requires all three imperatives to be progressed simultaneously to achieve the outcomes required of the community, industry and international capital markets.
The three imperatives are:

1. Establish an Australian Infrastructure Market (AIM)
2. Enhance attractiveness of infrastructure for private funding
3. Overhaul infrastructure for radical innovation and productivity growth

Each imperative is supported with recommended best practice actions detailed in Boxes 2-4. These are discussed below.

IMPERATIVE 1: ESTABLISH AN AUSTRALIAN INFRASTRUCTURE MARKET

What is an Australian Infrastructure Market (AIM)?

Australia must ensure through the AIM that all the different parts of the infrastructure system work together – from markets, land use, planning, approvals, project prioritisation, funding, financing, delivery and operation.

What problem is it seeking to address?

Governments typically approach infrastructure procurement on a project-by-project basis and as a result their interactions with the market are often uncoordinated and fragmented. When demand from government is lumpy and 'stop-go' in nature this can exacerbate the cost of infrastructure and lower the quality of market responses. This has direct implications for the way the infrastructure market configures itself and the ability to evolve and mature to ensure best possible services and innovation can be delivered from bidders to procurers.

Australia must ensure through AIM all the different parts of the infrastructure system work together.

The AIM is seeking to address a number of biases in infrastructure planning which distort quality decision-making. For example:

- Infrastructure often moves very quickly from project inception to engineering blue prints. The difficulty this raises is that infrastructure is rapidly designed without proper consideration to the problem it is intended to address.
- Infrastructure is treated as a static-physical asset and is designed and procured without proper consideration of the possibility it will deliver a service, require a value proposition and be relevant to customers.
- Building new infrastructure first as opposed to renovating and seeking better use measures of existing infrastructure.
- Under investment in spare capacity and interface with other infrastructure (especially multiple transport modes) so bottlenecks emerge too soon after project completion.
- Infrastructure procurement expertise and knowledge is often siloed in purchasing departments and lack whole of government coordination. Teams can be poorly trained for dealing with non-traditional procurement techniques such as public private partnerships.

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

The cost picture is complex, with a myriad of issues at play:

- There have been increases in the costs of physical assets, including steel, cement, bitumen, energy and skilled labour. Some of this inflation is due to the investment phase of the resources 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 crept higher without proper cost-benefit assessment (e.g. electricity reliability standards).
- The timing of large public capital works has also been questioned, especially in relation to the resources boom. Issues of building 'too much, at the wrong time' raised important issues regarding the macroeconomic effects of government capital programs.

How would it work?

Markets are very effective mechanisms, because they provide an efficient matching service between those that demand a good/service and those best able to supply it. A question regularly overlooked concerns the infrastructure market and how it could be shaped to better serve the needs of government and in turn the community.

The AIM is seeking to broaden the current scope of infrastructure procurement and liberate innovation and productivity. The main focus currently is on projects and the construction of assets. The AIM seeks to introduce another dimension that is concerned with the services to be delivered to customers (users) by these assets. In effect, the AIM will enable both the market for projects and the market for infrastructure service outcomes to co-exist. The benefit of this is that buyers (e.g. governments) have a need, they can seek problem-solving solutions to be focused on ways of achieving a particular service outcome without the presumption of building a new asset. The intention is that the AIM will establish a hierarchy where service outcomes will dictate both the design and need for a project.

AIM will establish a hierarchy where service outcomes will dictate both the design and need for a project. This will liberate innovation in private sector and lift productivity of infrastructure assets.

For the AIM to operate efficiently, it will require a high quality of information about the market for infrastructure, the network of assets and customer characteristics and requirements. While all efficient markets require good information, infrastructure assets are unique and long-lived and therefore the information requirements are very rich.

A national infrastructure market is made up of the following key characteristics[1]:

- long term pipeline of projects,
- strong private sector participation and ownership,
- a shift to outcomes and service delivery,
- innovation, responsiveness and ability to scale-up,
- full cost recovery,
- regulations which protect the long term interests of consumers if needed in the absence of market competition.

Infrastructure planning is a much more sophisticated and nuanced activity than simply publishing a list of possible future infrastructure projects.

The key challenge for government is to change its policy model from a simple purchaser of infrastructure to that of a market maker for infrastructure. A market maker in infrastructure is concerned with the efficiency of the price discovery process within the market, ensuring there is good deal flow so information is exchanged to match buyers and sellers; as well as signalling future capability requirements to the market.

All efficient markets require good information, infrastructure assets are unique and long-lived and therefore the information requirements are very rich.

Market making is multi-dimensional. It involves the development of asset standards and supporting protocols for design and systems to ensure they can operate with the 'things' around them. The market should be further supported by national infrastructure data that connects demographics of a region with its land use regimes and infrastructure requirements. For example, shaping cities with urban renewal precincts that require transport connectivity and employment lands. The coordination of transport modes is essential in Australia owing to the different levels of government responsibility. The lack of coordination is most evident with the interface of airports with land transport modes.

1. Tony Shepherd, Chairman Business Council of Australia, keynote address to SMART Business & Policy Dialogue, 30 September 2013, Sydney.

Government as a market maker is concerned with the long-term development of the infrastructure market, so through competition and innovation it is assured of acquiring global best practices from its suppliers at the best possible price. To do this requires clear framework that establishes market behaviours and a culture of innovation conducive to the long-term asset life cycles of infrastructure and the government's objectives.

The key challenge for government is to change its procurement model from a simple purchaser of infrastructure to that of a market maker focussed on expanding supply capacity and responsiveness.

Such a market framework should transcend individual projects and integrate the overall market so supply chains can be organised and adapt as required. Central to this is the ability for the market to innovate in physical design, construction, funding and governance (business models) without intrusive and prescriptive interventions from government.

Governments also have a responsibility to orchestrate their procurement which may result in a series of projects which are complementary in the construction process and have the capacity to produce significant savings. For example, a tunnelling project produces 'spoil' and its removal will drive-up costs; while a nearby surface road construction project could benefit from the 'in-fill' with significant net savings in terms of dollars and possibly carbon emissions. Apart from basic logistics associated with major projects, the continuity of projects enables private sector to recruit and train highly skilled personnel and source equipment that can drive higher productivity and bring innovative new dimensions to the project.

How does it impact decision makers?

Detailed technical solutions for infrastructure should only be developed when the procurer has provided clearly articulated objectives describing what the intended intervention is meant to do, the problem at hand and how success is to be measured. In other words, projects that have clear strategic objectives and purpose have a higher probability of their designs and technical specifications being fit for purpose. Governments appear to find this very difficult to do, particularly as institutional arrangements can prevent holistic and interdisciplinary viewpoints necessary for a complex solution to be effective.

Project selection needs to be undertaken as part of a portfolio approach that reflects a broader consideration of the infrastructure system. For example, road congestion could be addressed in many different ways including regulatory, pricing and deploying different assets such as public transport alternatives.

Evaluation of a project in isolation of the connected infrastructure network around it could lead to inefficient use of capital and underperform to community expectations. For example, transport infrastructure such as road and rail are heavily influenced by land use changes and related shifts in population, but are often planned in isolation of each other. Consideration of non-physical interventions like regulatory change and pricing can be also helpful towards improving the efficiency of an intervention.

Sweden and Australia's energy sector for example have in place institutional processes that are more agnostic towards greenfield projects. Both regimes attempt to incentivise policymakers and the market to consider behavioural change/better use measures of existing infrastructure including demand management. This is important in signalling to the AIM about innovation for non-capital intensive solutions and incentives to champion it.

Customer Service Outcomes for infrastructure procurement is a missing link that can trigger innovation and improve attractiveness for private funding.

Procuring for outcomes is an essential feature for better infrastructure planning and operation of a national market. It is important because the physical infrastructure should be designed to satisfy the needs of customers, through the delivery of services that meet certain pricing and quality (reliability) considerations.

Outcomes based procurement should incentivise private sector and government to address interface problems (i.e. how one asset or network relies on another to deliver a service or solve a problem, for example, road and rail interchange for freight or passengers).

This ensures maximum transfer of benefit to the bidding process without the rigid procurement formats of tradition models. Where design, inputs and processes are already specified in detail by the procuring authority, it has the potential to strangle innovation from bidders and deny the opportunity to gain network (system) wide benefits.

All infrastructure procurements should enshrine customer service outcomes (CSO) and benchmark to international best practice for their entire asset life. For example, without CSO there is high likelihood that by 2030 Sydney could add WestConnex to its already growing list of roads (eg M1, M2, M4, M5) with a peak hour exceeding 10 hours per day.

What has been missing with many major infrastructure projects, especially road transport is to enshrine CSO that will govern the long-term operation of these assets. For example, in the case of WestConnex these must be expressed to reflect community expectations on average speed, travel time and the consistency of the service during the peak hour. No such process appears to exist to inform the long-term operational requirements of this important new national infrastructure.

These CSO should form a central element of the AIM and empower the private sector to innovate with business models and technology to meet these benchmarks over the long term. Using tolls to help fund the project makes service benchmarks all the more important, otherwise commuters may not get value for money; a toll becomes just another tax and community support will evaporate.

Projects that have clear strategic objectives and purpose have a higher probability that their design and technical specifications will be fit for purpose. Governments appear to find this very difficult to do.

Market structures, competitive pricing and contestable ownership must occur within well-developed frameworks without political interference. As government subsidies are often involved in infrastructure procurements which assist with service delivery to certain groups (i.e. excessive cost recovery may make it prohibitively expensive) complete transparency is necessary to help drive efficiency.

Governance: At the core of good governance for infrastructure planning is the commitment to transparent, rigorous, evidence based and coordinated use of resources. This includes a strong culture to review past projects and supporting analytical tools upon completion, in order to understand why under and over performance occurred relative to initial expectations. Dedicated whole-of-government central infrastructure agencies that provide a centre of excellence for procurement and management of infrastructure can be effective, especially dealing efficiently with private sector.[2]

2. Partnerships Victoria in Australia is a good example of this approach.

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[3]. This contributes to reduced transparency of 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.

Many assets (such as roads) have no clear asset owner and are not carried on balance sheets like private assets.

As recently noted by Infrastructure Australia[4], there is no explicit or implicit objective of economic efficiency for roads in decisions to invest. Therefore the incentive to invest and align with end user pricing is absent, in contrast to regulation for ports and airports. The tax interaction effects and externalities appear to be very important to efficient pricing and regulation of roads and is not being adequately addressed by policymakers.

Improved data: There is a particular need for improved operational and financial data on infrastructure; this information is highly fragmented and in siloes across the three layers of government and building contractors. Short-term cash accounting, rather than proper balance-sheet accounting standards evident in the private sector, further hampers informed decision-making. Developing a balance-sheet perspective which focuses on the financial metrics — assets, equity, and liabilities for maintenance backlogs — and operational metrics (focused on delivery and operations), could enable a much more effective planning and policy dialogue.

Increasing **costs of infrastructure** in Australia are reducing competitiveness and ability to attract private capital.

Increasing costs of infrastructure in Australia are a complex equation and are driven by various factors. Escalating cost pressures are higher physical infrastructure costs, approval processes, quality and safety standards, and bid costs.

Greater policy attention is required to understand the cost drivers and how greater value for money can be achieved for taxpayer dollars.

3. Ergas, Henry, Submission to the Productivity Commission inquiry into infrastructure costs, January 2014.

4. Infrastructure Australia, 2013 State of play Report: Australia's Key Economic Infrastructure Sectors, December 2013

Many cost drivers are hidden, at times subtle, and cumulatively can be very significant on overall project costs. These include changes to technical standards (over-engineering), environmental and planning requirements, safety standards and treatment of contingencies in contracts. Understanding possible links between long-term land use planning and infrastructure costs is fundamental.

Short-term cash accounting, rather than proper balance-sheet accounting standards, evident in the private sector further hampers informed decision-making.

Quality of project delivery teams, particularly project directors, is also very important. Greater policy attention is needed to ensure tender specifications and scoping requirements are value driven and outcome focused.

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 policymakers in New South Wales and Queensland.

There is a particular need for improved operational and financial data on infrastructure; this information is highly fragmented and in siloes.

Governments that are clear minded on market structures and pricing, will find it much easier to consider financing options for infrastructure[5]. It is therefore essential governments have clear principles about whether they want private capital involved, and to what extent. Innovation, efficiency and risk transfer are often motivating factors, but these need to be tested to see if the market structures are appropriate to achieve the best result against the stated objectives.

Who is responsible for it?

Establishment of the AIM is an important role for the federal government and ultimately COAG, supported by consultation with the private sector and annual independent performance benchmarking.

5. McKinsey Global Institute: Infrastructure Productivity: How to save $1 trillion a year.

BOX 2
RECOMMENDED BEST PRACTICE ACTIONS FOR IMPERATIVE 1: ESTABLISH AN AUSTRALIAN INFRASTRUCTURE MARKET (AIM)

1. **Reconfigure Infrastructure Australia (IA) to be governed and funded as a COAG institution and commit to a 10 year rolling pipeline of major infrastructure projects.**

2. **Articulate direction and purpose of the AIM with a 'Statement of Intent'.** For example, it should espouse attracting global best of breed participants, centrality of private capital, reward for innovation and 'capital-lite' solutions, efficiency driven by clearly defined outcomes from government, respect for the customer, transparency and integrity in all market interactions.

3. **All infrastructure projects should enshrine customer service outcomes (CSO) and be benchmarked to international best practice for the entire economic life of an asset/network.** Instilling CSO into the AIM will reinforce discipline for value for money, stress test governance arrangements and improve attractiveness for private funding by ensuring relevant services are being delivered to the community.

4. **Federal, state and territory governments should commit and deliver a 'National Infrastructure Balance Sheet' within two years** to address serious deficiencies in the quality of information which prevents evidence based decision-making.

   The National Infrastructure Balance Sheet should operate as an online (geospatial) portal to enable timely, accurate, consistent and transparent data of all major infrastructure assets, networks and relevant demographic and land use statistics. Improved information on current state of assets, operational expenditure and maintenance backlog would improve the quality of decision making.

5. **Governments should adopt more open and transparent information, along with incentive structures to help enhance the discovery process for 'capital-lite' solutions** based on innovation and crowd sourcing.

IMPERATIVE 2: ENHANCE ATTRACTIVENESS OF INFRASTRUCTURE FOR PRIVATE FUNDING

What does enhanced attractiveness of infrastructure for private funding mean?

There are a number of enablers required to improve the attractiveness of infrastructure as a long-term investment. These range from addressing infrastructure with high design and construction costs, low asset utilisation owing to poor demand management, reliance on narrow revenue base such as user charges and absence of value capture mechanisms.

In addition, the risk allocation model for major greenfield projects can be inappropriate in some circumstances especially with respect to patronage risk and better enabling capital recycling of mature assets from government through establishing a long term corporate bond market.

$80b of long term capital is available globally and looking for investment opportunities yet there is an inadequate number of projects and an absence of a pipeline of future bankable projects.

What problem is it seeking to address?

There is approximately $80b of long-term capital, available globally, looking for investment opportunities. While there is no shortage of capital for infrastructure, there are an inadequate number of projects and an absence of a pipeline of future bankable projects.

High and uncertain costs are also very relevant to the incentives for private investment in public infrastructure. It is difficult for prospective private investors to manage greenfield and patronage risk with new assets such as toll roads and renewable energy projects. And with the additional impost of a risk premium for rising project construction costs, it is difficult for projects to pass stringent commercial testing.

Arresting the loss of long-term planning capabilities is critical to lower infrastructure costs. All jurisdictions now face scarcity of available land, especially separated transport corridors for freight and passengers in already built-up areas. As demonstrated recently with the Southern Sydney Freight Line, right of way to passenger services impacts design, longer delivery time and much higher capital and labour costs.

The lack of land-use planning in cities has required expensive tunnels when surface access would have been cheaper. Environmental regulation further exacerbates costs without a proper evaluation of benefits.

The infrastructure industry does not function well as a 'short-order' cook. It needs greater long-term certainty with projects and service requirements coming to market.

Urgency has played an unnecessarily big role in Australia resulting in 'too much, too late'. The Brisbane Western Corridor Recycled Water Pipeline is a case in point. Before the situation became potentially catastrophic, long-term planning with the community on the merits of water recycling could have been a far cheaper way of securing water security.

An institutional mind shift is required where infrastructure should not be just a counter cyclical economic policy past time. The infrastructure industry does not function well as a 'short-order' cook.

It would be beneficial to the nation to expand the supply capacity of the infrastructure industry and for governments to engage it in a more consistent manner with a 10 to 15 year project pipeline.

Greater certainty of major projects with accompanying service outcomes would provide a better environment for investment in capabilities to drive innovation, streamline delivery, purchase productivity-enhancing equipment and invest in highly trained personnel. Together, these all help in enabling a competitive and sustainable AIM that can reduce the high opportunity cost of previous public infrastructure projects.

In addition, infrastructure projects such as roads in Australia are often too small, more often than not below investment grade for debt financing and fail to have the appropriate risk/return profile to justify equity investment. Addressing these problems will enable Australia to tap these large funding pools and better fulfil its infrastructure requirements.

Australian super funds are well placed to increase the level of domestic investments in infrastructure but have not been either convinced or able to do so. This is despite their being a better understanding of the economic and policy environment relative to overseas. 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.

Most infrastructure is connected to a broader network and considerable distortions exist in the use of existing infrastructure which is often free compared to a user charge for the new. Toll roads are a typic al example of the impact of this distortion and the result is considerable uncertainty about patronage and revenue risk on a new road.

How would it work?

Governments must focus on how they will service private capital during the long period of investment in infrastructure. This means a willingness to allow full cost recovery for the infrastructure provided, permit prices to reflect the incentive to invest and where appropriate use their balance sheet to fund shadow tolls.

Increasing the predictability of policy and regulatory frameworks and minimising undue political interference in infrastructure decisions will be important. Taxation breaks are not widely considered to be a policy instrument of choice.

There are some key infrastructure challenges and hurdles that would focus the attention of policymakers *(the transport sector is used as an example to draw out the principles which could be applied to other areas of infrastructure*):

- Achieving better certainty of returns is important for attracting more private/superannuation investment:
  - Patronage forecasting is more reliable on a network, less reliable on part of a network and much less reliable on a single road.
  - Australia's toll roads are small by world standards (being just sections of roads rather than bigger road networks).
- There is a fundamental issue with the patchwork of toll roads in Sydney and Brisbane, with unit price differences of up to 12 times[6]. This makes it difficult to forecast patronage and difficult for users to evaluate value that together diminish investor attractiveness.

6. Gardiner, John Transport Reform – A Straw Man Solution, Paper Presented to the ITS Australia Conference, Gold Coast, 21 September 2011.

How does it impact decision makers?

There is still much work to do to improve the way infrastructure projects are short listed and prioritised. Short-term political influences often supplant longer-term considerations and displace rigorous cost benefit appraisal, especially for some major new infrastructure investments. This undermines the quality of projects and their suitability for private funding.

The fast track reforms required are:

- Implement a consistent methodological approach to cost benefit appraisals to enable proper comparisons of projects across all levels of government.
- Ensure full transparency of all cost benefit appraisals for public projects short-listed for consideration, inclusive of those rejected.
- Instil a culture of continuously improving project evaluation; through an independent post review of all cost benefit analysis upon immediate completion and again five and 10 years post completion.

Australia has been missing the benefit of an ongoing review and evaluation of its infrastructure programs to inform and improve future decision-making.

Three basic market conditions are needed in Australia to innovate new funding models.

- Long-term pipeline of major projects, coupled with a consistent track record of translating 'intentions' into 'bankable projects'.
- Outcome driven procurement without prescriptive input focus.
- Long term capital market development.

NSW is an exemplar for recycling capital from publicly owned brownfield assets, however the full benefit of this cannot be realised without long bond market.

Regulatory changes are required to enable superannuation and pension funds to be more effectively deployed to fund infrastructure.

Absence of a long-term corporate bond market is preventing Australian institutions to match debt funding with long-term asset investment.

- NSW is an exemplar for recycling capital from publicly owned brownfield assets, however the full benefit of this cannot be realised without long bond market.

- The $450b in SMSF cannot adequately access infrastructure debt vehicles, and would be better able to do so with a long-term bond market.

Onerous liquidity and investor portability requirements make investing in long-term liquid assets — such as infrastructure — very challenging for superannuation funds.

The high level of self-managed superannuation funds in Australia (at around $450 billion) are made up of many small accounts which lack the scale and ability to access infrastructure deals. These regulatory requirements will need to be balanced against long-term opportunities for national savings to do 'double duty'.

Value Capture.

Infrastructure development is often characterised with significant externality benefits. Funding models which broaden the revenue base, from an intervention by capturing value uplift from land development and agglomeration benefit, can be useful in improving the commercial return and public benefit.

Transport projects can have significant uplift to land value. Jurisdictions such as Hong Kong, Japan and the United States have identified innovative tax and regulatory mechanisms to achieve value capture. These mechanisms increase the commercial incentive to invest and assist with public finance at the same time.

Peak Demand.

Governments and investors in major infrastructure projects in Australia and the OECD are facing a significant conundrum. Peak demand is rising. This can be seen by road congestion in capital cities during the major commuter periods, and the very high demand in electricity consumption during extreme weather events.

In many circumstances additional capacity can be a very marginal investment, and in the case of major cities adding road capacity may not be possible in a dense urban centre.

There is significant benefit to society from improving the asset utilisation of existing infrastructure before committing to greenfield expansion.

The convention for planners and investors is that infrastructure networks appear to be experiencing heightened peak demand and attenuating average demand. Under-utilised assets in the non-peak period can result in unattractive investments. There are significant benefits to society from improving the asset utilisation of existing infrastructure before committing to greenfield expansion.

The impact of peak demand on future investment decisions is becoming increasingly problematic.

More rational pricing of infrastructure can be beneficial in demand management, capital works budget and investor attractiveness through better asset utilisation.

In line with the AIM, governments should be increasingly focused on ways of attracting private funding to provide technology platforms that incentivise and enhance asset utilisation. Improving the interplay between renovations of existing infrastructure, introducing new technology to improve performance and private funding of this technology is an important priority for government.

Congestions on roads in the peak hour reflect a number of broader institutional characteristics including impact of penalty rates on working after hours.

Intelligent Transport Systems (ITS) has proven itself to enhance asset utilisation in the United Kingdom, where ITS achieved reductions of 25 per cent in journey times, 50 per cent in accidents, 10 per cent pollution and four per cent on fuel consumption on the M42.[7]

Who is responsible for it?

There is a strong case for investors in infrastructure to be more active in informing governments about their requirements and sensitivities for investing in infrastructure.

Australia has been missing the benefit of an ongoing review and evaluation of its infrastructure programs to inform and improve future decision-making.

With superannuation and pension funds showing more interest than ever before in infrastructure projects and governments increasingly willing to let the private sector in, now is the time to start a dialogue on how this can be best achieved.

7. UK Highways Agency

BOX 3
RECOMMENDED BEST PRACTICE ACTIONS FOR IMPERATIVE 2: ENHANCE ATTRACTIVENESS OF INFRASTRUCTURE FOR PRIVATE FUNDING

6. Lifting the quality and attractiveness of projects for funding will rely on fast track reforms of project selection, prioritisation tools and methodologies.

   Governments should encourage greater transparency of cost benefit analyses for projects approved, as well as those considered as candidate projects but not approved. This will enhance the understanding of the market as to why projects proceed and the reasoning for not proceeding with others. This information is important to increasing the sophistication of infrastructure market participants to assess future direction and capabilities required of them.

7. There is an urgent need to undertake **a national review of the way cost benefit analysis and other analytical tools have performed in guiding previous decisions about infrastructure**. The focus should be concerned with reconciling what was expected in terms of costs and benefits before a project was commissioned compared with what transpired upon completion, and then again at five and 10 years post completion.

8. Australia can recapture its global leadership as an innovator for infrastructure funding by committing to:
   - Long-term pipeline of major projects matched with a track record of translating 'intentions' to 'actions'.
   - Focus procurement on outcomes, services and innovation.
   - Align infrastructure funding and capital market development through long-term bond market development, superannuation and pension fund preferences.

9. Investment attractiveness can be enhanced through higher asset utilisation. **Projects concerned with meeting peak demand (such as certain electricity distribution projects) should be better managed by programs that shift demand away from the peak period using pricing and other incentives should be more actively supported**. Sharing the benefits of technologies and IP that favourably shape demand, renovate existing assets and delay new capital investment should be a high priority for the AIM.

10. Governments must be more realistic to the funding support and guarantees needed to justify long-term private investment in certain infrastructure projects. **Recommendation 1 with its 10 year rolling project pipeline should also provide an early indication of likely financing and funding sources**. This will provide strategic information to the AIM on where the focus should be and the outcomes sought.

11. **Price signals should play a greater role in supply and demand for infrastructure, and where possible full cost recovery is desirable to improve the attractiveness** of private investment and use of technology to enhance asset utilisation to delay unnecessary greenfield projects.

12. **Greater attention to value capture measures** is desirable where adjacent areas benefit from an infrastructure investment. This should be actively considered to improve investment and community returns.

13. All governments in Australia should have a proactive approach to the superannuation industry in seeking their input to investment opportunities and impediments to infrastructure investment. **The federal government should examine the regulatory and taxation considerations relevant to long-term investing generally, and with infrastructure specifically**.

IMPERATIVE 3: OVERHAUL INFRASTRUCTURE FOR RADICAL INNOVATION AND PRODUCTIVITY GROWTH

What does radical innovation mean?

The infrastructure sector is grappling with big changes, with its users becoming more informed, assertive and vocal. Customers want outcomes not products.

Placing 'outcomes' as the central premise in infrastructure procurement is a radical innovation because it shifts the focus from the physical attributes of an asset to what is the required service to be delivered over the long-term. When free of prescriptive inputs imposed by governments, the use of outcomes invites greater innovation to drive the efficiency and productivity of infrastructure.

The identification of critical land corridors for cities and regions is an important and appropriate action for government.

For example, road or rail transport that is procured to guarantee a minimum travel time; energy generation and poles and wires that meet a particular level of reliability for a given price; and hospitals which ensure access to a doctor within a given period of time. In such circumstances the physical requirements of the assets become subservient to the service outcomes, and enable much better alignment with community expectations.

Service outcomes are ultimately about ensuring the management of assets and networks cannot be done in a silo and they require a broader system response. For example, congestions on roads in the peak hour reflects a number of broader institutional characteristics including impact of penalty rates on working after hours; urban dispersion from under-pricing of roads and access to cheap land on urban fringe; the impact of stamp duty on property sales which acts as a barrier to change residential location with changing employment opportunities. All these reflect system wide parameters impacting the demand for infrastructure and need to be managed in a coherent framework.

What problem is it seeking to address?

Infrastructure must evolve like the rest of the economy it serves. The biggest impediment to better productivity growth in infrastructure is that policymakers and business continue to deal with it as a series of individual projects rather than as a system.

Infrastructure construction has not had the benefit of innovation experienced in sectors like manufacturing. Expensive, slow and disruptive construction processes in infrastructure is the norm and this should be questioned. Options to change this through innovation and technology including greater use of modular construction should be championed.

How would it work?

The transition of the infrastructure system to greater innovation and productivity growth is simply about ensuring global best performance for service delivery and investment performance.

Policymakers must set out (for infrastructure providers) clear milestones demonstrating continuous improvement is occurring and must use these benchmarks to reassure the public the program of capital expenditure and maintenance is directed and purposeful towards these service outcomes.

Project approval processes and land acquisition is a significant factor in determining the speed and efficiency of infrastructure delivery. Jurisdictions such as New South Wales, United Kingdom and India have made significant institutional changes to reduce project costs by streamlining their approval process.

An important innovation for government agencies in accelerating approval processes is to ensure high quality decisions reflect whole of government considerations. It is critical that governments are consistent and have early stage approval mechanisms in place to avoid delays and revisions later. Multidisciplinary teams with project contractors closely involved are an effective way of improving the speed and quality of the process.

The identification of critical land corridors for cities and regions is an important and appropriate action for government. Ensuring land is available to connect cities and regions will benefit the community by enabling optimal design delivery and minimum project costs into the future. While some jurisdictions have land corridors in place, these need to be reviewed and assessed for adequacy in light of the changing demographic and settlement patterns.

There is too strong an institutional and political disposition to assume building new infrastructure is best.

The role of the national corridors that transcend state and administrative boundaries is becoming time critical as

cities and states increasingly rely on each other for efficient movement of people, goods and services. A national land bank is required to fund the acquisition of corridors based on rigorous land use and population demographics outlook for the next 50 and 100 years.

An important innovation for government agencies in accelerating approval processes is to ensure high quality decisions that reflect whole of government position.

As a community we must expect a higher level of planning capabilities and competency about the future of infrastructure. The five key principles of good governance that should drive all future deliberations of integrated infrastructure planning and management are:

- Whole of government planning and coordination
- Enhanced accountability
- Independent review
- Increased transparency
- Better information and analytics as we know very little about the system of infrastructure, and if a change is in fact an improvement

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.

How does it impact decision makers?

Decision makers should be more agnostic about the types of infrastructure solutions required, and enable the market of professional service providers to innovate and bring forward proposals which are compliant with the service outcomes required.

The focus of the infrastructure process should be about institutional alignment of government agencies to the delivery of outcomes. These service outcomes will be consistent with the government's broader social economic objectives of the government.

Singapore and Switzerland represent jurisdictions that have achieved a high level of organisational interaction to the delivery of infrastructure.

While there has been some acknowledgement that renovating existing infrastructure is highly beneficial for productivity growth through better use measures, there is too strong an institutional and political disposition to assume building new infrastructure is best. Instead, Australia must adopt an institutional mindset that constructing new infrastructure should only be an option when relevant existing infrastructure is fully utilised and all other brownfield options have been exhausted.

Big data has the potential to dramatically boost infrastructure network performance and 'unlock' new ways of managing how cities and regions function.

"If only Sydney knew what Sydney knows"[8] refers to the benefits of capturing and utilising the latent information of the people the infrastructure is serving. It will be crucial to directing what to build or renovate, where this should occur and when it should happen. This innovation can be an essential ingredient in ensuring long-term productivity, resilience and wellbeing of Australian cities and regions.

Australia must adopt an institutional mindset that constructing greenfield infrastructure is a last resort option when all other options have been exhausted — without this productivity growth will not be achieved.

Australia needs to ensure its policy and decision makers across the value chain of infrastructure have access to the most up to date tools, concepts and knowledge of research relevant to their field. A recent survey and research shows the infrastructure sector faces significant capacity and capability challenges in critical areas of prioritisation, planning, scoping and delivery[9].

Despite a strong focus on financial capital within the sector there has not been a matching focus on development of human capital. Successful projects rely on skilled and capable people to be agile and adaptive to create value and efficiencies. When this is missing projects fail to demonstrate innovation, risk management and inevitably result in cost overruns.

Infrastructure sector faces significant human capital challenges in critical areas of prioritisation, planning, scoping and delivery which require urgent national standards for knowledge sharing across jurisdictions and sectors.

8. Committee for Sydney, #wethecity, Issues Paper 2, August 2013

9. Better Value Infrastructure Plan, Infrastructure NSW (prepared by ARUP) April 2012.

A significant impediment to better infrastructure is the deep isolation that exists within government agencies during the planning and delivery of infrastructure. There is an inadequate degree of cross agency collaboration and knowledge sharing occurring. The further challenge is appropriate knowledge capture and transfer from past projects.

Big data has the potential to dramatically boost infrastructure network performance and 'unlock' new ways of optimising how cities and regions function.

Reforms in the way professionals are trained and developed for infrastructure is critical. This is not only for extracting greater efficiencies and driving more agile and adaptive solutions, but also to address the serious demographic challenges of an aging engineer and technical workforce. These problems have been further compounded with reduced skills within government and increased use of outsourcing models for design and construction of infrastructure.

The most important task for government in creating capabilities for infrastructure provision is through a multi-discipline, multi-party, multi-sector collaboration and a joined up approach to deliver more innovative, cost effective and fit for purpose solutions[10]. An Australian Infrastructure Market (AIM) requires actors of this calibre to perform at every level so that there is emphasise on transparency, sharing of information and transaction efficiency across the market and the industry's supply chain.

National standards are required for all infrastructure projects to develop knowledge sharing systems and frameworks which can improve the efficacy of information sharing within the sector, and across sectors. This framework should also enable greater inter-jurisdictional knowledge sharing and collaboration.

Executive education can help leverage knowledge and assist in building analytical skills and positive behavioural changes with people in industry, government and academia.

Policy and decision makers who have undertaken additional training and education in latest concepts and methodologies would give surety to the infrastructure sector that best practice was being applied.

All three levels of government and private sector actors need to ensure their current and future personnel are equipped with state of the art skills in planning, procuring and managing infrastructure.

Who is responsible for it?

Federal, state and territory governments with a stronger interface between universities and the private sector.

BOX 4
RECOMMENDED BEST PRACTICE ACTIONS FOR IMPERATIVE 3: OVERHAUL INFRASTRUCTURE FOR RADICAL INNOVATION AND PRODUCTIVITY GROWTH

14. Project approval processes and land acquisition are significant factors in determining the speed and efficiency of infrastructure delivery. Governments should give greater recognition that future decisions on infrastructure can be compromised, and productivity growth put at risk through higher costs and sub-optimal design without proper reservation of land corridors both within cities and regions and between states and territories.

    It is vital that **IA be authorised and funded to establish a national land bank for critical infrastructure corridors** necessary for national movement of people, goods and services. An integrated land use and demographic simulation model which can provide detailed analysis of the likely settlement patterns over the next 50 — 100 years should inform the acquisition and reservation of land corridors.

15. Improved coordination of projects through the AIM will be beneficial in attracting competition, raising confidence and retaining top tier designers, engineering and funding teams to drive innovation. **Australia must release itself from the attitude that infrastructure is a counter-cyclical fiscal tool and have a more consistent long-term presence in the marketplace.**

16. Federal and state governments should **establish an office of Public Private Partnerships** in a central agency such as, for example, the Treasury. International experience suggests centralised high competency infrastructure procurement agencies in government are the best way to attract private capital and high quality infrastructure service providers.

17. **National standards are required for all infrastructure projects to develop knowledge sharing systems** and frameworks which can improve the efficacy of information sharing within the sector and across sectors. This framework should also enable greater inter-jurisdictional knowledge sharing and collaboration.

18. **All three levels of government along with industry stakeholders need to ensure their current and future personnel are equipped with state of the art skills in planning, procurement and managing infrastructure as part of a system and market, not just as individual projects and assets.**

    The criteria for the next generation of professionals will require far more than technical analysis and design. They will need: the ability to synthesise and share information from multiple and eclectic sources; to deploy ‘big data’ skills and; use collaboration as a tool for competitive advantage.

The SMART Infrastructure Facility at University of Wollongong is one of the largest infrastructure research centres in the world.

PARTNER WITH SMART

The SMART Infrastructure Facility is one of the largest infrastructure research institutions in the world. It is defining a new area of research called 'integrated infrastructure planning and management'. As part of this commitment, SMART has established a wide range of national and international partnerships with government, industry and research institutions to undertake problem solving through applied research. If your organisation is looking for a world-class intellectual partner for infrastructure issues and long term strategic planning, please contact us.

Mr Garry Bowditch
Chief Executive Officer

+612 4298 1241
garry_bowditch@uow.edu.au

Prof Pascal Perez
Research Director

+612 4252 8238
pascal_perez@uow.edu.au

Ms Tania Brown
Chief Operating Officer

+ 612 4298 1431
tania_brown@uow.edu.au

http://smart.uow.edu.au

Follow SMART on social media:

twitter facebook YouTube

Facebook – Smartinfrastructure
Twitter – SMART_facility
YouTube – SmartTv1
Feedback welcome at smartgreenpaper@uow.edu.au