PARTNERSHIPS

2018 INFRASTRUCTURE AND INVESTMENT CONFERENCE

INFRASTRUCTURE PARTNERSHIPS AUSTRALIA

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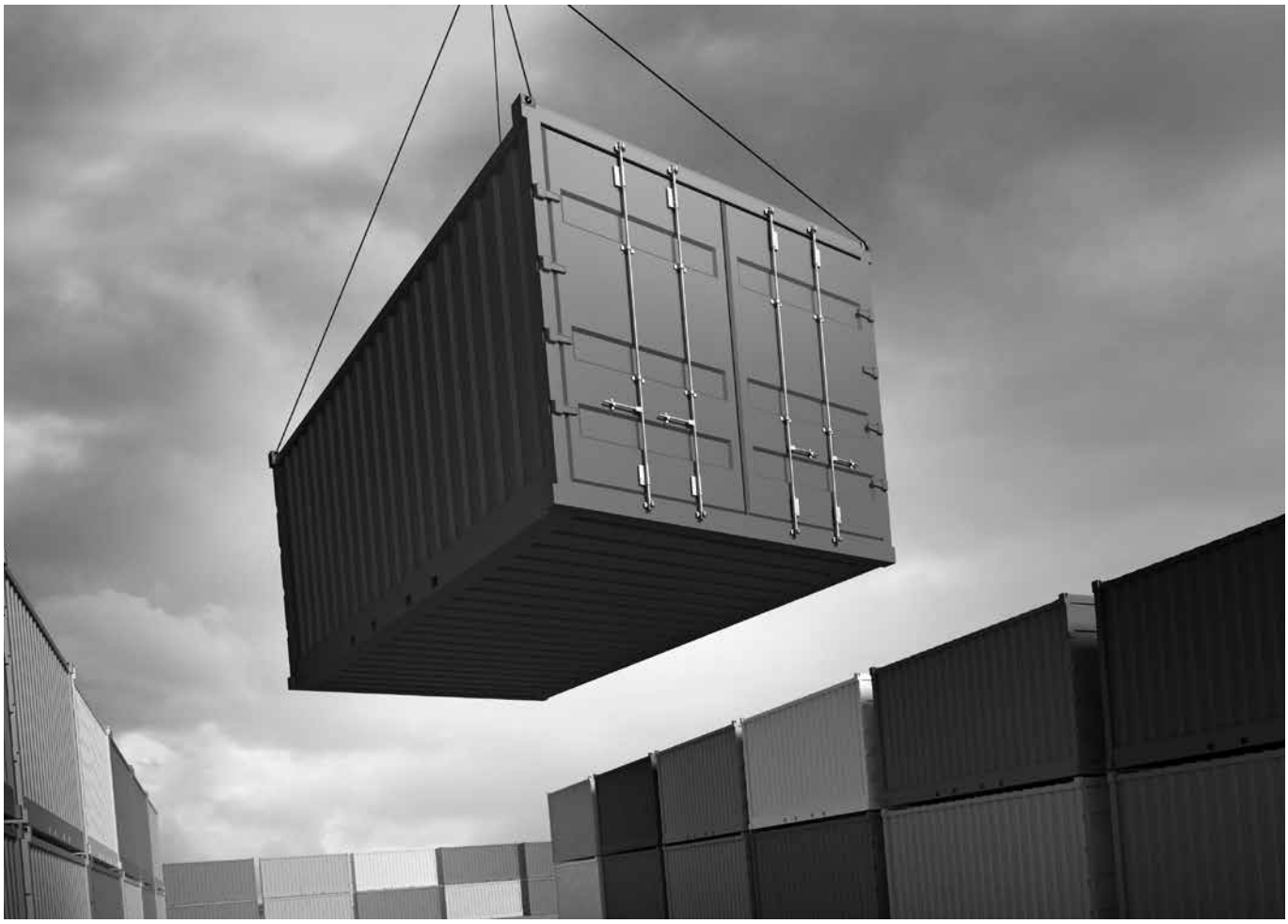
CONTENTS



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CHAIRMAN'S MESSAGE

I am delighted to welcome you to *Partnerships* – Australia's most eminent annual gathering of infrastructure leaders.

The name of today's event also embodies what we as a sector stand for. It is only by bringing together the public and private sectors, that we can have the conversations required to meet our nation's future challenges.

Today's programme has been carefully curated to allow leaders from across the infrastructure sector to reflect on our shared successes and engage in frank discussions about where we still have to go.

That's why I am delighted we are joined by former New Zealand Prime Minister **Bill English** to provide us with an international perspective on what can be achieved when governments seek to reform the way things are done.

Today's programme also provides us with an opportunity to examine new frontiers in the energy, water and transport sectors. Today we will hear about how new market structures can resolve challenges in the waste sector. We will also be invited to reflect upon our responsibilities as a sector in considering the theme of social licence.

There are other core issues that are facing Australia at present. Like the need to address the impact of electric vehicles on our declining road funding revenues.

As we all know, political leadership alone is not enough to address these challenges.

'Fixing' infrastructure needs all tiers of government. The professional public service and the wider business sector each play a critical role in leading the national debate on reform, and in engaging directly with the broader community so that we can achieve enduring solutions.

Across the day we will hear from Australia's political, public service, and business leaders. Each talking to how they're addressing the core challenges in their sectors.

I hope that today's discussions will inject momentum into the national debate and challenge your thinking.

Yours sincerely

Adrian Kloeden
Chairman | Infrastructure Partnerships Australia

FUTURE CITIES: THE STATE OF WASTE

Bas Hamers | Associate, Macquarie Capital
Christopher Voyce | Executive Director, Macquarie Capital

With Australia's population expected to grow by 11.8 million over the next 30 years[1], governments face a significant challenge to fund the investments in infrastructure required to sustain this growth. As numerous commentators have noted, the challenge is particularly acute in our capital cities where almost three quarters of this growth is expected to take place. While much has been written about our transport, energy, health and education infrastructure, there has been little written in the infrastructure press about the essential services provided by the waste management sector.

According to the *National Waste Report* 2016, Australian households, business and industry generated more than 33 million tonnes of waste in 2014-15, almost half of which made its way to landfill. Given the strong link between waste generation and population, it is unsurprising that waste generation is expected to grow with an increasing population.

Limited landfill space is reaching capacity faster than expected with the continued growth in waste and the prioritisation of residential development over necessary services such as waste management in our major urban areas, which is exacerbating the problem.

At the same time, external factors are having a profound influence on our waste management sector. When China introduced its *National Sword Policy* in 2017, followed by its *Blue Sky Policy* in 2018, they significantly increased the acceptance criteria[2] for imported recyclable materials. The impact on the Australian waste management sector was both immediate and severe. In 2014-15, China accepted approximately 65 per cent of Australia's exports of recyclable paper, cardboard and plastics. Anecdotally, by the end of 2017, this had reduced to less than 20 per cent for recyclable paper and cardboard and less than 5 per cent for recyclable plastics.

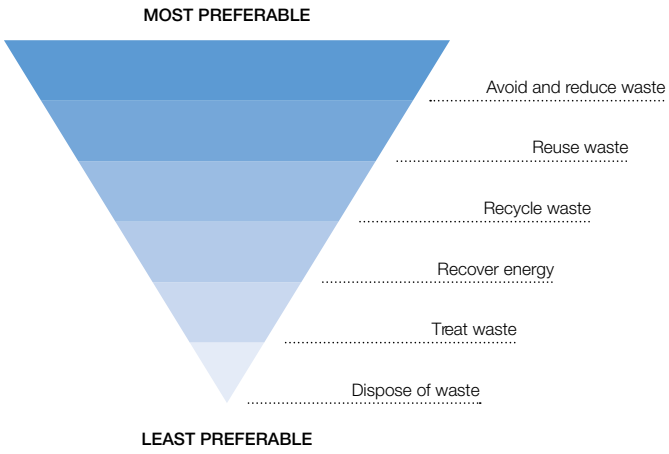
For many operators the only options were to stockpile, landfill or claim "force majeure" under contracts with local councils. This forced at least one council to announce an abandonment of curb side recycling[3], which was quickly recanted due to public opposition. The policy changes in China and their flow on impacts to other markets within our region have fundamentally changed the cost structure for dealing with recyclable materials in Australia.

Media attention has heightened public awareness of the impact waste has on the environment, both here and abroad. It has led to responses from Commonwealth, state and territory environment ministers committing to reduce the consumption of single use plastics, increase our recycling capability and demand for recycled products domestically. But are we collectively doing enough?

GOVERNMENT POLICY OVERVIEW

All states and territory governments have adopted the waste hierarchy (Figure 1) – an internationally accepted tool for prioritising waste management practices which underpins the state and territory policies for waste management. Most have also set ambitious land diversion targets and enacted landfill levies to provide a source of funding for waste management reforms and to provide a clear pricing signal.

Figure 1: The waste hierarchy



Source: The NSW Environment Protection Agency

For example, New South Wales, Victoria and Queensland, the three states that generate almost 80 per cent of Australia's waste, have set municipal solid waste (MSW) diversion targets ranging between 55 per cent and 72 per cent by the mid-2020s. The states are driving initiatives in order to find ways to achieve this goal: Victoria (through its *Resource Recovery Infrastructure Fund*) and New South Wales (through its *Waste Less, Recycle More* education strategy and supporting programs) have made significant funding available to improve waste management and infrastructure.

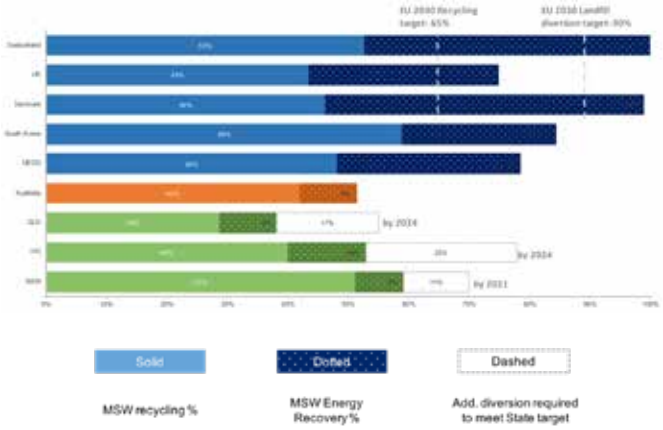
Western Australia has been a front runner in the development of waste-to-energy, where the WA Environmental Protection Agency and the Waste Authority co-authored an advice[4] on the environmental and health impacts associated with waste-to-energy technologies in April 2013. It builds on best practices globally and provided recommendations which helped Western Australia develop an assessment framework for waste-to-energy projects and new means of diverting waste from landfill. The Victorian Government also recently sought input from community and industry experts on waste-to-energy. The market sounding closed in December 2017, and a final position on waste-to-energy is expected shortly.

1. Infrastructure Australia, Summary report: Future Cities – planning for our growing population, February 2018. **2.** The acceptable level of contamination was reduced from 5% to 0.5%. **3.** Ipswich City Council statement, 19 April 2018. **4.** Environmental and health performance of waste to energy technologies, Environmental Protection Agency and Waste Authority, April 2013.

The Federal Government has also been active in the sector, providing loan funding through the Clean Energy Finance Corporation and grant funding through Australian Renewable Energy Agency (ARENA).

Yet, despite these positive initiatives and ambitious waste targets, *Figure 2* shows that Australia's MSW landfill diversion rate (51 per cent according to the latest *National Waste Report*) is considerably lower than in other developed countries.

Figure 2: Current waste diversion rates - and targets - for different jurisdictions



Source: Australian National Waste Report 2016[5], Eurostat, Macquarie Capital analysis

It is clear that many OECD countries have performed significantly better than Australia in meeting recycling, energy recovery and landfill diversion targets. While each country's situation is different and care should be taken in blindly applying policies from other markets, a number of similarities appear in those countries that have been successful, namely:

- clear policies with coordination across levels of government to ensure mechanisms to implement are in place, including strong economic incentives and funding combined with policies aimed at improving performance at all levels of the waste hierarchy
- clear planning guidelines and integration of waste management into forward looking infrastructure plans, just as transport, health and education are integrated
- government support where the conditions do not exist for the market to respond quickly to government policy
- a strong focus on recycling and, as further gains from recycling become harder to achieve, energy recovery using waste-to-energy technologies to deal with non-recyclable materials.

THE UK EXPERIENCE

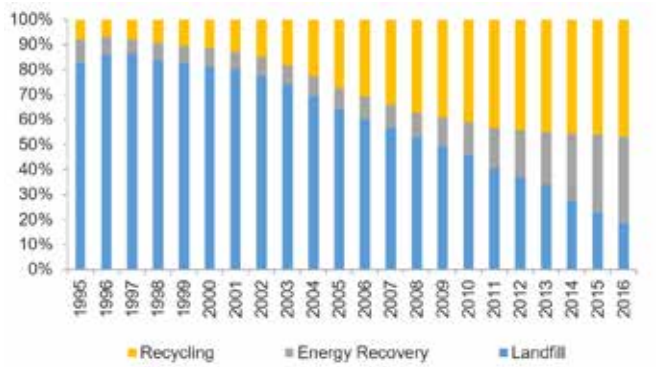
In 1995, the UK is estimated to have sent more than 35 million tonnes[6] of biodegradable municipal waste (BMW) to landfill. When the European Union introduced the *EU Landfill Directive*[7] setting binding targets for landfill diversion, the UK Government created the *Waste Implementation Plan* and empowered local authorities to implement the plan. The tools provided to local authorities included:

- clear targets for increases in recycling, energy recovery and landfill diversion set nationally
- additional funding for the sector, through an increase in the landfill tax
- an ability for councils to manage compliance with targets, through the introduction of a landfill allowance trading scheme (subsequently removed)
- the ability to use the private finance initiative framework to procure waste-to-energy projects, and
- financial support from the UK Government's Green Investment Bank with commitments of both senior debt and equity to waste-to-energy projects.

The progress enabled by this comprehensive policy response has been impressive[8], including:

- a 78 per cent reduction in BMW disposed of in landfill, relative to the more than 35 million tonnes in the 1995 baseline to 8 million tonnes in 2016
- 37 waste-to-energy plants, with the ability to process 11.8 million tonnes of residual waste, have been developed, while a further 4.1 million tonnes of waste-to-energy capacity is under construction
- the recycling rate for municipal waste has increased from less than 10 per cent in 1995 to more than 40 per cent in 2016, and
- the energy recovery rate for municipal waste has increased from 10 per cent in 1995 to over 30 per cent in 2016.

Figure 3: UK recycling and energy recovery rates for municipal waste

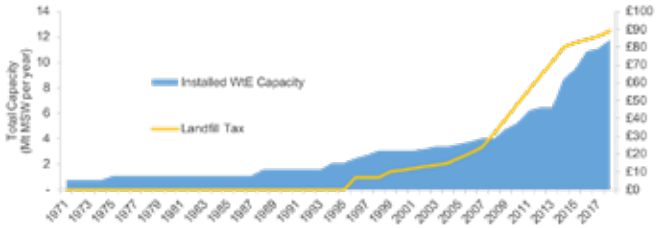


Source: Eurostat 2018

5. Please note that Victoria does not have a current State target. For this analysis the target of the Metropolitan Waste and Resource Recovery Group (as per their 2016 Metropolitan waste and resource recovery implementation plan) is used as a proxy for VIC **6.** Municipal Waste Management in the United Kingdom, European Environment Agency, February 2013. **7.** The European Directive 1999/31/EC states that by 2020 the amount of biodegradable municipal waste landfilled has to be reduced by 65% compared to 1995 levels. **8.** UK Statistics on Waste, Department for Environment Food & Rural Affairs, February 2018.

As *Figure 3* (previous page) and *Figure 4* (below) illustrate, waste-to-energy has played an increasingly significant role in achieving these outcomes, as further gains from recycling have been harder to come by.

Figure 4: UK waste-to-energy capacity and the landfill tax



Source: UK Energy from Waste Statistics – 2016, Tolvik

A BLUEPRINT FOR WASTE-TO-ENERGY IN AUSTRALIA?

An approach which simply replicates the policies of the UK and Europe, is bound to fail. Australia's large land mass, low population, sprawling cities, existing legislative framework and the state of our domestic recycling industry are all examples of the factors which require a local solution.

Some of the policy elements are already in place, however, more can be done by policymakers, industry and investors to promote the benefits of waste-to-energy and its part in the evolution of the waste management sector.

At a local level, councils are helping themselves – a number of Perth local councils have entered into waste supply agreements with waste-to-energy developers while the Local Government Association of Queensland has committed to zero waste to landfill by 2028, as well as expressing support for the reinvestment of any Queensland landfill levy into waste-to-energy projects, amongst other things.

So, what more can be done to promote waste-to-energy in Australia? The list below, drawn from our conversations with developers, waste operators, local councils and policymakers, is far from exhaustive but hints at the magnitude of the challenge ahead:

- national co-ordination of targets for recycling, energy recovery and landfill diversion at every level of the waste hierarchy. Ensure that policies that encourage recycling, do not undermine efforts to recover energy from residual waste and divert it from landfill
- rely on international best practice, rather than 'reinventing the wheel' with regulation. For example Western Australia has adopted the European Union *Waste Incineration Directive* standards for emissions.
- provide further incentives for local councils to group together to underwrite waste-to-energy projects with long term waste supply contracts
- clarify the planning pathway for waste-to-energy plants and provide funding to local governments to assist with early planning and site selection
- maintain economic incentives, such as landfill levies and container deposit schemes, to drive council and consumer behaviour
- develop community engagement guidelines for waste-to-energy project developers, similar to the initiative by the Australian wind energy industry[9], and
- greater private and public sector involvement in community education of the environmental benefits and public health impacts of waste-to-energy projects. For example, few would be aware that a waste-to-energy plant processing 400,000 tonnes of waste reduces carbon emissions by approximately 200,000 tonnes of CO2 equivalent or roughly 50 per cent by weight.

REASON TO BE OPTIMISTIC

The confluence of events and policy developments precipitated by the policy changes in China, increased awareness of our waste management challenges to our elected officials and the public, the conclusion of state waste policy reviews and tangible support from Federal, state and local governments gives us reason to be optimistic about the prospects for waste-to-energy in Australia.

With four to five million tonnes of annual processing capacity needed to match the UK's performance on energy recovery, the waste-to-energy opportunity could be significant for developers, waste operators, constructors and investors alike.

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9. The Clean Energy Council released its community engagement guidelines on behalf of the Australian wind industry in 2013.

DEPARTMENT OF TREASURY AND FINANCE – STATE GOVERNMENT OF VICTORIA

The Victorian Government is introducing a raft of policy reforms to enhance processes used by departments and agencies that procure, contract and administer Public Private Partnerships (PPP) projects. These reforms will ensure the PPP model continues to be flexible and robust, and delivers results for all Victorians.

STANDARD PROCUREMENT DOCUMENTS

To drive efficiencies, lower tender costs, and improve transparency, a new suite of standard procurement documents has been introduced to the procurement process.

New standard tender templates have been developed and are now successfully being used in the Expressions of Interest (EOI) and Request for Proposals (RFP) processes for PPP projects, including the recent Western Roads Upgrade.

A new standard Project Deed, key commercial schedules and accompanying guidance notes have been developed for both linear and social availability PPP projects. A standard Project Deed provides a base contract that all future Victorian availability PPP projects will use. The standardised approach will enable project teams and bidders to focus valuable tender time on project-specific issues. It will also improve contract interpretation, enforceability and administration.

The new Project Deed has been market tested with key private and public-sector stakeholders and incorporates a risk allocation which has been market accepted over 18 years of Partnerships Victoria policy. The new Project Deed was successfully implemented on the Western Roads Upgrade project and resulted in a streamlined negotiation and contracting process.

CONTRACT MANAGEMENT GUIDANCE UPDATE

Complementing the new Project Deed, the Partnerships Victoria contract management guidance has been updated. This will allow Victorian Government departments and agencies to manage PPP projects more effectively during the contract delivery phase, assisting the State to achieve project objectives and improving value for money outcomes.

MARKET-LED PROPOSALS GUIDELINE (MLP) UPDATE

A number of policy updates have also been incorporated to enhance Victoria's MLP Guideline. The MLP Guideline reaffirms the Government's commitment to use a transparent process when considering whether a submission is in the public interest, represents value for money and is consistent with Government policy and investment priorities. The updates are designed to improve the quality of proposals submitted, make the State's assessment processes more efficient and achieve better MLP project outcomes.

REAL OPTIONS FOR UNCERTAIN INVESTMENTS

As part of its wider infrastructure investment evaluation and decision-making framework, the Victorian Government has also updated its real options guidance. This will encourage departments and agencies to recognise the value of flexible investment strategies, particularly with projects impacted by significant uncertainty.

All the updated policy reforms documents are available at www.dtf.vic.gov.au

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GETTING THE HORSE BACK IN THE RACE

Adrian Dwyer | Chief Executive Officer, Infrastructure Partnerships Australia

We have to go back to the National Competition Policy era of the 1990s to find evidence of the last great micro-economic reform push.

Most people would agree that productivity-enhancing reform – removing market distortions and barriers to competition and ensuring greater cost-reflective pricing – will all help to grow the economic pie.

There is little dispute about the need for micro-economic reform in a post-mining boom, post-financial crisis era. In the infrastructure sector at least, we know what the solutions are to most of the problems we face.

The work of Infrastructure Partnerships Australia, the Productivity Commission and Infrastructure Australia have all been vocal on the need for competition policy reforms across the energy, transport and utilities sectors.

It is not for want of ideas that we see no progress on these issues. The problem is that after 27 years of continuous economic growth, we have forgotten how to prosecute the case for reform. Moreover, we have forgotten the general practice of the reform business. As a result, there is an abiding inertia at grips within our politics – an inertia that has let our reform muscle wither.

If Australia is a thoroughbred horse we've allowed it to grow fat in a paddock for want of a run. The risk is that if we do not restart reform, Australia may lose the global race for competitiveness and miss out on the full opportunities that come with a growing and dynamic economy.

THE CENTRE IS SHRINKING

There is no one individual to blame for our current predicament. Finding alignment between the political class and the community is probably more difficult than it has ever been.

Part of the reason may be that the centre of Australian politics is shrinking. According to research released in April this year, over the last two decades, the Australian public has drifted to the extreme poles of the political landscape.

As politics has fragmented and shifted to a game of single issues, it has become much harder still to negotiate outcomes in the interest of the whole community. It has become much harder to prosecute the case for reform to a public that is deeply sceptical of its representatives, and in a media environment that encourages snap judgments on complex issues.

With voters drifting away from the political centre and common sites of deliberation vanishing, there is a broad view emerging among policy makers and academics that what we need is a crisis.

WE CAN'T WAIT FOR A CRISIS

While we shouldn't hope for a crisis, there is some historical truth to the argument that without one, Australia may not be able make the case for a new reform agenda.

The success of the 1980s reforms was due to a remarkable constellation of factors too long to recount here. But in large part, the achievements of that era came down to the ability of the Hawke and Keating Governments to capture the centre of Australian political life at a time when the economy was characterised by severe recession.

Back then, growth was stuck in the doldrums, unemployment was around 10 per cent, and there was a prevailing urgency to aggressively engage in a race to save the country's future.

These dire economic circumstances set the foundation for a bold agenda in the 1980s, and the concerted reformism of the 90s under Howard and Costello. These same conditions do not exist today. We neither have a stable middle ground or an economic crisis to draw upon.

It is of little value then to look back to a political era for lessons when the ground upon which we need to make reform has so radically changed. While there are lessons to draw from the past, we should not be so enthralled by our nostalgia to think that the past offers a perfect guide for the future.

INTERGENERATIONAL CHALLENGES

The significance in all of this is plain to see. If we continue failing to grapple with last generation's reform challenges how can we ever be prepared for the future? The horse is in no state to run.

There is a danger we are unprepared as a nation to tackle the seismic shocks about to hit our economy. Automation of blue and white-collar jobs, convergence of our transport and energy sectors, and record population expansion in our cities present unprecedented challenges. Together they could completely upend our traditional models for managing change and delivering services.

These challenges come at a time when Australia is already behind the curve in preparing for the rise of a booming and urbanised middle class in Asia.

The prolonged absence of reform is showing up in the failure of wage growth to keep up with productivity. We are seeing it in congestion in our cities, in higher electricity and utility prices, and poor service reach across our public transport networks.

While the headline stats may say we are doing okay, the average person in the street is still feeling pain. The community is clearly frustrated with the failure of the political class to resolve these persistent problems.

Being deeply anxious about the future, the community is expressing their despair through populist demands on government. Yet despite some notable high points in NSW and Victoria, we have not sought to flex our microeconomic reform muscles in an attempt to resolve the underlying economic causes of this disaffection.

Instead we have seen threats of direct intervention into infrastructure markets that have been largely free from interference for the last 30 years. While the Government's motivation to intervene in markets is understandable, it will not deliver the outcomes it desires. In fact, it will just make matters worse. Indeed, if we too readily indulge the forces of populism we risk a pervasive backlash against the principles of open market economics and will jeopardise the progress of the last 30 years.

GETTING THE HORSE BACK IN THE RACE

So how do we get the horse back in the race? We need to direct our focus to those few high-impact reforms with the best prospect of political success.

Infrastructure Partnerships Australia and Infrastructure Australia have both called on the Federal Government to make additional infrastructure funding available to states and territories in return for competition policy reforms.

This would take the form of a cash for competitiveness type programme, similar in form to the National Competition Policy Payments.

Using incentives in this way would go a long way to improving services for the public and freeing up essential capital for new infrastructure investments. If successfully implemented, this incentive-based approach would help to deliver more efficient, customer focused and cost-effective infrastructure services. It would also help to relieve the pressure on living standards. Most importantly, it would give our political leaders the clear air and momentum they need to prepare Australia for the fundamental shifts facing the nation.

LONGER TERM REFORM AGENDA

However, these reforms only deal with last generation's challenges. To prepare for the major upheavals facing this generation, we need to change the way we think about charging for and delivering infrastructure. Over the next 30 years Australia's growing and ageing population will mean more people accessing services with less money to pay for it. We will need a new market model to drive down the cost of services while pushing up the quality.

Governments' role as sole provider of services will need to shift to a more blended-model, where government is instead a purchaser of services. This will involve greater private sector involvement in the provision of transport and social infrastructure services. Introducing more contestability for and within markets will be politically very difficult. But unless we address the growing operational cost of services in health, education and public transport, we will not have the money to build new rail lines and new roads for the community.

Kick-starting micro-economic reform remains a critical concern for all Australians. If we are ever to break free of the inertia that grips our politics, we must begin the practice of reform again and get the horse back into the race.

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MINING COMPANIES LOOKING TO RIDE THE WAVE OF LOW CARBON ENERGY

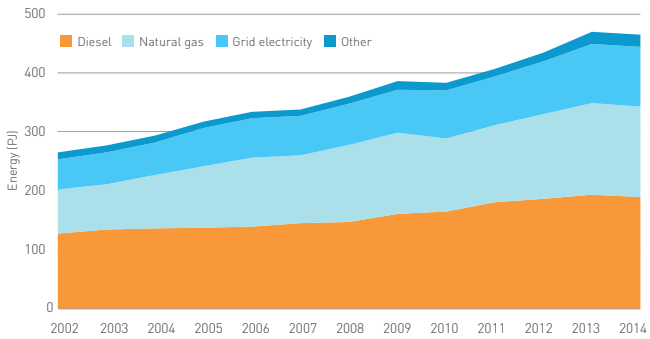
Megan Joyce | Head of Loans & Specialised Finance WA, ANZ Institutional
Tsen Wong | Director Utilities & Infrastructure, ANZ Institutional

The Australian mining sector is at a significant turning point in its energy procurement practices.

Mining is an energy intensive game, with energy currently representing approximately 30 per cent of a typical miner's total cost base. The mining sector accounts for roughly 10 per cent of Australia's total energy use, with consumption growing at around seven per cent per annum over the last decade (*Australian Energy Update August 2017*). Energy intensity is expected to continue to rise as ore grades fall, processing complexity accelerates, and mines deepen.

Traditionally mining companies have been heavily reliant on fossil fuel energy sources (diesel 41 per cent), natural gas (33 per cent), grid electricity (21 per cent), with only 2.5 per cent coming from renewable sources.

Figure 1: The Australian mining sector's energy consumption by source. 'Other' includes petrol, coal, LNG, renewables and biofuels.



Source: Renewable Energy in the Mining Sector White Paper 2017

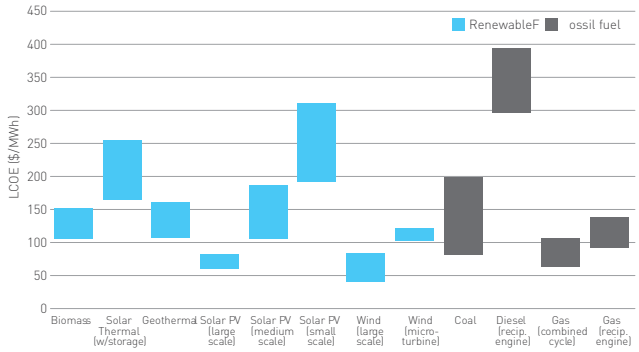
However in recent years, mining companies' energy procurement activities have been challenged as they grapple with three key challenges: **volatile energy costs, power reliability and pressure to reduce carbon emissions**.

VOLATILE ENERGY COSTS AND RELIABILITY

With on-going political debate on energy policy and potential impacts of carbon pricing on fossil fuels, mining companies are increasingly taking matters into their own hands. In doing so, they are constantly looking for ways to reduce their exposure to energy price volatility, in particular fossil fuels, over which they typically have limited control.

Energy cost increases in recent years have been intense, particularly on the east coast of Australia where prices have more than doubled in the past two years. The Australian diesel terminal gate price (linked to global oil prices), has varied from $0.40/L to $1.25/L over the past decade. While diesel prices are currently at historical lows, mining companies are concerned about price increases which are forecast in coming years.

Figure 2: The current unsubsidised levelised cost of electricity (LCOE) from fossil fuel and renewable sources. Adapted from Lazard.



Source: Renewable Energy in the Mining Sector White Paper 2017

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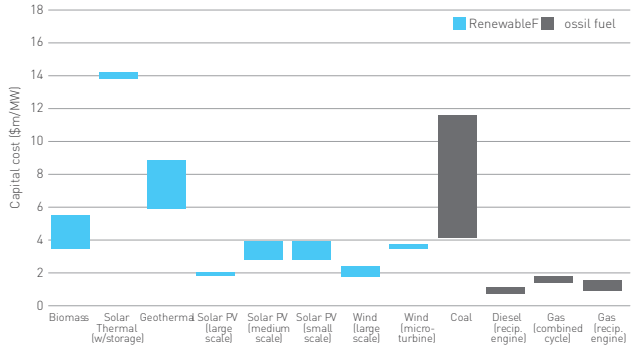

Source: Renewable Energy in the Mining Sector White Paper 2017

Reliability of energy supply has become a material risk, particularly for new mining investments. The well-documented power outage in South Australia last year significantly disrupted output at BHP's giant Olympic Dam copper and uranium mine, cutting full-year earnings by $105 million.

Traditionally mining companies have shied away from renewables given a perceived lack of price competitiveness and reliability issues, as well as generally limited familiarity with available technology. But with renewable energy costs falling materially in recent years and technology efficiencies significantly enhanced, miners are increasingly embracing the benefits of renewables.

In this context, the cost of solar photovoltaic capacity has fallen by about 70 per cent since 2010 (International Renewable Energy Agency). Over the same period, battery costs appear to have fallen by 40 per cent, with combined solar/storage solutions expected to decline a further 37 per cent through to 2030 (Bloomberg NEF March 2018). As a result, stand-alone diesel generation is no longer the most cost-effective option for longer life mines without a grid connection.

The predictable cost structure of renewables is also attractive. While upfront capital costs are higher, on-going operating costs are minimal due to free sources of energy (i.e. sun and wind) fuel and minimal maintenance costs – a significant advantage over fossil fuel power sources.

Two other advances that have significantly enhanced the efficacy of renewable power solutions are much improved technology relating to management of power sources at hybrid systems and the transportable nature of solar panels.

Wind and solar PV are cost effective but are intermittent electricity sources which are not fully compatible with the 24x7 requirement of mining operations. Until battery storage becomes a cost effective alternative, mining companies are relying on hybrid systems to provide reliable electricity supply at reduced costs by combining renewable sources with fossil fuel based generation. By adopting hybrid systems, miners can turn around 30 per cent of typical energy load to electricity, thereby reducing overall demand for coal, gas and diesel.

The recent ability to mobilise solar panels (such as that provided by Sunshift to South 32), also allows solar to compete on a more level playing field with mobile diesel/gas fired power solutions. Mobile solar farms are better placed to match shorter term Power Purchase Agreements (PPAs) offered by traditional fuel sources (five to 10 years). Furthermore, these PPAs are cost competitive, as the power asset owner can now amortise the capital cost over multiple mine PPA contracts in line with the longer life of the power asset (typically greater than 20 years), rather than over the shorter life of the initial mine user (typically less than 10 years).

Figure 4: Recent large-scale hybrid systems in the global mining sector.

				Fossil fuel		Alternative energy		
Project	**Location**	**Company**	**Year**	**Type**	**Capacity**	**Type**	**Capacity**	**Energy Storage (MW/MWh)**
DeGrussa	WA, Australia	Sandfire Resources	2016	Diesel	19	Solar PV	10	4/1.8
Weipa	QLD, Australia	Rio Tinto	2015	Diesel	26	Solar PV	1.2	-
Raglan	Quebec, Canada	Glencore	2014	Diesel	21.6	Wind	3	0.6/4.3
Diavik	NorthwestTerritories, Canada	Diavik Diamond Mines	2012	Diesel	46.8	Wind	9.2	-

Source: Renewable Energy in the Mining Sector White Paper 2017

TRANSITION TO A LOW CARBON FUTURE

The mining sector is a material carbon emitter contributing 19 per cent of Australia's emissions, while accounting for approximately 10 per cent of the country's total energy usage. Renewables offer a way for miners to meet emissions targets and decrease carbon footprints.

Against this backdrop and country commitments under the Paris Agreement, it is expected that mining companies globally will increase their usage of renewables from 2.5 per cent to up to eight per cent by 2022, at an estimated cost of US$ 3.9 billion (A$5.3billion) (Ernst & Young, via Energy & Mines).

In this context, South American mines are leading the charge for the uptake of renewables with many utility-scale renewable solutions already integrated into mining operations. By comparison, the uptake in Australia has only commenced in recent years, and with the exception of Sandfire Resources (who incorporated a solar farm at its DeGrussa mine), first movers have typically been dominated by larger mining companies with multiple power options and relatively small renewable commitments. Some examples include: BHP's Lakeland Solar and Storage Project in Queensland; South 32's 3MW solar farm for its Cannington mine; Sun Metals' 116MW solar farm for its nickel refinery in Townsville; Oz Minerals' solar and battery storage facility for its Prominent Hill mine in South Australia; and Rio's 6.7MW solar farm at its Weipa bauxite operation.

At the same time, it's also encouraging to see innovative renewable solutions being considered at old mine sites, turning liabilities into income generating assets. For example, solutions currently being considered by Idemitsu in Queensland would see old waste dumps converted into solar farms, and at the Kidston renewable energy hub in Queensland, old mine pits are being considered for conversion into pumped hydro stations. Energy would be sold into the grid to generate a low carbon income stream.

In short, these are exciting times in the mining sector as miners break from their traditional power providers, and seek alternative cost effective, reliable and sustainable power solutions. For those that are willing to deliver tailored renewable solutions to meet the specific energy needs of miners, there will be significant growth opportunities.

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TAKING IT TO THE STREETS: COMMUNITY ENGAGEMENT AND INFRASTRUCTURE PROJECTS

Henry Byrne | Group Executive, Corporate Affairs, Transurban

There is growing pressure for companies to publically demonstrate their 'social licence to operate' in Australia. While there is legitimate debate over the form this takes, the fundamental logic underpinning the concept of a social licence is inescapable. Successful businesses are cognisant of the diverse range of stakeholders around them and factor these groups into their strategies and plans. Nowhere is this more evident than the infrastructure sector.

While infrastructure and politics have always gone hand-in-hand the advent of new communication platforms mean people can organise and be heard louder than ever before, giving them more control over what's built in their backyard.

It is not overstating it to say infrastructure projects can live or die on community attitudes. In Australia over $20 billion worth of infrastructure projects have been delayed, significantly modified or cancelled due to pressure from community activists in the past decade. This theme is by no means limited to Australia, and it is clear globally there's a lot at stake.

The McKinsey Global Institute estimates that between 2017 and 2050 $69 trillion is needed in global infrastructure investment to keep pace with demand. The challenges that will emerge if we fail to make this investment are obvious. The Australian context provides a clear example of this. Our population is now growing faster than any other country in the developed world and, much like global trends, most of this growth is going to take place in our cities. At the same time our major cities, Sydney, Melbourne and Brisbane are also some of the least densely populated in the world. As these cities build outwards it will become harder for people to get around, with roads providing vital lifelines to those living in the outer suburbs with access to jobs, education and health services.

To date, there has been some reason for optimism around our ability to meet this challenge. Australia is currently experiencing the highest level of infrastructure spending since the Global Financial Crisis. Current estimates show an unprecedented $100 billion program of infrastructure projects is under way. This will not only be an important propulsion for the country's economy, but is also integral to the future liveability of our major cities.

However this level of investment presents challenges on the ground with local communities as activity impacts transport networks and neighbourhood-scapes – leading to a kind of 'construction fatigue'.

With community tolerance being tested, it's importance to engage the community transparently and as early as practical on outcomes that affect them.

No longer will the community tolerate a 'decide and defend' approach from governments or infrastructure developers.

This was top of mind as Transurban headed into the design and development of the West Gate Tunnel Project in Melbourne. By listening to the community, we heard people's concerns

around air quality, noise and the project's proximity to current and future residential areas. Open, transparent and regular communications on how feedback had been responded to showed the community their voice made a real impact. This enhanced the final design and led to greater acceptance of the project. Community feedback led to tangible changes such as:

- designing a longer tunnel, moving the west-bound exit further away from existing homes
- improved pedestrian and cycling connections
- new project-specific high quality noise walls that allow natural light to filter through while protecting privacy, and
- the design of nearly nine hectares of community open space.

Through this project we advanced our model for community engagement that is based on feedback and communication and set a template that we will continue to develop and extend.

Our approach also recognises that meeting community expectations can't end when a project is built. Contracts between government and private operators last for decades and there is an expectation that community outcomes are maintained or improved throughout the life of the project.

Responding to evolving customer expectations has also been integral to addressing the perceptions of value being delivered by major infrastructure projects. In 1999, we opened our first road, CityLink, in Melbourne. At the time it was ahead of the game, pioneering free-flowing electronic tolling using e-Tags within customer cars. But since that time, the expectations of our customers have continued to evolve and they are looking to emerging technology platforms to harness information to help them form views on value, and make choices about when and how they use our roads.

A good example of this has been in development of new products harnessing technology offerings that enable our customers to interact with us in different ways. Market research tells us that around half of our customers are classified as occasional toll-road users, meaning they typically use our roads less than once a month. For this group, electronic e-TAGs, and the set-up involved, are not always their preference.

Recognising this change, we developed a GPS-enabled mobile app, LinktGO, which allows drivers to see their toll travel in real time and pay trip-by-trip. After they've registered their car and a credit card on the app, customers can start driving.

We're also looking at ways to help customers better evaluate the value they're getting from our roads. One way of doing this is providing customers with information about how a trip on a Transurban toll road compares to a trip made on alternative, un-tolled routes. To do this, we launched a Trip Compare Tool which uses real time information to enable customers to see how a tolled and un-tolled route compares on a range of metrics. Customers get a break down of time savings, number of traffic lights, fuel costs and CO2 emissions.

This allows customers to make up their own mind as to whether the trip is worth the cost. Importantly, it is a step towards putting more choice, through information, into their hands.

Initiatives like these have emerged from a desire to respond to legitimate challenges that have been raised by our stakeholders. In doing this, we will continue to improve the services and value that we deliver.

PUTTING COMMUNITIES FIRST ON THE WEST GATE TUNNEL PROJECT FOR MUTUALLY BENEFICIAL RESULTS

26 MONTHS OF ENGAGEMENT TO DATE

5,700+ FACE-TO-FACE ENGAGEMENTS

4,500 COMMENTS AND SUBMISSIONS

100+ COMMUNITY INFORMATION SESSIONS

240,000 WEBSITE VISITS

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INFRASTRUCTURE INVESTMENT: MEETING THE CAPACITY AND CAPABILITY CHALLENGE

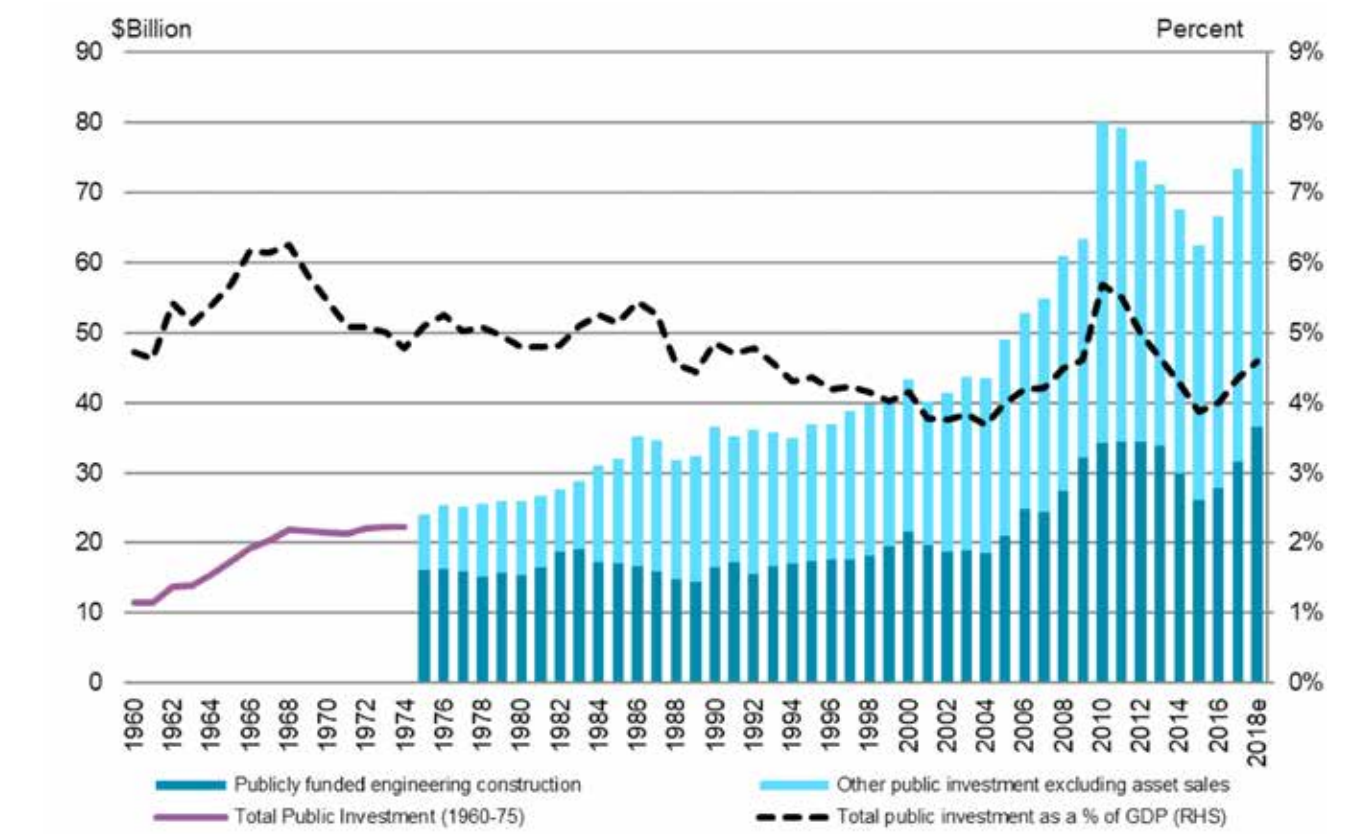
Adrian Hart | Associate Director, BIS Oxford Economics

Infrastructure is vital for the operation of a successful society and economy. This is especially so for a nation such as Australia, with its combination of wide distances, challenging climate and high population urbanisation. Investment in physical infrastructure, along with investment in education, health and technology is fundamental for maintaining a growing and skilled population, improving productivity and sustaining our high standard of living.

PUBLIC INVESTMENT HAS NOT KEPT PACE WITH POPULATION GROWTH

Over the past few decades, however, Australia has had a disappointing record in terms of timely infrastructure investment and delivery. Figure 1 shows the path of real (i.e. inflation adjusted) public investment since 1960 – which includes publicly funded engineering construction. Engineering construction includes the construction of transport (road, bridges, railways and harbours) utilities (electricity, water, sewerage, pipelines and telecommunications) as well as mining and heavy industry construction (although this latter category of investment is mostly provided by the private sector).

Figure 1: Public Investment in Australia 1960-2018



Source: ABS Data, BIS Oxford Economics Data

Even allowing for the fact that there has been privatisation of public assets (particularly in electricity and telecoms, but also some transport assets), the public sector remains the dominant provider of social and economic infrastructure. However, public investment in infrastructure has simply not kept pace with growth in population or the economy. While public investment doubled during the 1960s, it took another 30 years (1970-2000) for public investment to double again, despite strong population growth in the interim. The 2000s ushered in an economic boom period which, combined with the benefits of previous microeconomic reforms and strongly rising taxation revenues (eventually) helped fund major public infrastructure investment programs at the Commonwealth and state levels. However, the 2000s public investment cycle only represented a belated and sharp catch-up effort following decades of underinvestment in infrastructure.

This underinvestment has only been made worse by persistent and severe underestimation of population growth by government agencies. In 2002, the Commonwealth Treasury's first *Intergenerational Report* (IGR) predicted Australia would reach a population of 25 million by 2042. In 2007,[1] the second IGR's projections had improved somewhat: it had shortened the period to 2027.[2] The question remains as to how different our infrastructure investment priorities would have been if we had known in the early 2000s that Australia's population would break 25 million by 2018.

In any case, the corrective surge in infrastructure investment proved to be temporary as governments reduced public investment once economic conditions deteriorated post-Global Financial Crisis – and this decline continued right through the bust in resources investment, despite emerging excess industry capacity and capability to deliver. As the resources bust (and the corresponding decline in the Australian dollar) drove an economic recovery in the non-mining states – New South Wales and Victoria – these jurisdictions were, for a time, able to boost infrastructure investment and take advantage of this excess industry capacity and capability to procure preconstruction and construction services. But strong increases in infrastructure investment in these states since 2016, supercharged by finance from long term asset leases and roaring property markets, has whittled away the excess capacity which once existed. With the former resource boom states now also looking to reinvigorate infrastructure investment, meeting ambitious infrastructure investment targets from here will be challenging from a capacity and capability perspective.

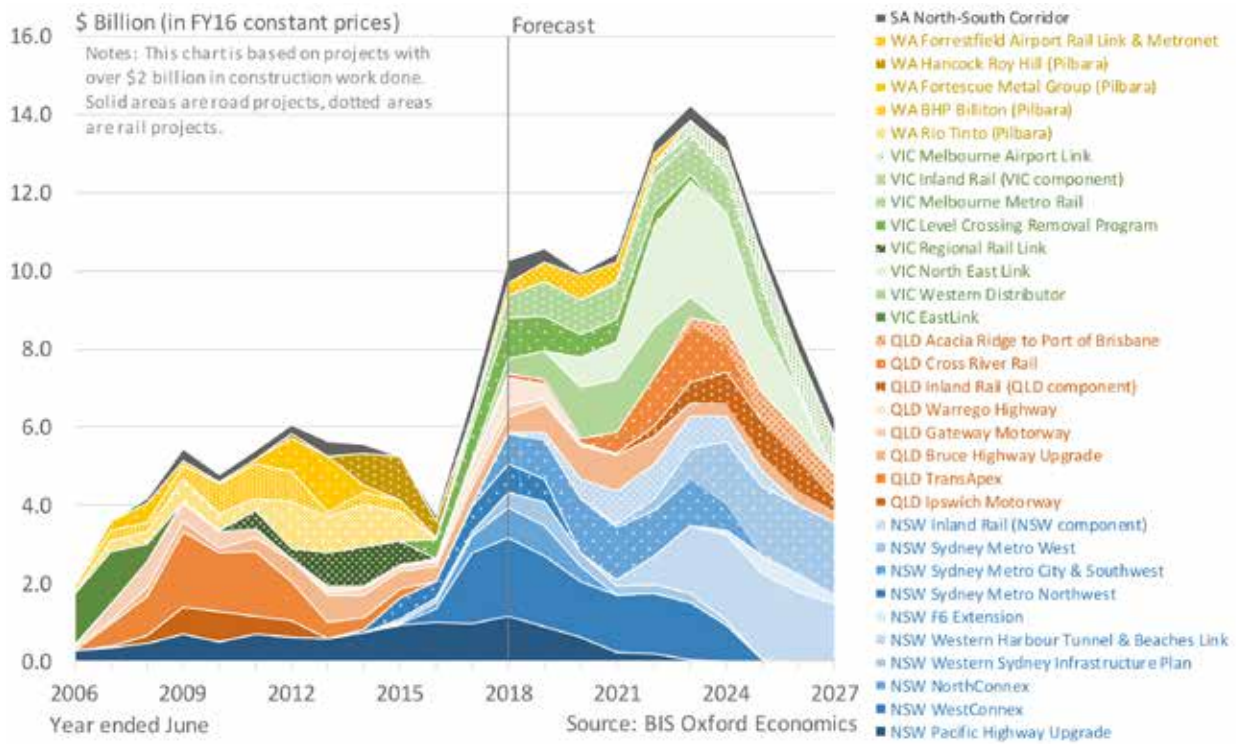
THE INFRASTRUCTURE CHALLENGE

How large is this challenge? Despite a return to growth in infrastructure investment in recent years, there is still an extraordinary wave of investment to take place over the coming decade as shown in *Figure 2*, particularly in urban transport (mostly road and rail) which was identified by Infrastructure Australia as a growing infrastructure gap in its 2015 *Australian Infrastructure Audit*.[3]

BIS Oxford Economics' recent *Engineering Construction in Australia* report notes that transport-related engineering construction has risen from $21.2 billion in FY2015-16 to an estimated $28.7bn in FY2017-18. This is forecast to grow to $36.3bn by FY2022-23 based on an analysis of recent Commonwealth and State Government Budgets, as well as private sector initiatives.[4] While New South Wales and Victoria will continue to see the bulk of transport infrastructure investment, it will continue to be highly focused in metropolitan areas (with the notable exception of the Inland Rail project), creating further challenges for capacity and capability to deliver. By contrast, the *Engineering Construction in Australia* report notes that utilities-related construction is likely to decline over the next five years reflecting the completion of the National Broadband Network rollout (Australia's largest public infrastructure project to date), policy risks in the electricity sector and low levels of investment in water and sewerage infrastructure, particularly in rural and regional areas.

1. Commonwealth of Australia (2002), 2002-03 Budget Paper No. 5, Intergeneration Report 2002-03, p5. **2.** Commonwealth of Australia (2007), Intergenerational Report 2007, px. **3.** Infrastructure Australia (2015), Australian Infrastructure Audit, Volume 1, p5. **4.** All dollar figures are expressed in constant 2015/16 prices.

Figure 2: Major Australian Transport Projects Over A$2 Billion



Source: BIS Oxford Economics

CAPACITY AND CAPABILITY THREATS

In light of the emerging transport infrastructure investment wave, BIS Oxford Economics was commissioned by Infrastructure NSW to report on industry capability and capacity risks in the New South Wales construction sector[5] that could potentially impact timely and value for money delivery of the NSW Government's infrastructure program.[6] This involved extensive engagement and consultation with government, the construction industry and related supply chains. While our focus was on NSW, many of the lessons learned from this exercise can apply to other jurisdictions.

The key findings from the report were:

- **New risks to skills capability are already emerging**, particularly across a class of 'onsite' skill sets such as site managers, supervisors and a range of other onsite professional positions and trades.
- **Risks to construction material supplies are also apparent, particularly for quarry products and natural sand** that are important ingredients in concrete. Meanwhile the loss of domestic manufacturing also threatens local supply of by-products important to the construction industry and increases reliance on overseas supply chains.
- **Transport and logistics risks** are of paramount concern, particularly in metropolitan areas.
- **Construction cost escalation will likely accelerate as construction activity rises and supply chain risks are exposed.** This prediction has already proved correct, with popular measures of civil construction cost escalation, such as the Road and Bridge Index and the engineering construction implicit price deflator,[7] lifting considerably over the past year.

CAPACITY AND CAPABILITY SOLUTIONS

Our report also presented a range of solutions that would help mitigate these risks and provide a positive value legacy from infrastructure investment over the long term. The most critical measures include:

- **The provision of a clear and coherent 'whole of government' long term project pipeline** to give industry the best possible chance of responding, particularly in regional and remote areas. Ideally, the long term project pipeline will assist with the sequencing and resourcing of key metropolitan and regional projects and reduce risk on critical infrastructure projects. Here, initiatives such as Infrastructure Partnerships Australia's *Australia and New Zealand Infrastructure Pipeline* (infrastructurepipeline.org) and the monthly *Pipeline Report* have had success in providing visibility over the long term project pipeline. But, while improving, governments across Australia still have a way to go to develop fully coordinated and comprehensive

5. Depending on whether the latest energy policy, the NEG, can attract bi-partisan support and instil a measure of certainty. **6.** BIS Oxford Economics (2017) NSW Construction Delivery Assessment: Capacity and Capability. This report is available for download from the Infrastructure NSW State Infrastructure Strategy website: https://insw-sis.visualise.today/documents/about/NSW_Construction_Delivery_Assessment_Capability_and_Capacity.pdf **7.** Both measures are published by the Australian Bureau of Statistics.

project pipelines.

- **Boosting workforce development initiatives to meet demand for key onsite skills** through the development or expansion of the Infrastructure Skills Legacy Program (in NSW) and removing existing constraints to workforce development initiatives at the procurement phase. Similar initiatives have also been developed in other states, mandating a share of apprentices and traineeships on major infrastructure projects.
- **The establishment and regular maintenance of an industry wide construction materials plan**, based on major projects from both the public and private sectors, so that a demand and supply balance for scarce quarry products can be maintained.
- **The enunciation of a formal construction transport and logistics plan** to avoid bottlenecks, delays and rising costs for the transport of construction materials and disposal of waste.
- **Use procurement processes that encourage maximum industry participation, investment in capacity and capability, and innovation**. As industry capacity tightens, it is important to ensure that the procurement model itself does not put barriers in the way of participation through unnecessary restrictions to skills transfer from other industries (e.g. mining), the conflation of cheap construction prices for long term value, and the optimal allocation of risks on major projects to those which are best placed to manage them.

Figure 3: Growth in Construction Price Indices, Australia, Percent

LONGER TERM SUSTAINABILITY OF INFRASTRUCTURE INVESTMENT

The release of the *NSW Government Action Plan*[8] in June 2018 through the Construction Leadership Group (CLG) – and the broad interest in the findings of the *NSW Capacity and Capability* study from other jurisdictions – indicates that governments are becoming increasingly aware of capacity and capability issues and are listening to industry concerns. As large infrastructure programs continue to be rolled out over the coming decade, it will be important that this more collaborative approach is embraced at all levels of procuring public agencies and departments – not just at the executive.

However, in the longer-term, the ultimate solution to capacity and capability risks is to smooth the public investment cycle. While it may be impossible (and undesirable) to eliminate public investment 'waves' entirely, there is cause for optimism that better long term planning and the use of non-cyclical funding/financing mechanisms can help ameliorate the amplitude of the peaks and troughs, with their concomitant negative impacts on capacity, capability and costs on the one hand, and excess capacity, unemployment and weak income growth on the other. A steadier delivery of infrastructure over time obviates the need for intense construction catch-up 'moments' which, often being funded pro-cyclically, tend to exacerbate capacity and capability risks.

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8. NSW Government (2018) NSW Government Action Plan: A 10 point commitment to the construction sector

SURGING FORWARD – ELECTRIC VEHICLES

The debate around electric vehicles is no longer a question of 'why' or 'if'. It is a question of when, and how much.

Almost every major vehicle manufacturer has significantly shifted research and development toward electric vehicles, and an increasing number of governments around the globe have also committed to the staged or complete phase out of internal combustion engines. Global consumer trends and investment decisions have revealed two realities of our future; it will be powered by renewable energy and electricity will be the fuel of transport.

These developments go hand in hand. As the cost of renewable energy continues to fall, fossil fuel generators are leaving the market and being replaced by renewables. An electric vehicle charged from the current power grid is already less emissions-intensive than a comparable internal combustion engine, and these benefits will only increase as the energy sector continues its transition towards decarbonisation.

Auto manufacturing is a market that has already turned a corner. The majority of auto manufacturers, including GM and Volkswagen, have announced plans to roll out more than one fully electric car by 2020, with many including Porsche and Volvo setting electric vehicles sales targets of 50 per cent of all sales by 2025. A study by Bloomberg New Energy Finance released earlier this year projects that by 2040, 40 per cent of Australian new car sales will be electric. From there, we can chart a steady path to electricity being the dominant transport fuel across the nation.

This impending reality has spurred governments across Europe, Asia and the US to back the market with incentive schemes and policy support. Even our closest neighbour is acting, with New Zealand's government announcing a target of 64,000 electric vehicles by 2021.

IMPLICATIONS FOR ENERGY DEMAND

This massive change in the way we move will also introduce significant new dynamics for energy system operators and network businesses, particularly the need to plan for the growth and changing system requirements in electricity demand that will arise from widespread electrification of transport.

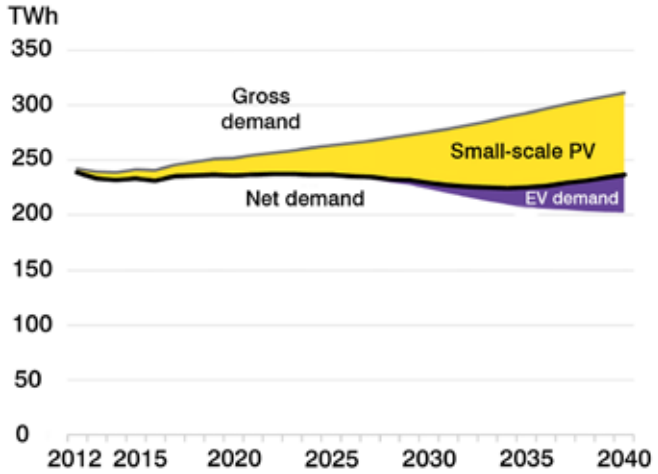
According to the International Energy Agency, in 2017 the estimated global electricity demand from all electric vehicles was 54 terawatt hours (TWh) – or around 80 per cent of the annual electricity demand of NSW. More than 90 per cent of that global demand is located in China and is mostly due to two-wheelers and a program which has seen a huge shift toward electric buses as part of municipal public transport.

At a household level, research has found that owning an electric vehicle increases energy demand per household by between 25 per cent and 43 per cent.

The uptake of electric vehicles will also help to improve Australia's energy security and lower national dependence on imported petrol and diesel. Substituting domestically produced electricity for imported petroleum will improve Australia's national terms of trade and boost local economic activity and jobs creation. Fuel cost savings of electricity against petrol will also mean households will see savings by adopting electric vehicles.

Although predictions about the impact of electric vehicle uptake on demand vary, credible estimates suggest electric vehicle charging will make up between six per cent and 11 per cent of annual electricity demand across Australia by 2040 – at least 12,400 gigawatt hours (GWh).

Figure 1: Australia electricity demand – with EVs



Source: Bloomberg New Energy Finance

OPPORTUNITIES FOR GRID OPERATORS

For grid operators like TransGrid, there are opportunities to maximise the benefits of electric vehicles in the form of optimising vehicle charging time, and the potential for electric vehicles to provide small-scale energy storage.

Some reports suggest that electric vehicle uptake in line with forecasts would mean there is up to 350 GWh of 'behind the engine' battery storage by 2040. If software solutions can coordinate this battery fleet effectively, this level of storage could play a significant role in providing grid stability and ancillary services, with 350 GWh equivalent to the proposed capacity of the Snowy 2.0 project.

With the introduction of the electric vehicles charging load, other new dynamics emerge in terms of the impact this new demand will have on the way the grid functions. Generally, power demand and vehicle mobility demand are both characterised by two peaks – one during the morning and one in the early evening hours, with a period of low demand during night time.

By encouraging overnight charging or "smart-charging" behaviour, consumers and networks can reduce the need for additional generation capacity by shifting charging loads to periods with lower demand. This could translate to lower electricity prices thanks to the possibility to rely on power produced by lower cost generators.

Furthermore, optimising the utilisation of the grid assets during the day will reduce the total cost of energy per kilowatt hour (kWh).

INTERDEPENDENCIES WITH OTHER TECHNOLOGIES

While "behind the wheel" storage represents a significant opportunity, other factors such as the impact of continued development of autonomous vehicles and rapid charging technology may mean that only a fraction of that potential is available.

For example, approaches to car ownership may change so that the focus becomes maximising the revenue potential through ride sharing under an autonomous driving platform where the time a car spends on the road is maximised. With the development of rapid charging, cars may not be idle in a household garage at traditional times of high demand, making them unavailable for network support or storage potential.

Alternatively, development of Internet of Things technology may mean that car owners can make a choice between revenue from autonomous ride sharing, or choose to have the vehicle connect to the future grid to provide network support services under an aggregated and coordinated model – depending on which option provides the greatest revenue opportunity for the vehicle owner.

TransGrid and energy infrastructure investors generally make investment decisions with a 40-50 year horizon. The potential for a step-change in energy demand and usage due to electric vehicles is right on our radar, and we're examining all the ways this transformation could impact our network and customers.

While there might be some challenges along the way, we firmly believe that an electric vehicle future is coming. If welcomed and supported, Australia will experience significant economic, environmental and social benefits not only for users but for society at large.

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INFRATECH: DRIVING PERFORMANCE FROM INFRASTRUCTURE ASSETS

Michael Hunter | Vice President, Principal, Macquarie Capital
Patrick Sieb | Executive Director, Infrastructure, Australia and New Zealand, Macquarie Capital

Technological innovation is redefining the infrastructure landscape. Traditionally, technology's role in infrastructure has either been peripheral or the focus of large manufacturers supplying equipment. Now, technology and data are converging and taking centre stage to drive performance from infrastructure assets. InfraTech is growing exponentially with evolving capabilities including improving the design, construction, operation and maintenance of assets, while driving better performance and benefits for owners, operators and users. The increasing demand for more efficient and sustainable assets alongside rapid technological innovation makes InfraTech an important and expanding growth sector.

Why now? The creation of InfraTech is driven by the convergence of three megatrends:

1. proliferation of low cost, internet connected sensors providing data at unprecedented scale
2. computational capability in the cloud enabling powerful, scalable analytics that can be deployed anywhere
3. a generational change fostering innovation and the use of new technologies.

TECHNOLOGY: INFRASTRUCTURE'S FRIEND OR FOE?

Over the last decade, technology has disrupted innumerable consumer sectors. In the infrastructure space, current technology is largely focused on creating efficiencies such as improving performance and extending asset life. In the longer term, some technologies applied at scale may have a significant strategic impact on a number of assets, such as mass adoption of electric vehicles. These will present significant opportunities for those who position themselves to capture the benefits.

For example, the power sector has been affected with an increasing focus on renewables and distributed energy. Technology is also aiding this adaptation with solutions such as grid scale batteries to manage grid stability and defer capex, workflow software to help companies be more efficient, and even virtual power plants that control a large number of small batteries and diesel generators.

CHANGING THE INFRASTRUCTURE GAME

InfraTech is driving a step-change uplift for asset owners and operators. A 'road is just a road' is no longer the case. Instead, possibilities of everyday infrastructure are being explored by innovative companies embracing this change. Is there a digital twin of the asset used to optimise the design and construction? Is the maintenance reactive or preventive? Is the flow optimised dynamically? What is the longer term impact of autonomous vehicles or drones? The sample below of emerging companies highlights some of the possibilities:

Design: a Silicon Valley company designs new hospitals through algorithms capturing all the individual construction components and operational functionalities to optimise the design on a whole of life basis

Construction: a Brisbane workflow management company is aggregating sub-contractors on-boarding and tendering, saving time, money and capturing historical sub-contractor performance and cost

Operations: a Norwegian advanced analytics company is using algorithms to predict when critical assets are about to fail, saving millions of dollars in unplanned shutdowns

MACQUARIE

Risk management: an Australian start-up is using virtual reality for inspections and for train workers operating in high risk areas, reducing risks of workplace injuries

Improve asset life: a US company is using 3D spatial imaging that can detect and analyse micro-fractures in infrastructure, such as bridges and foundations, providing early detection and warning

Improve revenue: a US start-up using low cost LiDAR to optimise pitch and yaw of wind turbines to increase annual energy production

IT'S ALL ABOUT CROSS-POLLINATION

Innovation doesn't happen in isolation. Technology companies on the frontier are taking learnings from one sector and applying them to another. Internet of Things, artificial intelligence and machine learning enable the aggregation of multiple sources of data, from diverse industries, which in turn is building more sophisticated algorithms and applications.

For example, a Chicago based advanced analytics company applied the learnings on tyre performance of airplanes to optimise tyre life of mining trucks. Another advanced analytics company used its learnings and algorithms from reducing water consumption on cruise liners to optimise scheduling for smart meter repairs and maintenance.

MACQUARIE CAPITAL'S INFRATECH ECOSYSTEM

Capturing the benefits of InfraTech and staying ahead of the curve requires a holistic approach. Macquarie Capital has a dedicated InfraTech team bridging corporates and industry to InfraTech solutions through an 'ecosystem' that:

Identifies early innovation: partnering with technology accelerators and building relationships with research institutions to identify the next generation of InfraTech solutions

Invests and grows InfraTech companies: using a combination of partnerships with venture capitalists and our own balance sheet, we are investing money and resources in world leading InfraTech companies to help them grow and scale, leveraging our infrastructure and technology expertise and global networks

Partners with corporates: creating an InfraTech 'Corporate Club' to help corporates identify and work with leading InfraTech companies to help solve their key business problems and provide co-investment opportunities

Partners with institutional capital: working actively with institutional capital to provide a gateway to invest in not only infrastructure assets, but InfraTech opportunities that improve the value of those assets

CASE STUDY: HOW EMS B&K IS USING ANALYTICS TO HELP BUSINESSES GROW

EMS Brüel & Kjær[1] (EMS B&K) is an example of how InfraTech can be applied to infrastructure to optimise operations and maximise growth. EMS B&K is a world leading provider of continuous, real-time environmental monitoring solutions, including noise, vibration, dust and air quality.

They use algorithms to turn billions of data points per day from IoT sensors, weather information and other third-party data to derive actionable insights for customers. Tracking portals are also available to the public to help manage community expectations and enhance clients' social license to operate.

For example, EMS has enabled:

Airports around the world to improve infrastructure utilisation by monitoring airport noise and flight tracks, allowing airports to make changes to meet compliance and making data available to the public to demonstrate compliance and ultimately support expansion.

Construction companies to operate longer hours and work in high density areas by helping manage noise and vibration and avoid damage to nearby buildings or defend any legal claims.

Mining operators to work with communities to manage noise and air quality, maintain compliance, reduce opposition and expand mines.

EMS B&K's unique technology and solutions have made them a global market leader for airport noise management, while also operating across numerous infrastructure sectors including construction, mining, ports, renewables, utilities and rail in over 40 countries.

BUILDING THE FUTURE WITH INFRATECH

Technological innovation and the growing demand for diverse and actionable insights has enabled the exponential growth of InfraTech. The infrastructure landscape is being redefined to adapt to a future where intelligent infrastructure will be a prerequisite in creating smart and connected cities.

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1. Macquarie Capital is an investor in EMS B&K.

SPEAKER PROFILES

Adrian Kloeden

Chairman | Infrastructure Partnerships Australia

Adrian Kloeden is currently Chairman of Infrastructure Partnerships Australia, Aquasure, Hancock Victorian Plantations and the Serco Asia Pacific Advisory Board. He is a Director of the Victorian Chamber of Commerce and Industry and The Smith Family. Adrian's management experience covers a wide variety of industries, including forestry, agribusiness, manufacturing, distribution, retail, research and development, brand management, technology, e-commerce, defence and tourism and transport. He has held leadership positions in large and small public and private companies and government related organisations and has operated in many regions of the world. His early education was in Australia where he graduated in science from the Australian National University. He followed this a few years later with a master's degree in business from the London Business School. He also has an Honorary Doctorate from Deakin University.

Adrian Dwyer

Chief Executive Officer | Infrastructure Partnerships Australia

Adrian Dwyer is the Chief Executive Officer of Infrastructure Partnerships Australia – the nation's leading public and private sector infrastructure think tank. Adrian served as Infrastructure Partnerships Australia 's Head of Policy from 2011 until 2015, where he led major studies on road pricing reform, contracting and financing models, among others. In 2015, Adrian left Infrastructure Partnerships Australia to serve as the Executive Director of Policy and Research at Infrastructure Australia – the Commonwealth Government's statutory infrastructure body. Adrian was appointed as Infrastructure Partnerships Australia's Chief Executive Officer in March 2018.

The Hon Tim Pallas MP

Treasurer of Victoria

Tim was elected to the Victorian Parliament in 2006 and is the state member for Werribee. Following the election of the Andrews Government in November 2014, he was sworn in as Victoria's 50th Treasurer. In October 2017, Tim was appointed the Minister for Resources. His first budget in May 2015 delivered the biggest education budget and investment in public transport in the State's history. His second budget in April 2016 included the single biggest school capital investment in Victoria's history as well as fully funding the construction of Melbourne's new Metro Tunnel. His third budget in May 2017 included an unprecedented $1.9 billion investment to tackle family violence. Tim is most proud of his latest budget. The 2018-19 Victorian Budget - in addition to delivering another strong surplus - focused on continued jobs growth, and investment in projects and services vital to the State.

The Hon Michael McCormack MP

Deputy Prime Minister, Minister for Infrastructure, Transport and Regional Development

Prior to entering Parliament Michael began professional life as a cadet with *The Daily Advertiser*. At the age of 27 he was appointed to the newspaper's editorship, becoming the youngest person appointed to edit a daily newspaper in Australia at the time. During his career at the newspaper, Michael was a champion of many community issues. Michael was elected as The Nationals' Member for Riverina on 21 August 2010. Following the 2013 Federal Election, Michael was appointed Parliamentary Secretary to the Minister for Finance and in September 2015 he was then appointed Assistant Minister to the Deputy Prime Minister. In this role, Michael worked alongside then Nationals' Leader and Deputy Prime Minister, Warren Truss, in the administration of regional development programmes. Following the announcement of Mr Truss' retirement in February 2016 Michael became the Assistant Minister for Defence and after the 2016 Federal Election, Michael was appointed to the Ministry as the Federal Small Business Minister. On 26 February 2018, Michael became the 14th Leader of The Nationals and the 18th Deputy Prime Minister of Australia.

The Hon Anthony Albanese MP

Shadow Minister for Infrastructure, Transport, Cities and Regional Development; Shadow Minister for Tourism

Anthony was re-elected the Member for Grayndler at the July 2016 election and is currently the Shadow Minister for Infrastructure, Transport, Cities and Regional Development and the Shadow Minister for Tourism. Anthony has been a Member of Parliament since 1996 and believes strongly in the need for Government to invest in local communities. This includes Federal Government investment in public transport to address the issue of urban congestion. Following the election of the Federal Labor Government in November 2007, Anthony became the Minister for Infrastructure, Transport, Regional Development and Local Government, and Leader of the House of Representatives. Anthony was named Infrastructure Minister of the Year for 2012 by London-based publication Infrastructure Investor and in 2010 was named Aviation Minister of the Year for producing Australia's first ever Aviation White Paper. In June 2013, he became Deputy Prime Minister, and also took on additional responsibility as Minister for Broadband, Communications and the Digital Economy.

Terri Benson

Managing Director | South East Water

Terri was appointed Managing Director of South East Water on 29 May, 2017. She has held a range of both executive and non-executive director roles in the government utility and private infrastructure sectors. She is a former CEO of SEQWater, a water wholesale utility in south-east Queensland, a former Managing Director of Essential Energy and also a former Chair of the Energy and Water Ombudsman NSW. Prior to joining South East Water, Terri was the Managing Director of Birdon, a diversified engineering and services business providing innovative solutions to the military and marine industries with operations across Australia, USA and Europe.

Dr Jim Bentley

Managing Director | Hunter Water Corporation

Jim Bentley was appointed Managing Director of Hunter Water Corporation in July 2016. Hunter Water is a State Owned Corporation of the NSW Government, supplying water, wastewater and stormwater services to nearly 600,000 people in the Greater Newcastle and Lower Hunter areas. Before coming to Australia Jim was based in New Zealand for 10 years. During this time he held a number of roles including being the Inaugural Director of the Centre for Infrastructure Research at the University of Auckland and CEO of a boutique infrastructure services consultancy through which he led a number of major transport projects and led leadership development and project management programmes for a range of clients.

John Bradley

Secretary | Victorian Department of Environment, Land, Water and Planning

John is the Secretary of the Department of Environment, Land, Water and Planning in Victoria. He has previously served as Director General of the Queensland Department of Premier and Cabinet, and Director General of the Queensland Department of Environment and Resource Management. Until September 2017, he served as CEO of Energy Networks Australia – the peak body representing Australia's electricity transmission and distribution and gas distribution businesses. John has also held senior positions with the Queensland Water Commission and the Western Australian Office of Energy. John previously advised the International Monetary Fund and held several board directorships. He has a Bachelor of Arts from the University of Queensland and a Masters of Business Administration from the Queensland University of Technology.

Preet Brar

Chief Financial Officer | Veolia

With a Masters in Business Accounting and more than 10 years in business management, Preet's passion for sustainable solutions and the circular economy is evident in the way she runs her business. A creative thinker with shrewd business savvy, Preet fosters and develops these same qualities in the people around her. Preet has been with Veolia for 14 years, across multiple business units. In her current role as Chief Financial Officer, she establishes the strategic, growth and performance expectations and is accountable for the region's overall financial performance. Preet is a staunch believer in a circular economy and leads a team which has delivered a circular model of innovative resource management, supporting economic growth whilst saving our valuable resources.

Jodie Brough

Partner and Office Head (Sydney) | Newgate Communications

Jodie has more than 20 years' experience in communications as a Federal Press Gallery journalist, political adviser, senior communications specialist in the bureaucracy and consultant. She specialises in complex strategic projects for government and corporate clients, focusing on stakeholder and community engagement, issues management and reputation-related positioning. Lead partner for Newgate's transport and infrastructure practice, she has advised on some of Australia's most significant infrastructure projects including motorways, public transport, defence and urban renewal. She frequently advises on PPPs, both for bid teams and governments, through all phases of project development from the bid through to planning, construction and operations. Jodie also frequently works with clients managing reform or organisational change. She works extensively with government agencies managing changing community and stakeholder relationships, reflecting the central role communications and engagement play in managing risks and delivering on outcomes. Prior to consultancy, Jodie was a Sydney Morning Herald federal parliamentary press gallery journalist and worked in state government in NSW. She has a Bachelor of Arts from Macquarie University.

Henry Byrne

Group Executive Corporate Affairs | Transurban

Henry was appointed Group Executive Corporate Affairs in July 2017. Prior to this, he was General Manager of Corporate Affairs. Henry started with Transurban in 2007 and has previously held management roles in Investor Relations and Operations within the business. Prior to joining Transurban, Henry had worked as a lawyer and financial journalist.

The Rt Hon Sir Bill English

Former Prime Minister of New Zealand

Bill English was Minister of Finance and Deputy Prime Minister from October 2008 to December 2016 and Prime Minister of New Zealand until the change of government in October 2017, and retired from politics in March 2018. Bill English guided the New Zealand economy through the global financial crisis to be one of the faster growing developed economies with sustainable government surpluses. Bill English also focussed on public sector reform, balance sheet management and led the development and implementation of Social Investment, a world leading policy innovation for large scale social services. He oversaw significant investment in digitalising government and improving customer experience of public services. Bill is now a consultant with commercial government and not for profit clients. He is a director of Wesfarmers and was recently appointed to the Commonwealth APS Review reference group.

Behyad Jafari

Chief Executive Officer | Electric Vehicles Council

As the CEO of the Electric Vehicle Council, Behyad works with industry, government and the media to accelerate the electrification of road transport, for a more sustainable and prosperous Australia. With experience advising politicians, businesses and non-profits, Behyad has a strong understanding of Australia's political, corporate and media landscape.

Natalie Malligan

Head of Cities, Australia and New Zealand | Uber

Natalie is Uber's Head of Cities for Australia and New Zealand. She is responsible for the growth and efficient operation of Uber's ridesharing service, which now serves more than three million people across more than 25 cities in the region. Prior to joining Uber Natalie was a Manager in Bain and Company's Private Equity practice in San Francisco and Sydney. She holds a combined Bachelor of Commerce and Laws from the University of Sydney, and a Master of Business Administration from Columbia University in New York.

Sue Murphy

Chief Executive Officer | Water Corporation of Western Australia

Sue graduated as a Civil Engineer from the University of Western Australia in 1979. After winning a Clough Scholarship as an undergraduate, she joined Clough Engineering in 1980 commencing what would be a 25 year career in that organisation. 12 years in the field as a site engineer and project manager led to corporate roles with a focus on human resources, safety and engineering design management and her appointment in 1998 as the first woman on the Board of Clough Engineering. In 2008, Sue was appointed Chief Executive Officer of the Water Corporation. Sue is a member of the University of Western Australia Senate, Board Member of the UWA Business School and the Water Services Association of Australia (WSAA). Sue is also a Board Member for the Fremantle Dockers. In each year from 2009 – 2015, Sue was listed in the top 100 most influential engineers in Australia by Engineers Australia. In 2013, Sue was honoured with the prestigious Sir John Holland Civil Engineer of the Year Award by the Board of the College of Civil Engineers of Engineers Australia. Sue was also elected as an Honorary Fellow of the Institution of Engineers Australia. In 2014, Sue was presented with the IWA's "International" Women in Water Award and listed at number 8 of the 2017 "Top 25 Global Water Leaders" by Water and Wastewater International Magazine.

Dr Kerry Schott AO

Patron | Infrastructure Partnerships Australia

Kerry Schott is Chair of the Energy Security Board, Chair of Moorebank Intermodal Company, a Director of NBN, and a Director of TCorp NSW. She also Chairs the Assurance Board for Sydney Metro, and is a member of the Advisory Board for City and SouthEast Light Rail. Kerry was Managing Director and CEO of Sydney Water from 2006 to 2011. Before that Kerry spent 15 years as an investment banker, including as Managing Director of Deutsche Bank and Executive Vice President of Bankers Trust Australia. During this time she specialised in privatisation, restructuring, and infrastructure provision. Prior to becoming an investment banker Kerry was a public servant and an academic. Kerry holds a doctorate from Oxford University, a Masters of Arts from the University of British Columbia, Vancouver and a Bachelor of Arts (first class Honours) from the University of New England. She was recently awarded an Order of Australia and Honorary Doctorates from the University of Sydney and the University of Western Sydney. She is also a Patron of Infrastructure Partnerships Australia.

Tony Shepherd AO

Patron | Infrastructure Partnerships Australia

Tony is Chairman of Macquarie Specialised Management (a global infrastructure fund), the Sydney Cricket Ground Trust and the AFL GWS Giants. He is also a Director of Menzies Research Centre, Virgin Australia International Holdings and Racing NSW. He is an advisor to Bank of Tokyo Mitsubishi UFJ, a member of the ASIC External Advisory Panel and Pacific Leadership & Governance Precinct Executive Advisory Board. Tony has had an extensive career in Australia and overseas in the private and public sectors. He pioneered private infrastructure with projects such as the Sydney Harbour Tunnel, Melbourne City Link and East Link. He was the inaugural Chairman of WestConnex. He oversaw the listing of Transurban, Transfield Services and Connect East. Tony was President of the Business Council of Australia, Chairman of the National Commission of Audit and Chairman of ASTRA (the subscription TV Association). Tony is also a Patron of Infrastructure Partnerships Australia.

Karen Shippey

Chief Director: Environmental Sustainability | Department of Environmental Affairs and Development Planning, West Cape Government, South Africa

Ms Karen Shippey has a Master's Degree in Environmental and Geographical Science from the University of Cape Town and over 20 years of work experience. Whilst her post-graduate studies focussed on Sustainable Development, her work experience took her into the world of infrastructure development, working as an Environmental Assessment Practitioner. Ms Shippey has spent much of her career undertaking work in the water sector and especially on the Western Cape Water Supply System. This work incorporated environmental impact assessments on surface and groundwater infrastructure as well as community and stakeholder engagement for the Western Cape Water Reconciliation Study and project oversight on the Olifants Doorn Ecological Reserve Studies amongst others. She also undertook the stakeholder and impact assessment work for the Table Mountain Group Aquifer Feasibility Study which focussed on the deep hard rock aquifer below the Cape Fold Belt and underlies much of the Western Cape region. She however considers one of her most unusual and interesting projects in her career to be the South African Rainfall Enhancement Project Strategic Environmental Assessment which considered the likely impacts of weather modification within South Africa. Ms Shippey joined the Western Cape Government in 2011 and became Chief Director: Environmental Sustainability for the Western Cape in 2015. This role saw her providing oversight and leadership across the Provincial Climate Change, Green Economy, Sustainability, Biodiversity and Coastal Management portfolios. Between 2015-2018 the Western Cape experienced a severe drought and due to her extensive knowledge of regional water supply systems, and associated role-players, Ms Shippey was seconded to the Provincial Disaster Management Centre (PDMC). During 2017 and 2018 she provided technical support to the drought relief and disaster management efforts for the region. Her drought response role focussed on engaging with the Economic Sector and supporting specifically Business Continuity Planning. Since the immediate "Day Zero" crisis was averted in May 2018, she returned to her core focus areas which underpin the Provincial efforts to strengthen ecological infrastructure and develop resilience through improved Climate Change Response.

Gayle Sloan

Chief Executive Officer | Waste Management Association of Australia

Gayle is an arts and law graduate from the University of Adelaide. Gayle spent many years working for the NSW Attorney General's Department before moving into the Attorney General's Ministerial Office in 1998, and then the NSW Police Minister's Office in 2000. Following this time in state government, Gayle worked as a Director in a number of NSW councils, primarily looking after service delivery and assets. She developed and delivered a number of waste management contracts on behalf of councils, as well as managing environment and regulatory departments, including rangers and compliance officers. After three years of being a stay-at-home mum, Gayle returned to work in 2012 at Visy. In November 2015, Gayle joined WMAA as Chief Executive Officer.

Dr Allison Stewart

Project Director | Infrastructure Victoria

Dr Allison Stewart is the Project Director for Infrastructure Victoria's Automated and Zero Emissions Vehicles Infrastructure Advice. Allison is an experienced capital projects leader, strategist, and academic. She is a recognised expert in the theory of mega-events, and her work has been cited by the Economist, the BBC, the Financial Times, and the Wall Street Journal among others. She completed her doctorate in mega-project management at the University of Oxford's Said Business School, and has experience working in the infrastructure, energy, defence, and mega-events industries.

The Hon Alan Stockdale AO

Former Victorian Treasurer, Non-Executive Director

Alan Stockdale has extensive business and government experience. Elected to the Victorian Parliament in 1985, he was Shadow Treasurer from 1985- 1992 and then Treasurer (1992-1999) and Minister for IT and Multimedia (1996-1999) in Victoria's Kennett Government. As Treasurer, he implemented one of the most far-reaching reform programs in the world, including more than A$30 billion of privatisations; restored the Government finances of Victoria; reduced Government debt and regained Victoria's AAA rating. He was a key Minister in the Government team responsible for the reform of Victoria's public infrastructure and development of major projects. In 1999, the prestigious "Privatisation International" named him its Privatisation Minister of the Year. He was Federal President of the Liberal Party from 2008 to 2015 and a member of the Party's Federal Executive from 2008 until 2017. After leaving Government in 1999, Alan worked as an investment banker with Macquarie Bank for seven years, specialising in infrastructure projects and developed a career as a company Chairman, Director and consultant. He is currently Chairman of the Medical Research Commercialisation Fund (MRCF) and KNOSYS, a consultant to Maddocks Lawyers and Metro Trains Australia and a member of the Advisory Board of Lazard Australia.

Christopher Voyce

Executive Director | Macquarie Capital

Christopher has been an Executive Director in Macquarie Capital's Infrastructure, Utilities & Renewables industry group in ANZ since September 2015, after returning from 11 years as a senior director with Macquarie Capital in the United States. Christopher has more than 20 years' experience advising corporates, governments and investors on infrastructure M&A, project financing and project development. He has closed over $50 billion in infrastructure financings, fund raisings and acquisitions for a range of clients in the power, utilities, transportation and social infrastructure sectors in Australia, Asia, Europe and North America.

Michael Wandmaker

Managing Director | Melbourne Water

Michael has extensive senior leadership experience across several industries, both in Australia and internationally. He was previously President of FT Services, CEO of Silcar Maintenance Services, Vice President at Siemens Canada Ltd and held various executive positions with Tyco Services and Transfield Holdings. Prior to becoming Managing Director at Melbourne Water, Mr Wandmaker was Group President and Acting CEO of UGL Limited.

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