Infrastructure

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Reboot the system for urban growth

Planning As cities grow, there is a need to redesign access to infrastructure facilities.

Christopher Niesche

Planners and governments in Australia's major cities face a choice as they grow, says Tim Baynes, a senior research scientist in population growth scenarios at the CSIRO.

The first option is for cities to keep expanding and building on their perimeters, but this means that getting around the cities will become increasingly difficult, especially if better-paid knowledge jobs remain concentrated in city centres.

The costs of the approach will continue to mount. The Australian Infrastructure Audit 2019 projects that the total cost of road congestion and public transport crowding in Australia's large cities will be $39.6 billion in 2031.

The other possibility is to increase urban density and infill.

This strategy is already outlined in many Australian cities' metropolitan planning documents, says Baynes, who co-authored the *Australian National Outlook* report produced by the CSIRO and the National Australia Bank, which canvassed various scenarios for Australia's future.

Cities need a multi-dimensional response.

"(We have) mixed land use, the new centres of employment and diverse housing options, so that you have communities that are not just a place to reside," says Baynes. "They are vibrant mixed-income communities.

"People of different income strata can live and work in the same place, with new centres and new employment locations.

"This is the vision – layers of density, diversity in housing, and mixed land use, and new employment centres."

As the cities grow, they won't only need more transport infrastructure – the infrastructure will need to be designed differently. Baynes says the "hub and spoke" model, where transport radiates out of the centre like bicycle spokes, has served Sydney and Melbourne well until now.

"The moment you get to five million [people], you meet this geometry where it's very difficult to move laterally around the city. You have to go in to come out again to get to places," says Baynes, who is also adjunct associate professor at Australian National University's Fenner School of Environment and Society.

"At some point, you have to perhaps be a little brave in infrastructure and look at the connections that aren't yet there."

Australia's population is forecast to hit 41 million people by 2060, according to research by the Productivity Commission cited in the National Outlook Report. Sydney and Melbourne are each forecast be home to 8 to 9 million people, with Brisbane and Perth each housing 4 to 5 million people.

Rapid population growth presents the challenge of where the additional population will live and work, while still having convenient access to infrastructure such as transport, schools and hospitals.

"It's finding a way in which to ultimately develop cities in a sustainable way to accommodate more people and all of their requisite needs, and part of that involves almost creating cities within cities," says Jaron Stallard, global head of infrastructure at NAB.

In fact, Sydney is already pursing a "Three Cities" strategy, with three major population centres where people can work, live and play.

The infrastructure needs will be extensive. Australia already has a $200 billion pipeline of committed infrastructure projects, according to the 2019 Australian Infrastructure Audit.

"It's very evident that the public sector's ability to fund that is going to be insufficient to support that need. The role of private investment is therefore critical," says Stallard.

Importantly, several institutional

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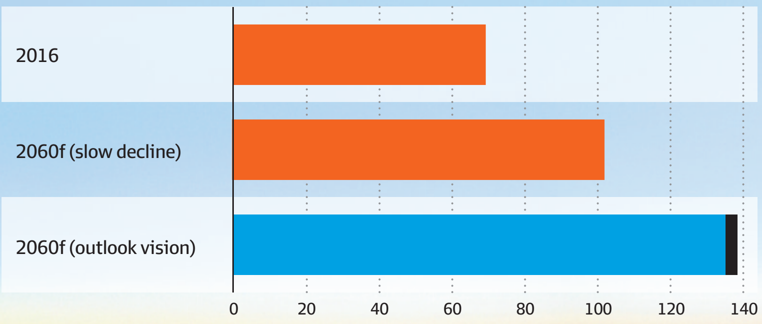
Highway to a prosperous future

Real GDP per capita ($ '000) ■ Cooperative global context ■ Fractious global context



Australia's growth potential in 2060 under different scenarios, on 2016

	Under Outlook vision (full potential)	Under Slow Decline (inadequate response)
Annual GDP growth (%)	2.75–2.8	2.1
Real wage growth (%)	90	40
Increase in total energy use (%)	6–28	61
Net emissions	Net-zero	Same levels as 2016
Increase on returns to landholders ($b)	42–84	18
Household spend on electricity (% income)	-64	-38
Increase in avg density of major cities (%)	60–88	Similar density to 2016
Environmental plantings (Mha)	11–20	Minimal change

SOURCE: NAB, CSIRO

Building for renters set to change views

James Dunn

The build-to-rent property sector is establishing a foothold in Australia – and it just might change the way people view renting.

BTR developments are designed for renting on a long-term basis, dealing with one owner. In the United States, where the sector is much more established than anywhere else, the buildings typically are owned by institutional investors, but the owner could be the developer.

Either way, the format provides tenants with an experience similar to home ownership. As longer term leases are struck, the security of tenure can help the occupants to live in more desirable areas and develop much stronger community ties, and, in effect, give them an experience very similar to owning a home.

In the US, the sector is known as "multifamily" – and institutions are major investors in the sector, looking for income and diversification.

According to global real estate investment management firm Nuveen, the US multifamily sector is a very resilient asset class: for the past 40 years, the average annual income return from it was 6.8 per cent, and even through the global financial crisis, the average income return was 5.5 per cent.

The sector also benefits its tenant customers, and with housing affordability, bigger and denser cities, growing population and a looming undersupply of apartment stock all becoming prominent issues for Australia, BTR developments are kicking off as part of the response.

The country's first true BTR project opened this year on the Gold Coast when UBS Asset Management, Australian builder Grocon and global real estate giant JLL converted 1251 apartments in the former Gold Coast Commonwealth Games athletes village into a $550 million village of rental units, known as "Smith Collective".

The Element 27 building in the Perth suburb of Subiaco, developed by US BTR heavyweight Sentinel Real Estate, opened in October.

ASX-listed real estate firm Mirvac will complete its first purpose-built effort within the Pavilions project at the Sydney Olympic Park next year and recently bought a completed 490-unit BTR project opposite Queen Victoria Market in the Melbourne CBD. Melbourne-based developer Salta Properties plans a BTR apartment block in Melbourne's Docklands, while US BTR giant Greystar has joined forces with local partner Macquarie Capital to plan Australian projects.

Ken Morrison, chief executive officer of the Property Council of Australia (PCA), sees BTR as a positive development. "Australia has had the 'build-to-sell' model for many decades, and our policy settings are based on that, but with more people renting, our cities getting bigger, and people wanting more choice in their housing options, it's clear that there's a demand for this type of product. Now we have to make sure that the policy frameworks are there so that we get the supply to match that demand," he said.

Mr Morrison said land tax, withholding tax rates for foreign institutional investors and the GST treatment of build-to-rent are all potential pitfalls that must be worked through, as well as planning frameworks and design guidelines, which had been set up around build-to-sell housing.

"There are quite a few discussions that the industry and governments need to have about a truly level playing field for BTR," he said.

Renting is becoming a popular option and builders as well as investors are keen to cash in on the trend. PHOTO: SAM MOOY


Property Council of Australia CEO Ken Morrison. PHOTO: DOMINIC LORRIMER

The arrival of build-to-rent coincides with increased focus on "affordable" housing – particularly in the context of a city's "key workers", a category that includes vital but relatively low-paid occupations such as police, nurses, firefighters and teachers – and on "social" housing, catering to low-income and disadvantaged people.

In the UK, where the BTR sector is growing apace, the government has tried to encourage BTR developers to include these housing categories in their projects.

"If there is planning gain on a development, the local planning authority can put certain restrictions on the development, saying a certain portion of it can be only used for social and affordable," said Michael Carr, head of social housing finance, Europe and North America, at National Australia Bank. "There will be a reasonably complicated negotiation, which will involve a number of drivers, but the objective from the planning authority is to get as much social/affordable into that development as they can."

Whether it is possible to combine social and affordable housing with "true premium BTR" is untested in the Australian market, said NAB's Bill Halmarick, head of real estate, corporate and institutional banking. "The interesting point here is that the BTR model is built around a premium rent being paid, because you're providing all sorts of shared amenities – it could be a pool, a fitness centre, a concierge, a cinema, a bar, a rooftop garden. That model assumes that you're going to be able to charge premium rent, which is diametrically opposed to the concept of social and affordable housing.

"The private developers that are setting up BTR assets at the moment, I don't believe they're really looking to incorporate social and-or affordable housing into those developments, if they're not required to," he said.

"The flip side is that governments are coming at it from a different angle – they are saying, 'We can offer you a site and you can do 70 per cent BTR, but you will have to include 20 per cent affordable and 10 per cent social in that project.' But it's fair to say that whether you can actually blend social and affordable in with BTR is unclear."

$22 trillion hole in global infrastructure spending

Mark Eggleton

Global infrastructure spending needs to increase significantly if we want to sustain economic growth into the future, according to the most recent Global Infrastructure Outlook released by the G20's Global Infrastructure Hub and Oxford Economics.

The report outlines a potential shortfall of $US15 trillion ($22 trillion) in infrastructure spending between now and 2040, with the roads, electricity and airport sectors confronting the largest gaps in spending requirements.

"The world will need to increase the proportion of GDP it dedicates to infrastructure to 3.5 per cent, compared to the 3 per cent expected under current trends," the report says.

Closer to home, Australia is still in the midst of a construction boom, with the latest RLB Crane Index indicating there are now 757 cranes assisting construction work across the nation.

In fact, of all the cranes removed from completed projects, 100 per cent were placed back on new projects during the last six months.

Moreover, while we're seeing a downturn in residential construction, it's being offset by state and federal government infrastructure spending and planning as is evident by "the location of cranes along key city transportation corridors and activity centres".


Cranes in the skyline are a good indicator of economic activity picking up. PHOTO: STEVEN SIEWERT

"This is most evident in Sydney along the Pacific Highway and the Dandenong rail corridor in Melbourne," the report says.

NAB's Global Head of Infrastructure Jaron Stallard says infrastructure spending is very strong, especially as the pace of global urbanisation continues.

He adds there is a lot of catch-up infrastructure that needs to be built and with a relatively sluggish global economy, central banks have pulled a lot of levers on monetary policy, which has, in turn, released a lot of cheap capital onto global markets.

"There has been a mountain of private capital raised and it's ready to be deployed to infrastructure," he says.

Looking back to the Global Infrastructure Outlook, Stallard acknowledges there's plenty of demand to build "bread and butter" infrastructure such as road and rail, but there's a huge pipeline of telecommunications infrastructure that also needs to be built as big data and the Internet of Things become more omnipresent in every part of the economy.

As for whether infrastructure projects are profitable upfront, Stallard suggests capital providers have moved beyond a simple cost-benefit analysis of projects.

"There is now more of a focus on the ongoing service provided over a longer tenor."

Stallard says the public, private partnership model is "alive and well" in Australia, despite some suggestions large contractors are a little wary of the model and governments are loath to lock in guaranteed rates of return to contractors because of the potential of costly bailouts if a project doesn't perform.

"There's always a debate about PPPs, especially when things don't go well but the private sector brings in a lot of project expertise, especially around ongoing running costs, which government doesn't have," he says.

NAB goes well beyond funding traditional PPPs though and works with clients right across the funding spectrum.

"We're often in at the project level and work with a client's business as their infrastructure needs develop. For example, with an airport client looking to fund new runways, we'll ask 'how best do you fund this expansion', and look for innovative funding solutions."

Internationally, NAB is now rated in IJGlobal's Top 10 banks globally by project finance deal value and transaction numbers.

Stallard says while Brexit is dragging the UK down, the pipeline for Europe is strong with lots of digital infrastructure and in the United States, where there is a West Coast LNG terminal construction spike as the country's shale gas boom continues to expand and producers look to tap into Asian markets.

And as global infrastructure continues to boom, many Australian funds are looking to invest offshore, especially local super funds, who are sitting on huge pools of cash and need to find opportunities in larger markets.

Alternatively, global funds look at Australia to invest due to our innate advantages like the strong rule of law and solid regulatory environment.

More pertinently, infrastructure spending globally isn't discretionary, it's fundamental to society. The key, according to Stallard, is getting the planning right and ranking what needs to be done.

"As Infrastructure Australia have indicated, we need to be strategic about our infrastructure priorities and have a diversified infrastructure plan."

Speaking at the 2019 Infrastructure Australia Audit launch, the organisation's chair Julieanne Alroe spoke of the need to be more strategic about how we plan and fund local projects, especially in regional areas.

She said while our major urban areas and regional centres are well served by infrastructure, "in many parts of the country, service provision falls below what is acceptable for a highly developed nation".

"Addressing these imbalances in infrastructure service provision needs to be a priority," she said.

Climate change needs planning for resilience

Christopher Niesche


The floodgates of Hume Dam were opened to cope with a huge inflow of water. Extreme events require adaptability. PHOTO: MARK JESSER

Infrastructure owners face a big challenge – balancing the need to make their assets more resilient against extreme climate events while balancing other demands on their funds.

The stakes are increasingly high as climate change makes disaster events more frequent and more severe.

Natural disasters will cost Australia $39 billion a year by 2050 unless more is invested in infrastructure resilience, according to a study by the Australian Business Roundtable for Disaster Resilience and Safer Communities.

The National Institute of Building Sciences estimates that for every dollar invested on making infrastructure and communities more resilient, approximately $6 is saved in the post-disaster recovery period.

But operators of existing infrastructure have a hard question to answer as they are also pushed to increase efficiencies and boost returns.

"How do you make that investment decision?" asks Peter Chamley, the Australasian chairman of global engineering firm Arup and an authority on infrastructure resilience.

"Do I spend money on being more efficient or do I spend money on resisting a shock that might not come for another 10 years?"

Infrastructure resilience doesn't just relate to the ability of a piece of infrastructure to withstand a shock event, he says, but also to adapt to changing conditions or to be able to bounce back quickly after it has suffered a shock.

"One of the issues is really around shifting designers' thinking away from building something that is resistant or has some fail-safe level of protection to perhaps softer systems that in a very controlled way you allow to fail safely and designed in such a way that it can bounce back quickly after the event has passed," he says.

For instance, instead of building ever higher walls to protect a flood-prone area, some parts of it might be allowed to flood, but be able to drain quickly and contain infrastructure that can cope with some inundation for a short period.

Importantly, resilience shouldn't just be considered in terms of isolated pieces of infrastructure but as systems, because so many infrastructure assets have become more complex and interdependent.

Water supplies, for instance, once relied solely on gravity and were therefore straightforward. Now they need power for pumping, chemical treatment facilities and the Internet of Things for monitoring operations.

So far, the challenge of infrastructure resilience is not being met. The 2019 Australian Infrastructure Audit


Infrastructure Australia CEO Romilly Madew. PHOTO: PAUL JEFFERS

found that Australia lacked comprehensive resilience strategies for its assets and networks.

"Planning for resilience requires a comprehensive risk assessment, and an understanding of the potential social, economic and environmental costs of outages, damage, disruption or failure," Infrastructure Australia CEO Romilly Madew said in a speech in August.

Madew also warned that climate change-induced disasters could affect Australia's financial stability as insurers faced large anticipated payouts; emissions-intensive companies braced for new legal liabilities; and changes to regulation put previously valuable assets at a redundancy risk..

"All of this could lead to sharp adjustments in asset prices, which would have consequences for Australia's financial stability and long-term economic prosperity," she said.

David Jenkins, head of sustainable finance at NAB, says, "Most, if not all, of these assets are fundamental to the economy and the communities, and the costs and the burden of either repairing or making these more resilient is becoming increasingly a challenge.

"The stranded asset risk is very real ... if you consider some of these low-lying areas that are increasingly subject to rising sea levels and flood levels, at some point, in many of these areas, it'll be either a case of retreat, relocate, or significant investment to address these continuing impacts."

Jenkins says NAB is working to change the focus away from being reactive to a more proactive approach, but funding is a challenge.

"In many of the cases, the burden has fallen squarely onto the local government or state government level where there's been limited opportunity or little consideration given to the apportionment of cost on the beneficiaries for this style of infrastructure," he says.

"We're trying to find ways in working with our customers and government and private sector entities to try and find ways to develop new financing solutions to assist with these."

One of the challenges is how to identify and capture streams of revenue to repay the investment in retrofitting infrastructure – that is, how to apportion the benefits to the various beneficiaries and how to monetise some of those benefits.

A collaborative approach between the government and the private sector, as well as developers and asset owners, is essential, he says.

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funds and superannuation funds have already said they want to invest in infrastructure.

"There's absolutely no shortage of finance for infrastructure in Australia. It's an attractive sector and there's a lot of private money – both from the equity and the debt side – to invest."

The timing and sequencing of projects will be a challenge. Sydney and Melbourne alone have $78 billion in committed transport infrastructure.

"The money is there," Stallard says. "What people need to be conscious of is around ensuring that the pipeline of activity is undertaken in a co-ordinated fashion, such that you can still get the right and appropriate expertise actually on the ground."

Planners also need to focus on creating liveable cities and ensure there is sufficient green space, and that infrastructure allows people to make the best use of beaches or parklands. This accessibility helps sustain a healthy population.

"It's very hard to put a monetary value on this," says Stallard.

"But if we reserve this space and create a park and we've got all these water features in there as well and trees and greenery, and we know that people are going to use that as a result, maybe people have less sick days, therefore there's less demand on our health system."

Baynes says that in pursuing the multi-city strategy, it's important that planners don't just try to recreate the existing CBD.

"It's how you gracefully evolve the city to provide other centres that are further away but not too far away," he says. "If you can connect to it quickly with infrastructure, you can make new centres that don't compete."

For example, California has different cities, each of which perform different functions – San Francisco is the tech hub, while Los Angeles has a strong media sector and San Diego is a trade hub.

Industry insight

David Gall

Chief Customer Officer – Corporate and Institutional Banking, NAB

This content is produced by The Australian Financial Review in commercial partnership with NAB.

Earlier this year, the Australian National Outlook report asked what Australia would be like economically, socially and environmentally in 2060.

The study – a combination of CSIRO's modelling and research with input from NAB and 19 other participants – presented a compelling view about two possible futures for Australia.

It looked ahead 40 years and painted a picture of what life could be like for our children and grandchildren.

In what is termed the "Outlook Vision", Australia takes decisive action and a long-term view, achieving positive outcomes. In "Slow Decline", Australia fails to adequately address the global and domestic issues, resulting in declining economic, social and environmental outcomes.

Achieving the positive outcomes described within the Outlook Vision is within our grasp.

Achieving the positive outcomes described within the Outlook Vision is within our grasp. But we need to take definitive action on five core shifts – across energy, land use, culture, industry and the urban landscape – to get there.

What has emerged since the report launched in June is that its significance lies not just in the data and numbers.

The report is also driving healthy debate and conversation because it prioritises the long-term prosperity of our nation through careful consideration of what these five core shifts mean and the role each of us can play.

That's particularly powerful at this moment in time, when the short-term outlook for Australians – and citizens across the world – is indeed uncertain.

The daily news cycle is a reminder that we face slowing global growth, escalating US-China trade tensions and concerns about Brexit. Capital expenditure is down 1 per cent from a year ago.

NAB's Q3 Australian Consumer Anxiety Index shows that consumer anxiety rose 2.9 points over the September quarter to 57.3 points, in part attributable to global and domestic economic uncertainties.

And it's a similar story for business owners. The NAB Quarterly Business Survey for the third quarter of 2019 showed confidence as being well below averages in 2018, falling 7 points to -2.

If we can address the challenges and opportunity within technological change, climate change, demographics, social cohesion, trust in institutions and the rise of Asia, the National Outlook predicts Australia can set a path to higher GDP per capita by 2060.

It's a path where we will see strong economic growth, greater energy affordability, "net zero" greenhouse gas emissions and liveable major cities.

But navigating this path won't be easy.

For example, a growing and ageing population is placing stress on our major Australian cities, particularly the provision of housing near employment, services and amenities.

For our urban landscape, a positive future relies on making decisions that shape inclusive communities where people can live within easy commutes of work and services.

There are opportunities for both the public and private sectors to design and build higher-density living in the so-called "middle rings" of cities, increasing access to transport, health and education infrastructure as well as recreation facilities within an easy commute of one or more city centres.

Higher-density planning and building up the middle ring can reduce the yearly distance travelled by vehicles in our cities by 45 per cent. It brings people closer to jobs, amenities and where they need to be in their daily lives. It builds vibrant and diverse communities.

But the key piece of the puzzle is housing – and importantly, affordable and specialist housing for those that need it. And this is where NAB can make a meaningful contribution.

We are allocating $2 billion over the next three years to help more Australians access affordable housing.

We are focusing on providing loans and developing new financing avenues for not-for-profit groups and other organisations that build crisis accommodation, community housing, disability housing, build-to-rent properties and sustainable developments.

While we don't have all the answers, we have deep understanding of the housing market and the right relationships to have a positive impact.

Ultimately, we are here to serve customers, to keep their money safe and enable investment. We are open for business and are lending to businesses that want to grow.

And more broadly, we play an important role in supporting our customers to create long-term prosperity in Australia. Access to affordable and specialist housing is one way NAB is navigating the pathway to aspirational outlook vision in 2060.

The ANO research has also led to a partnership between NAB and ClimateWorks Australia to help future-proof the agricultural industry against environmental challenges.

We also recently committed $2 billion in financing to help emerging technology companies.

Since announcing this series of commitments, we've received overwhelming feedback from the community and from our customers. We all have a vested interest in where Australia is heading and what we can all do about it to drive change.

We are committed to doing our part on this journey and taking meaningful action. We hope this special report promotes more discussion and positive action for our nation's future.

There's wonderful life after death for waste

Christopher Niesche

Veena Sahajwalla wants us to reconsider how we think about end-of-life products.

"It's interesting that we refer to materials when they reach end-of-life as waste," says Sahajwalla, director of Sustainable Materials Research & Technology at the University of New South Wales (SMaRT@UNSW).

"It's actually missing out on a fantastic opportunity by simply putting it into the problem basket."

Take a jam jar, for example. "Why are we calling it a problem just because it no longer carries our food in it?" Sahajwalla asks.

Many of these products are made of high-quality materials and we should look at possible uses for the materials that go beyond the same purpose, such as another jar or bottle.

The philosophy underpins the work of SMaRT, which is developing microfactories to transform waste materials into other products. They can operate in as little as 50 square metres of space and so can be located wherever waste is stockpiled.

One of the factories takes end-of-life glass and textile products and transforms them into tables and countertops which contain up to 80 per cent recycled materials, and which are on show at some of Mirvac's display apartments.

Veena Sahajwalla, of UNSW, says we need to consider end-of-life use for products.

Sahajwalla says that if turning end-of-life products into new products is to have a sustainable role in tackling the waste crisis, they will need to compete economically with other products in the market.

There is already some progress on this. One of the SMaRT microfactories is producing plastic filaments for 3D printing with an "absolutely competitive price", she says.

This relies on making products the market needs.

There might be little point in producing more glass jars, for example, because Australia might already have a surplus of jars, thanks to the large amount of imported manufactured food.

Waste is a growing problem in Australia.

The National Waste Report 2018 prepared for the Department of the Environment and Energy found that in 2016-17, Australian generated 2.7 tonnes of waste per capita.

The nation as a whole produced an estimated 67 million tonnes of waste including 17.1 million tonnes of masonry materials, 14.2 million tonnes of organics, 12.3 million tonnes of ash, 6.3 million tonnes of hazardous waste, 5.6 million tonnes of paper and cardboard and 5.5 million tonnes of metals.

Four-fifths of waste in Australia come from commercial and industrial uses.

It is a steep rise from 2006–07, when 57 million tonnes of waste was generated. However, on a per capita basis, waste declined by 10 per cent over this timeframe.

Despite the focus on household waste, Cameron McKenzie, chief executive of Aspire, says about four-fifths of waste in Australia come from commercial and industrial uses and construction demolition.

Aspire is working to match this sort of waste with builders and others who can reuse the materials rather than having them go into landfill.

The business – which was spun out of the CSIRO in April – works via a platform where it matches owners of waste with businesses which have a use for it.

It has matched businesses with waste Styrofoam with a company that then shreds it before mixing it with concrete for thermal bricks for construction.

A food company with surplus produce was matched with another business which picks it up and distributes some of it to disadvantaged people and some to a piggery.

Some companies are able to sell their waste, but even for those that give it away, there can be financial rewards. The food company, for instance, was able to cut its rubbish bill from $8000 a month to $1500.

Behind the platform lies analytics which do the matching, because products are not always like-for-like. The analytics also look at what the environmental impact of the end use will be.

It preferences those that will emit less carbon dioxide and those which are nearer, so require less transport.

The Melbourne-based business is in the process of expanding nationally and McKenzie says that in the last financial year it converted 45,000 tonnes of waste and saved over $210,000 in supply chain costs.

Also in Melbourne, a group of suburban councils banded together to form the South Eastern Organics Processing Facility, which will take up to 120,000 tonnes of household food and garden waste a year and turn it into 50,000 tonnes of usable compost.

Carlos Gros, a director of Sacyr Environment Australia, which will operate the facility, says the composting process at the facility will be the same process that happens naturally but quickened through the circulation of water and oxygen through the waste. He says that as a general rule, anything that can be reused or have a new use should not end up in landfill.