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Australia's infrastructure: Making cities resilient

Australia’s infrastructure and population are constantly growing and as well as being a resilient economy, the expectations of quality infrastructure and connectivity for a better quality of life are increasing. Infrastructure also provides the opportunity for leading companies to finance, construct, own and operate infrastructure assets.

The issue in Australia - most of the infrastructure required to be built are in complex cities and are in highly urbanised environments and with this comes significant environmental issues, planning issues and community issues. It also means that solutions to these problems are expensive and developers and governments are finding it difficult to fund the expensive infrastructure projects. The rise in discussions around future cities has increased by 175 per cent with conversations being had around the Australian government improving productivity and liveability of the nation’s largest cities as they grow over the next 30 years.

Australia has nearly 600 different local, state and territory Governments that, together with the Australian Government, fund and plan infrastructure. We have short election cycles and three levels of government - federal, state and local. This can challenge long-term infrastructure approaches to projects and as much revenue raising capacity is held by the federal government and it is removed from the planning and delivery scope at state and local government levels.
By having a multitude of players involved in infrastructure projects, our development is slow and delivery risks are high, which constrains productivity and makes projects less attractive for potential investors. The term climate change is very prominent in the media, with over 55,000 media items from August 2018 to August 2019 – it is evident there is much discussion around how Australia is contributing to the downfall of the environment, including the impact various infrastructure sectors are having on the climate.

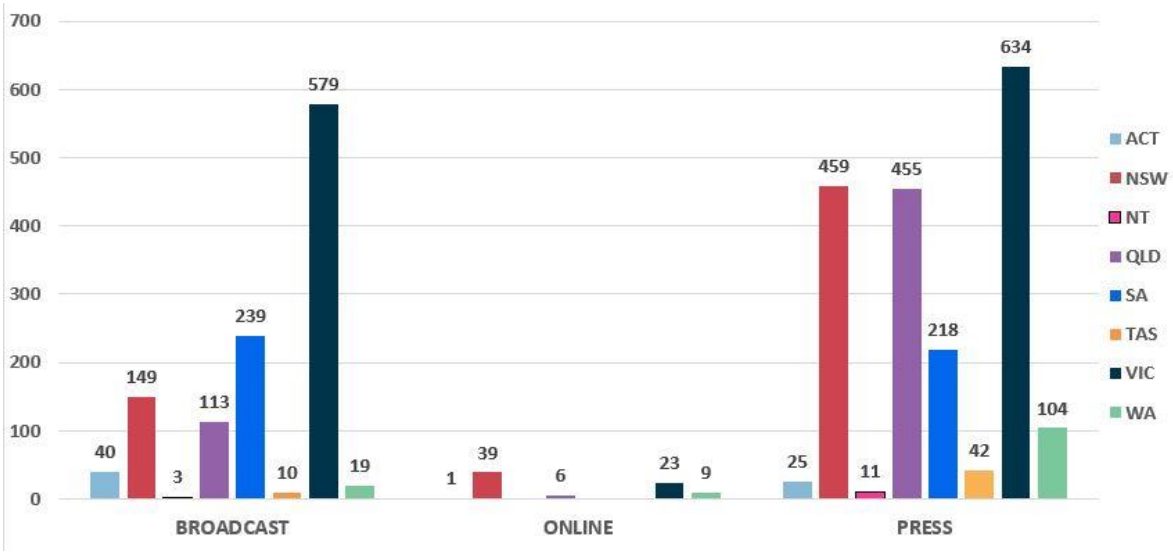
While efforts are being made at both a national and state level to address Australia's chronic infrastructure deficit, there is a lack of a strong pipeline of projects. Why is this?

In this whitepaper we explore the various infrastructures within Australia including transport, water, energy and telecommunications to understand their current status, the effects each sector is having on the environment and analyse the role media plays.

A growing population

Australia's population is rapidly growing, ageing and urbanising, with implications for the demand for infrastructure and services and the structure of Australia's economic geography. Australia's ageing assets have been put under growing strain and with rising congestion of our roads, crowding on public transport, growing pressures on climate change and the effects it has on our water and energy infrastructure, it is the opportune time for the Australian government to address these issues. There is a significant need for a change in infrastructure to improve the living standards for Australians.

Between the period August 2018 and August 2019, there were close to 23,000 media mentions related to infrastructure across broadcast, online and press channels. Mentions in Victoria were more prevalent and especially across press and broadcast with 634 and 579 mentions respectively. NSW and QLD also showed strong figures with press mentions and not surprisingly, these numbers spiked throughout the months of April 2019 – July 2019, where there were discussions about infrastructure projects and policies leading up to the federal election and after the election.



Transport Infrastructure

The Australian Government has committed to investing $100 billion over 10 years from 2019-20 in transport infrastructure across Australia through its rolling infrastructure plan, of which a substantial component is under the Infrastructure Investment Program.[i]

As transport is critical within our everyday lives, the Australian Government is significantly

investing in the sector to combat road congestion, have better roads connecting vast regions and improve the quality of roads in metro and regional areas.
Our vast transport network system provides us with the ability to work, learn and interact with people and given the plethora of demands placed on the network, it is not surprising that the sector is facing major challenges.

The current situation

With transport infrastructure, there comes social and economic impact with the developments of urban transport in Australia.
Congestions in transport infrastructure not only have significant consequences for our national economy, they also directly impact communities, reduce people's access to education, health services, employment and other opportunities. Road congestion accounts for most of these costs due to private vehicles still being the dominant mode of choice accounting for 64 per cent of passenger transport and 85 per cent of all land-based passenger kilometres.[1] It has been estimated the cost of road congestion will grow from $18.9 million in 2016 to $38.8 billion in 2031.[2] These statistics confirm road congestion is increasing to be an all-day, everyday problem.

Public transport makes up approximately 20 per cent of journeys to work in Australia's major cities and while crowding on public transport is mostly a peak period problem, it is rapidly growing into a larger issue as the number of patrons increase and peak periods become longer.[3] Crowding is especially evident on urban rail services as commuters look to avail themselves of the relatively good speed and reliability of the train for longer-distance travel, compared with road travel by car or by bus operating in mixed traffic. The Sydney Trains network is a good example of how rapid growth in demand is causing overcrowding at stations and on trains, with impacts on service reliability and travel times and the dissatisfaction of commuters. In both Sydney and Melbourne, the large pipeline of rail projects both underway and planned will not alleviate the cities becoming congested by 2031 but will result in even more overcrowding.

[1] https://ministerinfrastructure.govcms.gov.au/mccormack/media-release/building-our-future-delivering-right-infrastructure-growing-nation
[1] https://www.infrastructureaustralia.gov.au/sites/default/files/201908/Australian%20Infrastructure%20Audit%202019.pdf
[2] https://www.news.com.au/finance/economy/australian-economy/infrastructure-audit-reveals-australias-10-roads-likely-to-be-the-most-clogged-in-2031/news-story/27c09ef173d80b327fb74d8cdcb1d0bb
[3] Wilkins, R and Lass L, 2018, The Household, Income and Labour Dynamics in Australia Survey: Selected Findings from Waves 1 to 16, Melbourne Institute: Applied Economic & Social Research, University of Melbourne, p 49, available via: https://melbourneinstitute.unimelb.edu.au/__data/assets/pdf_file/0009/2874177/HILDA-report_Low-Res_10.10.18.pdf.

Sydney drivers traversing the busiest roads can expect to spend 70-90 per cent of that portion of their commute delayed, compared to 60-80 per cent now. Interestingly, of Australia's five busiest roads, four are in Sydney. However, congestion in Melbourne and Brisbane are strongly growing.[4]

The Australian Government has committed $4.5 billion through its new Roads of Strategic Importance initiative to improve productivity and efficiency on Australia's key freight roads, airports, transport hubs and better access for tourism, mining and other sectors.[5] Some of these featured projects include:

- Melbourne Airport Rail Link
- Western Sydney Infrastructure Plan
- WestConnex
- NorthConnex
- Pacific Highway (NSW)
- Bruce Highway (QLD's north-south corridor)
- Gateway Upgrade North
- Toowoomba Second Range Crossing
- Northlink WA
- North-South Corridor
- M80
- Midland Highway
- Melbourne to Brisbane Inland Rail
- Metronet
- Monash Freeway

Although Australia's various government bodies are investing in building new roads and new public transport networks, it has presented some challenges with funding for new assets and also with the maintenance of existing assets. At present, there is a gap between usage and expenditure on infrastructure projects and this has created a lack of transparency about why and how money is spent. According to Infrastructure Australia (IA), there is said to be "precedented" pressure and the current boom in construction projects needed to become the "new normal" to keep pace with population growth and changing consumer demands.

[4] https://www.news.com.au/finance/economy/australian-economy/infrastructure-audit-reveals-australias-10-roads-likely-to-be-the-most-clogged-in-2031/news-story/27c09ef173d80b327fb74d8cdcb1d0bb

[5] https://investment.infrastructure.gov.au/

Regional areas

The varied quality of Australia's regional road network is resulting in a high number of crashes and fatalities. Relative to population size, the number of fatalities in regional areas was over four times greater than for major cities during 2008 and 2016.[6] While behavioural factors play a role in the cause of road crashes, infrastructure deficiencies such as the sudden curvature of roads and lack of safety barriers in appropriate areas are also major factors when it comes to accidents.

Moving forward

There are many opportunities with the constant improvement of technology. By 2040, electric vehicles (EV) are projected to account for 70% of new vehicle sales and 30% of the vehicle fleet in Australia. There are currently approximately 2,300 EVs on Australian roads. With the greater adoption of EVs, it will have a significant impact on maintenance cost savings, fuel consumption and numerous benefits for the environment.

The current big issue with adoption is the lack of charging stations - with less than 800 across Australia and only 70 of these being fast charging. Other factors for slow adoption are high vehicle prices, model availability and the distance over which they can travel on a single charge.

The initiatives to combat these challenges are developing a network of fast charging stations on the national highway network to provide national connectivity and developing policies and regulations to support charging technology adoption.

Energy infrastructure

A steep increase in network costs across the nation has driven energy bills up 44 per cent over the last ten years and during a period of low wage growth, the pressures associated with the cost of living has dramatically increased.[7]

Much of Australia’s energy infrastructure is fixed, costly and has a long life with its markets being complex and sensitive to change. With two forms of energy – electricity and gas - networked across Australia, neither are fully connected across the mainland. For a sector

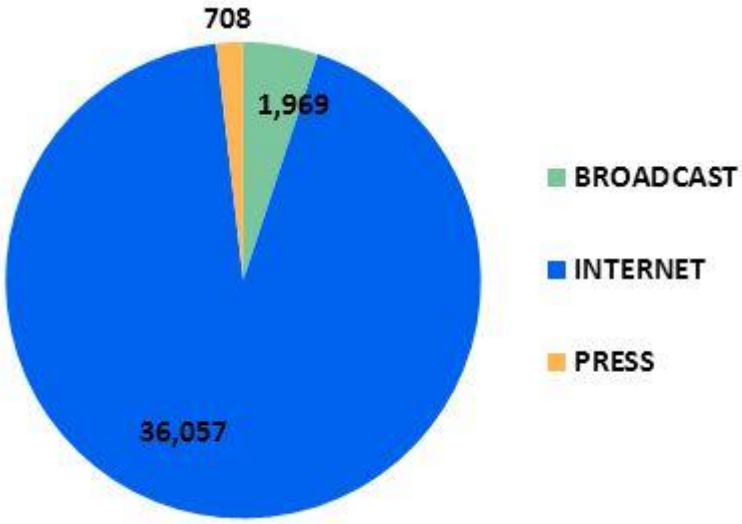
[6] https://www.infrastructureaustralia.gov.au/map/regional-road-network-safety-improvements

[7] https://www.accc.gov.au/system/files/Retail%20Electricity%20Inquiry%20-%20Preliminary%20report%20-%2013%20November%202017.pdf

that is undergoing great transformation, as well as adapting to new sources and consumer preferences, these are also the factors for the sector experiencing challenges. Alongside this energy transformation and uncertainty of government policies, there also presents the issue of climate change and how the government will manage it. Energy costs have risen faster than inflation in the past decade and this has meant a poor deal for many users, with bills rising exponentially and many users expressing dissatisfaction with the affordability of their energy services. The pressures associated with low wage growth and the increase to the cost of living has only added to the dissatisfaction of users.

The below graph depicts the number of media mentions of “energy” and “increase” during the period August 2018 – to August 2019. It can be seen that these terms together were topics of conversation and from the significant number of 38,734 mentions, 36,057 of these were mentioned online.

Media mentions using terms “energy” and “increase”



For many years, Australia's main source of energy has been from black and brown coal and as a result has held a comparative advantage in energy costs yet due to the effects these energies have on climate change and concurrent technological change means that renewable energy sources are becoming more prevalent and challenging the status quo. With the cost of our energy rising faster than other countries, we are now comparatively less competitive and our potential for growth, investment and productivity is undermined.
There is ample opportunity for Australia to take advantage of the world transitioning its energy fuel mix towards lowering its emissions and becoming an advocate of renewable energies with solar and wind energy.

Telecommunications infrastructure

Australia's telecommunications sector is vast, covering networks that carry voice and data between users across Australia and worldwide. The sector is not limited to only voice and data, it also includes spectrum, satellites, data centres, network towers and more.

The demand for faster data transfer using optical fibre-based networks prompted the federal government's commitment to constructing the National Broadband Network (nbn) – Australia's largest infrastructure project. The nbn is a purpose built, high capacity broadband network and has been developed to provide Australian households and offices with reliable and highspeed broadband connections and be the predominant wholesale provider of fixed line access services. In the 4.8 million households that it has been activated, its service has not met the desired expectations and has faced numerous issues regarding its service quality. This is particularly evident in remote and rural areas that are reliant on satellite nbn.

Technological advancements have allowed the telecommunications industry to grow with constant improvements to its infrastructure including a new generation of mobile networks. This is prevalent as Australia's use of fixed broadband and mobile data has increased by 175% and almost 250% respectively since 2015.[8]
Most of the telecommunications infrastructure in Australia is privately owned with notable exception to the publicly owned nbn network yet once it is complete it will transfer over to be a privately-run entity.
In the past month, nbn are receiving more and more pressure to finalise their installations across the country, with 123 suburbs still waiting for the network. In the past three months –

[8] https://www.infrastructureaustralia.gov.au/sites/default/files/2019-08/Australian%20Infrastructure%20Audit%202019%20-%208.%20Telecommunications.pdf

June to August 2019, there have been over 6,000 mentions of the nbn in the media. This spike in mentions is due to the company refusing to confirm the installation for these suburbs only days after it was announced the rollout was on track and due to be completed by 2020 – the delays are suggested to be as a result of infrastructure problems.

New and emerging digital technologies are redefining the communications and media sector and the way Australian's connect, access and consume content and services. With the introduction of 5G, it has accelerated a 'fourth industrial revolution' - a new era in the development and disruptiveness of technologies and promoting the blurriness of technology into every aspect day to day operations.
These evolving telecommunication infrastructures are providing governments, businesses and households with the ability to leverage new technologies that enable greater access to information, improve efficiencies and boost productivity within their entities.
For example, the government has implemented systems such as MyGov used as a secure way to access government services online with one login and one password. This platform has created great efficiencies, especially at tax return time.

In the business world, more and more organisations are welcoming cloud computing into their workforce, as well as the Internet of Things and artificial intelligence to simplify tasks. Cloud storage is providing more mobile accessibility, reducing hardware costs and are saving businesses from high security costs and data redundancy.
With the introduction of smart technology, households are embracing these technologies to provide convenience and automate household tasks such as robotic cleaning machines and turning on devices with virtual assistants.

Water infrastructure

Many Australian's rarely think of where their drinking water comes from or where their wastewater goes. Australia's water supply is thought to be of high quality and as a nation, Australian's are the leaders in the development and application of environmental and health standards.[9]

Reliable and sustainable water resources support the health and wellbeing of all Australians and having access to clean drinking water raises productivity levels and supports the economic growth of the country across various industries. The nations independent

[9] http://www.agriculture.gov.au/SiteCollectionDocuments/about/factsheets/water.pdf

infrastructure advisor, Infrastructure Australia has warned and raised concerns about soaring bills and a lack of water supply to the fastest-growing parts of Australia. The Australian government is working to improve the efficiency and productivity of farm irrigation water use and management through a number of funding programs to review the current risks and to mitigate any further issues.

Murray-Darling Basin

The Murray-Darling Basin is of significant economic, social and environmental importance to the country. Known as Australia's food bowl - it has a population of approximately 2 million people and supports much of Australia's agriculture and agricultural exports.[10] The Basin also contains more than 30,000 wetlands, including 16 internationally significant sites, which provide habitat for migratory birds. However, in recent years, the basin has been under immense stress due to the over-allocation of water, severe drought and the early impacts of climate change. These was evident with the recent incidents of fish deaths in parts of the Murray-Darling Basin and regional towns running out of drinking water. These events have tarnished the confidence placed in Australia's water management.

The government has committed to restore the Basin's rivers and wetlands to health while supporting strong regional communities and sustainable food production. To return the basin to health, the plan requires a reduction in diversions to a more sustainable level.
One of the infrastructure programs - Sustainable Rural Water Use and Infrastructure Program invests in rural water use, management and efficiency and improving water for the environment and promote water recovery in the Basin.

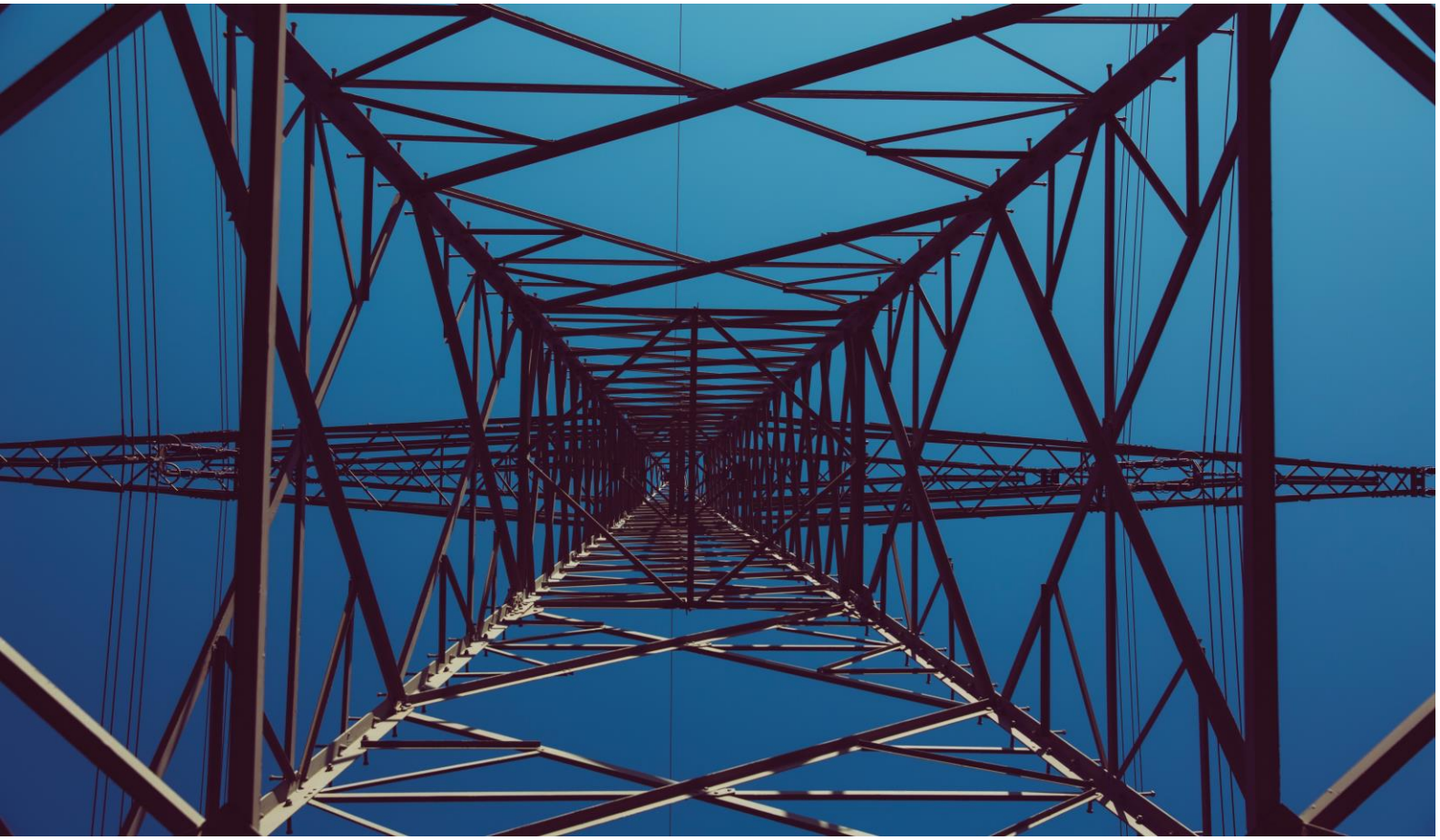
As with other forms of infrastructure, the water sector has faced various challenges from factors such as population growth, climate change and changing user expectations.
In this sector, climate change is the most prominent as it relies heavily on rainfall to replenish storages, streams and groundwater and on ecosystems to support a reliable water cycle. Higher temperatures result in larger volumes of water being evaporated and extreme weather events such as floods, cyclones, bushfires and rising sea levels can damage assets and disrupt wastewater treatment.
Discussions around the Basin being on the brink of collapse and urgent action is required. Over 3,000 mentions in January 2019 as a result of the millions of fish deaths in the Darling River, sparking much debate over the Murray-Darling Basin Plan – developed to bring the

[10] https://www.mdba.gov.au/sites/default/files/pubs/FS_water_resources.pdf

Basin back to a healthier and sustainable level, while continuing to support farming and other industries for the benefit of the Australian community.[11] The conversations continued over the course of summer with February producing 2,700 mentions, with prominence over Broadcast. Over the duration of 5 months – January to May 2019, we saw over 12,000 mentions across online, press and broadcast which showcases the severity of the issue and the large concern for the government to act in regard to climate change.

The idea of flexible or future-proof cities is becoming more important. Technological innovation is required to deliver infrastructure that is more flexible and responsive as well as providing new approaches to planning, financing and procurement.
The link between investment in infrastructure, technology and improved quality of life is playing its part in Australia. But there is always more than can be done.
Infrastructure in Australia needs to be more effective, cost-efficient and flexible to uncertain futures, as well as to maintain and repurpose existing infrastructures.

The challenges that come with urban growth are not easy to address. Without there being an investment in infrastructure, and no desire to make calculated risks, cities will struggle to provide for their citizens.



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