NSW 2040 Economic Blueprint

Investing in the state's future

NSW GOVERNMENT

NSW Treasury
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The NSW 2040 Economic Blueprint has been prepared by NSW Chief Economist, Stephen Walters.

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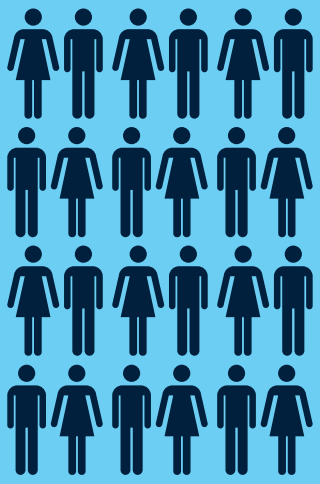
Byron Bay Lighthouse

NSW 2040
Economic Blueprint

Contents

Investing in the future of NSW

NSW TODAY



Home to more than
8 MILLION PEOPLE

Infrastructure boom with **$93 BILLION PROJECT PIPELINE**

Strong and stable economy with **AAA credit rating**

Abundant natural resources including coal and gas

AUSTRALIA'S ONLY GLOBAL CITY
AND GATEWAY TO THE WORLD

Per capita income of around **A$60,000**

Lowest unemployment rate of any state

Key sectors include financial services, tourism, education, technology and advanced manufacturing.

The NSW Economic Blueprint is designed to help chart a course for the NSW economy and keep our state strong as we move towards 2040 and beyond.

NSW TOWARDS 2040

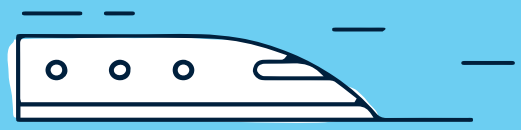
Economic boost as **Asian middle class** passes three billion

Efficient government through innovation, reform and **slashing red tape**

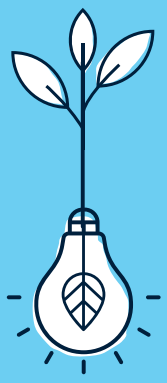
NATION'S FIRST TWO TRILLION-DOLLAR ECONOMY AFTER 2040

Increased productivity to counter **ageing population**

Five major urban centres connected by modern infrastructure

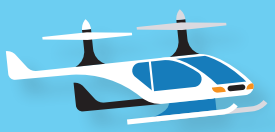


Growing regions with **improved transport links and resource security**



Reliable and affordable energy **with lighter environmental impact**

Innovative industries **focused on priority precincts**



Foreword by the Treasurer

The Honourable Dominic Perrottet MP is Treasurer of New South Wales and charged NSW Chief Economist Stephen Walters with producing this Blueprint.

In a rapidly changing world, we can choose to innovate, challenge ourselves and take advantage of the many opportunities bestowed upon New South Wales. Or, we can sit back and leave our future to chance.

This is not a government which gambles with the responsibility of ensuring a better life for the people of New South Wales.

We have spent the best part of a decade re-building the state's capabilities. In the past year alone, we have opened the new Sydney Metro Northwest train line and the first section of the new WestConnex motorway, invested billions into improving and building roads, bridges, schools and hospitals in every corner of the state.

We have a further $93 billion earmarked for infrastructure projects across the next four years. Vision fails without execution, but equally our vision for New South Wales must extend beyond simply finishing the next length of rail line or building the next school.

New infrastructure is important, but we need to take the longer-term view and ensure we are not just building physical bridges, but putting in place the planning, policy and framework which effectively form the building blocks to the future.

The dual pressures of dealing with the here and now and planning for the longer term could paralyse us if we let them. But that is not an option. We need to ensure that New South Wales stays a leader and is not a follower.

New South Wales will become Australia's first two trillion-dollar state, the clear first choice for business and industry, the first port of call and clear favourite for the majority of those who come to our shores.

While traditional industries such as mining and finance will remain important and continue to thrive, we must promote high-growth areas such as advanced manufacturing, tech-innovation, medicine, education and tourism, particularly from Asia.

New South Wales is already internationally recognised as a high-quality providore to the world and over the next two decades we will take this to the next level. Better regional and international transport links will allow us to export more of our world's-best products and services to the rapidly growing markets of China and India, as well as our well-established markets in Japan, the US and Europe.

New technology and infrastructure will allow regional New South Wales to have greater opportunities for skilled jobs and workers in industries more often confined to traditional city hubs.

As envisioned by the Greater Sydney Commission, our capital city will evolve, with three distinct centres based around the existing CBD, Parramatta and Western Sydney Airport. Wollongong and Newcastle will continue to grow with improved transport infrastructure and technological advances boosting economic opportunities.

We will have dedicated precincts of expertise across NSW which support emerging and growth industries and encourage innovation and investment. Our education and training sectors will need to adapt and change with a focus on ensuring we have life-long training opportunities to ensure our skills match the jobs of the future.

We already are hard at work in important areas of reform that will shape the future. The NSW Review of Federal Financial Relations is looking at ways to improve the funding relationship between Canberra and New South Wales, with a final report due next year. The NSW Productivity Commissioner Peter Achterstraat recently released the first discussion paper focusing on the need to make us more competitive.

A final area of focus is to ensure the state has a global outlook. This is much more than being the first stop for tourists or default choice for international students. We must work diligently to bring the world to our doorstep and equally hard opening our door to the world, enhancing our trade and investment opportunities at every opportunity.

This Blueprint, prepared by NSW Chief Economist Stephen Walters, draws together many of the opportunities and challenges we face and will help us chart a course for our future. I thank Stephen for his important work and know that as this generation builds for the next, the Blueprint will help ensure we keep NSW ahead of the pack and the very best state in the country.

The Honourable Dominic Perrottet MP
Treasurer
November 2019

Executive summary and recommendations

This 2040 Blueprint sets the direction for New South Wales' continued economic success in a changing world, making recommendations about where we should focus our efforts.

The $2 trillion economy

New South Wales has among the highest average household incomes in the nation and the lowest unemployment rate, a world leading service sector and negative net government debt.

First $2 trillion state after 2040

We should be able to become Australia's first trillion-dollar state by 2030 and its **first $2 trillion state after 2040** – and even sooner if we find and implement measures to improve our productivity.

Our 2040 aspirations

- We want a **high standard of living** for a **population** that is healthy, well-educated and skilled for high-income jobs of the future.
- Our **economy should be diversified** in favour of fast-growing industries and services and be expanding quickly enough to lift living standards.
- Our **five major urban centres** should be **vibrant and well-connected**, with modern infrastructure well-suited to our needs and a growing population.
- Our **regions should be productive and growing**, serviced by world-class infrastructure and transport links.
- We desire **innovative businesses and industries** of the future and a government that leaves a lighter footprint on private sector activity.
- Our **environment and biodiversity** should be **preserved for future generations** and our energy sources reliable and affordable, with enhanced water resilience across the State.
- **Government** should behave in a way that **encourages innovation**, particularly via procurement.

Five global megatrends will shape our next 20 years

Global forces will play a big role in New South Wales' next two decades and many of them will be positive. Five stand out:

- Asia will be a much richer consumer with new tastes to which we can cater and new abilities as well.
- Our previous development efforts have placed the natural environment under stress and we will need to respond.
- Digital technologies, including new tools like artificial intelligence, will keep changing our lives and our work.
- Patterns of migration will help determine how quickly the population of the state ages.
- Rapid change risks bringing social problems that need to be addressed.

Likely industries of the future

Technology change and disruption will continue, but the experience of the past 20 years indicates that the economy and society will adapt and grow. While there are no perfect predictors of future success, indicators can tell us which industries are more *likely* to grow over the next two decades. Development of these industries should attract both global talent and global investment capital.

The industries singled out in this 2040 Blueprint are:

- Industries where New South Wales is already strong: finance and financial technology; mining; education; tourism and events; the arts.
- Industries that serve our domestic needs: cyber security; medical technology; waste management.
- Emerging industries: advanced manufacturing; food production and agricultural technology; aerospace and defence; space; hydrogen for fuel.

Seven levers will boost our performance

State governments have seven main policy levers to improve economic performance – our human capital, institutions, fiscal policy, infrastructure, innovation, natural resource policy and industry development abilities. Each has limits. But compared to the powers of national government, they may be growing more effective over time.

The full 2040 Blueprint recommendations are set out on the next page.

Recommendations

Aspiration: A two-trillion-dollar economy after 2040

IMMEDIATELY

- Support the Productivity Commissioner's examination of the state taxation system.
- Invest in the NSW Government's overseas presence to better promote 'Brand NSW'.

LONGER TERM

- Promote the state not just as a tourist destination but as a place to invest, do business and study.

Aspiration: Healthy, productive people

IMMEDIATELY

- Improve the performance of the vocational education and training system.

LONGER TERM

- Develop a responsive skilled migration list that is integrated with the national list.
- Undertake education reforms including those via the Gonski process, particularly to reward high-performing teachers.
- Invest in training and capability building to cut construction industry skill shortages.

Aspiration: Vibrant, well-connected cities

IMMEDIATELY

- Improve the ways the state plans long-term infrastructure.

Aspiration: Productive, vibrant regions

IMMEDIATELY

- Work with the Commonwealth Government to examine ways for new migrants to move to the regions.

LONGER TERM

- Better commercialise research in food, food technology and agricultural technology.
- Help regional businesses diversify and capitalise on growth in tourism.
- Improve freight networks in the regions.

Aspiration: Innovative, world-class businesses

IMMEDIATELY

- Work with the NSW Productivity Commissioner on problems related to planning, regulation and vocational education.
- Support the review of the state's research and development landscape.
- Establish an industry taskforce to encourage high-growth future industries.
- Release a Space Industry Development Strategy.
- Commit to long-term funded initiatives to encourage more advanced manufacturing.

LONGER TERM

- Establish research, development and commercialisation facilities in the Innovation Precincts.
- Help NSW Government bodies to pilot innovative solutions and share government data.
- Use the Innovation Precincts and industry strategies to concentrate research strengths, drive collaboration between researchers and businesses and speed up innovation.
- Adopt the eight criteria for future growth industries outlined in Chapter 5 to ensure that benefits of industry development activities are maximised.
- Support the growth and success of early stage innovative businesses by developing programs to incentivise businesses to invest, innovate and hire.
- Set funding governance arrangements and selection guidelines for project specific assistance to ensure money is spent efficiently.
- Create a digital finance and fintech industry development strategy.
- Develop a digital emerging technology industry strategy with a focus on artificial intelligence, blockchain and quantum computing.
- Resource the implementation of existing defence industry plans.
- Establish medtech commercialisation and accelerator programs.
- Develop advocacy strategies for major upcoming defence procurements.

Aspiration: Sustainable environmental and resources management

IMMEDIATELY

- Work with the Commonwealth Government and the states to agree a national energy policy.
- Keep working with Commonwealth, state and local government to better deal with waste.

LONGER TERM

- Develop a policy on hydrogen production and export.
- Adopt a longer-term policy on drought that emphasises water security and better drought-proofing.
- Create an environmental goods and services development strategy to capitalise on waste management and circular economy opportunities.
- Develop a state-wide policy to ensure adequate supplies of drinkable water.

Aspiration: Better government performance

IMMEDIATELY

- Support the NSW Review of Federal Financial Relations.

LONGER TERM

- Examine NSW Government procurement practices to ensure that government purchasing encourages innovation.
- Ensure that government decision-making is underpinned by the best available information.
- Make better use of data and digital technology in delivering government services, especially health services.
- Realise the ambitions of the NSW Cyber Security Industry Development Strategy by committing to ongoing support of the NSW Cyber Security Innovation Node.

01.

Introduction

The people of New South Wales are at the heart of this 2040 Economic Blueprint.

Eight million people, all of us with dreams, hopes, wants and needs, all with a stake in the ongoing success and future of our great state.

This 2040 Blueprint aims to inform views on what the New South Wales economy can achieve over the next two decades.

From pre-federation times to the 'banana republic' emergency of 1986, Australians have often relied on the onset of crisis to change our economic mindset. The recession of the early 1980s and the disruptions in its wake triggered a long era of national reform: we floated the dollar, curbed protectionism, ended unproductive regulation and government ownership in some industries and toughened competition policy.

These helped set up Australia for close to three decades of growth from the early 1990s.

The 2040 Blueprint seeks to show how a new generation of reforms can improve living standards in New South Wales – but without requiring some great crisis.

The Premier State

New South Wales faces the next two decades and beyond with impressive advantages.

We have a resilient and flexible economy that has powered national economic performance in recent years. We have high levels of household income and productivity[1], the lowest unemployment rate and an enviable standard of living. Add to that abundant natural resources, a highly educated and skilled workforce, world-renowned tourist destinations, stable and reliable government and associated institutions, highly sought-after education facilities, a world leading service sector and highly competitive industries.

We have a resilient and flexible economy that has powered national economic performance in recent years

After a period leading to significant budget deficits less than a decade ago, the NSW Budget is now in surplus and will remain so right across the Budget projections.

Net debt is negative and the state's AAA credit rating is secure.

We do face challenges: an ageing population, climate change, high energy costs, disruptive technology, tax inefficiencies, trade tensions, scarcity of water, threats to our biodiversity and the unwelcome disruptions of technology.

And old economic "rules" don't seem to be working as well as in the past. Low interest rates are not generating stronger economic growth, low unemployment has not sufficiently lifted wages and rapid changes in technology have not boosted productivity by as much as economists had predicted.

Yet disruption also brings opportunities. Most notable of all, the extraordinary growth in Asia's middle class has the potential to drive exports and economic growth in New South Wales for decades. And the rise in Asian education seems likely to deliver a torrent of new ideas that can drive living standards even higher. That process has already begun.

[1] Productivity is the ratio of outputs to inputs at a point in time. Productivity growth measures the change in productivity over a period of time.

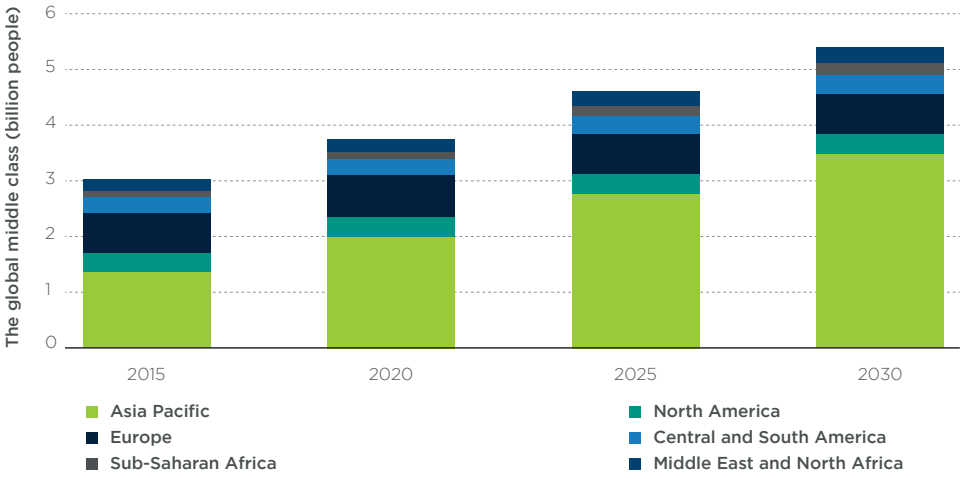


Figure 1: Asia's soaring middle class
Projected size of middle class on five continents to 2030 (billions of people)
Source: Brookings Institute and NSW Treasury

Staying 'lucky' – capitalising on our strengths

New South Wales writer Donald Horne coined the phrase *The Lucky Country*[2] in 1964. He meant it ironically, yet that phrase came to define popular thinking about our rich nation. And New South Wales has had more than its fair share of this luck.

Sydney (re)gained the title of Australia's most populous city in the early 1900s and has held it ever since. Its centrality and the rise of air travel have helped it to become Australia's only true alpha[3] city, the first stop for the majority of visitors to our shores and the global gateway for local businesses. The resources of the regions beyond the capital and the resourcefulness of our people, have further fed the state's prosperity.

We had more luck after the recession of the early 1990s: the extended economic expansion in China pushed the prices we receive for our exports to levels rarely seen. That boom is not yet over.

Yet luck alone only takes us so far. As our state grows over the next two decades, we need to keep building connected and liveable communities, prepare people for new jobs and ensure access to services such as affordable energy and plentiful water. We need to adapt existing industries and attract new ones.

Over the next 20 years, the many elements of the economy that will drive up our living standards – from education, to high-value food, to energy – should be given the best possible chances for success.

[2] *The Lucky Country,* Donald Horne, 1964. [3] Sydney is considered an 'Alpha+' world city, according to Loughborough University's globalisation and world cities research network, which measures the connectivity of cities in terms of position and influence. According to its model, Sydney is ranked in the top 10 most connected cities, alongside New York, London, Tokyo, Paris and Hong Kong. Alpha cities in general have critical links with major economic regions and states that are linked to the world economy.

Assembling the 2040 Blueprint

The Blueprint's twenty-year timeframe, out to 2040, meets two goals. First, with this timeframe the Blueprint can look beyond the near-term issues that grab today's headlines. Second, it can look to a time when long-term decisions made today might conceivably have their greatest impact. Just as 1999 was a sensible time for nations and regions to consider the impact of issues like the internet and population ageing, now is the time to consider how we want the New South Wales of 2040 to look.

The Blueprint has been informed by:

- **Research** on economic, jobs and productivity trends, including an extensive review of previous work by government (see Appendix 1).
- **External consultation** with around 50 stakeholders across government, industry and academia (see Appendix 2).

It argues for two types of actions:

- **First,** we should continue to attack long-lived problems that slow our progress, shortcomings particularly in the state's systems of tax, planning and regulation. The NSW Government is already addressing these issues and work by the NSW Productivity Commissioner and the NSW Review of Federal Financial Relations will address them further in 2020.
- **Second,** the state should implement the longer-term strategies detailed in the final section of this 2040 Blueprint. We should give the greatest possible chances for success to those industries – from tourism to advanced manufacturing to water management – that have the greatest chance of fuelling the state's prosperity.

Leveraging other NSW strategies and reviews

The 2040 Blueprint leverages the NSW Government's future-focused plans and priorities that drive place-based developments and strong jobs growth across New South Wales. In laying out our choices, the Blueprint presents an overarching framework upon which other strategies can build, such as:

- The **NSW Trade and Investment Strategy,** which will be released soon.
- The **State Infrastructure Strategy**, the work of the **Greater Sydney Commission**, the 20-year plan for Regional NSW, the **Future Transport Strategy**, the state's **digital plan** and others.
- The next iteration of the **NSW Intergenerational Report (IGR),** due to be published in 2021.
- The **NSW Productivity White Paper,** due for release in 2020.
- The work of the **NSW Productivity Commissioner** in identifying six priority areas which if addressed could boost productivity – including the state's systems of tax, planning and vocational education and training (VET).
- The examination of revenue in the **NSW Review of Federal Financial Relations** being led by David Thodey AO.
- The state's **research and development** performance, currently being examined by an expert panel overseen by the Hon Gabrielle Upton MP.
- The upcoming New South Wales **Social Compact** outlining the path forward for human services in the state.

02.

New South Wales' resilient economy has been a driver of Australia's growth for decades.

It is the largest state in the country, with annual output of more than $600 billion – a third of Australia's entire economy.

Services dominate our economy, accounting for around three quarters of activity, similar to economies such as Singapore and other advanced economies. Our biggest comparative strength lies in business services and particularly three knowledge-based fields: financial services; professional, scientific and technical services; and information, media and telecommunications.

In manufacturing, we have particular strengths, including in innovation and are a major producer and exporter of agricultural products, food and beverages and of coal, nickel, copper and lithium.

Today's NSW economy and industry structure

In examining the state's economic future, we should first find out where New South Wales already excels. We should find out what current performance says our state does better than other states and territories and overseas competitors. Then we can work out how best to leverage these strengths and improve on our shortcomings.

With the help of stakeholders, a series of comparative advantages has been identified for New South Wales, starting with our current high standard of living.

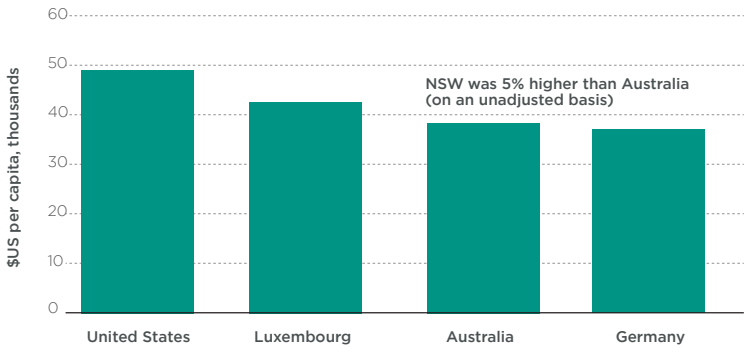


Figure 2: High household incomes in NSW
Household average gross disposable income per capita in four high-income nations, 2016-17.[4] Figures in $US, adjusted for payments in kind. *Source: Organisation for Economic Co-operation and Development.*

[4] Adjusted for payments in kind.

An enviable standard of living

The people of New South Wales have a standard of living that is the envy of much of the world.

Our average per capita disposable income (see Figure 2), is around US$40,000. Were New South Wales a country, the OECD would rank it behind only the US and Luxembourg[5]. Sydney is routinely voted among the world's most liveable cities. Our environment is clean, our tertiary education system is world-standard and our society is amongst the world's most diverse.

The best performing state economy...

For most of the last five years, the New South Wales economy has grown at or above the national average (see Figure 3, below) while the jobless rate has been below the national rate.

While average wages growth remains subdued, healthy employment growth is driving growth in household incomes.

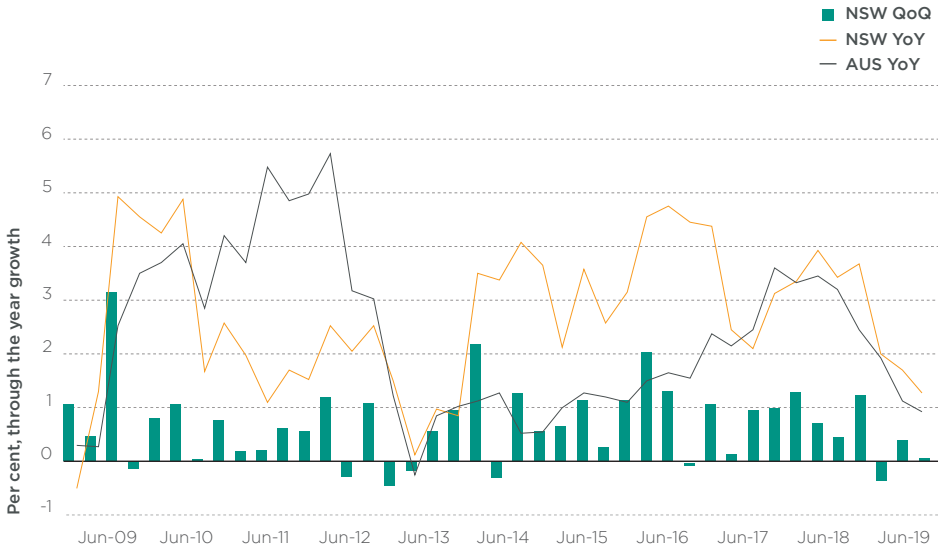


Figure 3: NSW and Australian domestic final demand
NSW and Australian growth in final demand, year on year, and NSW growth quarter-on-quarter. Figures by quarter, chain volume measure, seasonally adjusted (%). *Source: Australian Bureau of Statistics*

...with the best state budget position

By keeping spending growth consistently below revenue growth, New South Wales has achieved the nation's lowest government debt. Yet we are funding the nation's largest infrastructure spending program to add to our productive capacity.

New South Wales is one of a handful of state-level jurisdictions with a AAA credit rating. The others include Victoria, two Canadian provinces and three German states.

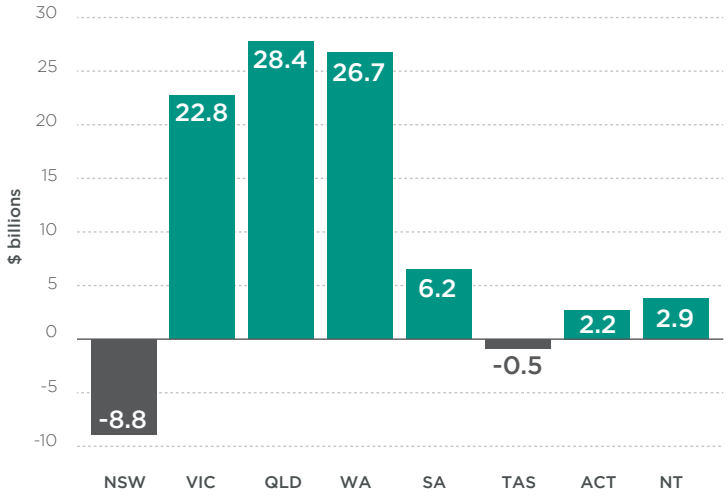


Figure 4: NSW has negative net debt
General government net debt of Australian states and territories, as at June 2019. *Source: State and territory government Budget papers. Note: Queensland's reported net debt is adjusted for its superannuation asset treatment, making comparisons consistent across all jurisdictions.*

[5] From the OECD Better Life Index at www.oecdbetterlifeindex.org/topics/income/

> New South Wales is in the midst of an unprecedented infrastructure boom, with public infrastructure investment at record levels.

High level of productivity

New South Wales has a highly-productive economy by international standards. In 2017, New South Wales produced US$54 per hour worked[6], above the national average. New South Wales' productivity is assisted by the state's scale – eight million people centred around our capital city.

Our productivity also reflects the state's high output and employment share of productive businesses and information services. The 2018 establishment of the NSW Productivity Commission was designed to further boost the state's performance.

World-leading infrastructure investment

New South Wales is in the midst of an unprecedented infrastructure boom, with public infrastructure investment at record levels. The 2019-20 Budget provided $93 billion over four years to 2022-23 in infrastructure capital for hospitals, schools, TAFE and transport. The Government also is contributing $1.6 billion to develop major cultural infrastructure and creative precincts.

Public transport and roads received $55.6 billion, including funding for Sydney Metro West. Major infrastructure projects now complete or nearing completion include Sydney Northwest Metro, which commenced services in May 2019 as Australia's first fully-automated metro rail system and the largest urban rail infrastructure investment in Australian history.

Largest exporter of services in Australia

New South Wales is the largest exporter of services in Australia. Driven by rising Asian demand, tourism and education exports made up over half of the state's services exports in 2018, with their value up by around 30 per cent between 2015-16 and 2017-18. Education exports encourage local consumption and build a pathway to skilled migration. Exports of education alone were worth $12 billion in 2018; it is now the state's second largest export, behind coal. The University of Sydney and the University of NSW are ranked inside the top 75 institutions globally[7].

Exports of education alone were worth $12 billion in 2018

Tourism already is a substantial source of export revenue (ranked third behind coal and education), but there is potential for growth to accelerate. Nature-based and eco-tourism have special potential given New South Wales' pristine national parks and coastal environments. Excellent arts and cultural experiences and world-class cultural, sporting, entertainment and conferencing venues and institutions are well known globally and attracted 13.6 million cultural and heritage visitors to New South Wales in 2018.

[6] Figures in 2010 prices, on a Purchasing Power Parity basis. [7] *Times Higher Education,* 2019.

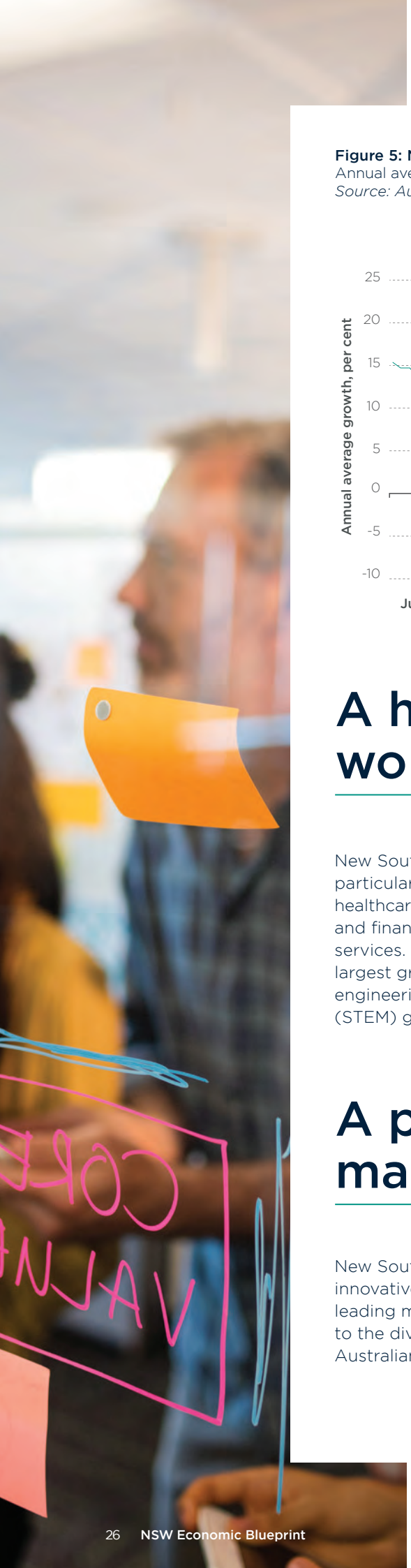
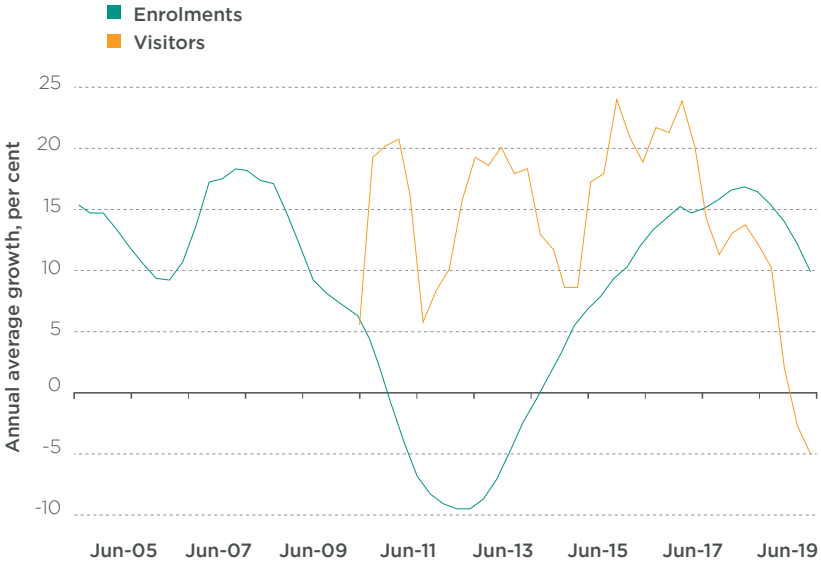


Figure 5: NSW tourism and education exports have grown rapidly
Annual average growth in overseas enrolments and short-term visitors (%).
Source: Australian Bureau of Statistics, NSW Treasury.



A highly educated workforce

New South Wales' workforce has particularly strong representation in healthcare, infrastructure, construction and financial and professional services. The state hosts Australia's largest group of science, technology, engineering and mathematics (STEM) graduates.

NSW Innovation and Productivity Council[8] data shows that if it were a country, New South Wales would rank fourth in the world for percentage of workers with tertiary qualifications: 48.6 per cent, 97 per cent of them employed.

A productive and growing manufacturing sector

New South Wales is home to highly innovative, competitive and world leading manufacturers that are vital to the diversity and strength of the Australian economy.

New South Wales manufacturers produce almost a third of the country's total manufacturing output, generating around $33 billion in gross value added and directly employing 253,000 people, or a third of jobs in the sector countrywide.

[8] *NSW Innovation and Productivity Council Scorecard*, September 2019.

Extensive trade and investment links with Asia

Our shared time zones and supportive pattern of historical migration have reinforced strong cultural, economic and political ties between New South Wales and our major Asian trading partners. Japan remains the state's largest single export destination; China is second and is the largest source of both tourists and students entering the state. The state's open and transparent business operating environment makes it an attractive destination for foreign investment. It is ranked first out of the states and territories for Chinese foreign investment.

Abundant natural resources and food exports

Large and diverse mineral and gas deposits, exploration projects and a burgeoning renewable energy sector make mining, resources and energy important parts of the NSW economy. Asia's quest for cleaner air and growing global gas demand will make renewables and gas larger elements in that mix over the next two decades. New South Wales' generally favourable climate for growing crops, world-class food safety regulation and transport and logistics systems position us to meet demand from emerging markets for premium, provenance-protected food goods[9].

The state's open and transparent business operating environment makes it an attractive destination for foreign investment

Sydney, a finance hub of Asia...

Sydney is the financial capital of Australia and ranks tenth on the Global Financial Centres index[10]. Total superannuation assets in Australia totalled $2.9 trillion[11], the fourth largest retirement saving pool in the world. Much of the sector's activity and Australian arms of most major global financial service organisations are headquartered in Sydney and it is an official trading hub for the Chinese renminbi. The Australian Securities Exchange, headquartered in Sydney, is the 16th largest stock exchange in the world by market capitalisation. It employs nearly 40 per cent of the more than 445,000 financial services professionals working in Australia.

...and magnet for global workers

Sydney is the second highest ranked city in the Asia Pacific region for innovation[12]. New South Wales is the start-up capital of Australia[13], ranked fifth highest in the world for entrepreneurship[14]. Sydney is also the highest ranked capital city in Australia for quality of life[15]. Sydney is the only Australian city in the top 10 most attractive cities for the global workforce[16]. Australia is ranked fourth in the world for protection of intellectual property, ahead of the UK, Germany and France[17].

Expanding creative industries

New South Wales is Australia's leading state for creative industries and they are a growing piece of the NSW economy. Many thousands of creative businesses employ around 42 per cent of the sector's workers and have exports worth $2,963 million – 70 per cent of Australia's total creative services exports[18]. New South Wales is recognised as the leading state for screen production, with 56 per cent of the Australian screen industry employed in New South Wales[19] and a Disney-owned Industrial Light & Magic studio setting up in Sydney, one of only three studios outside North America.

[9] www.nswfarmers.org.au/NSWFA/Content/IndustryPolicy/R_and_D/Supply_chain_transformation_and_export_readiness.aspx. [10] www.longfinance.net/programmes/financial-centre-futures/global-financial-centres-index/ [11] *The Association of Superannuation Funds of Australia*, Ltd.[12] NSW Department of Industry. 2019. *Sydney Innovation and Technology Precinct The Future Made Here*. [13] 2018 Startup Muster Annual Report available at www.startupmuster.com/reports. [14] The Global Entrepreneurship and Development Institute. 2018.[15] Mercer, Quality of Living Survey, 2019. [16] Global Talent Survey 2018.[17] atr-ipri2017.s3.amazonaws.com/uploads/IPRI_2019_FullReport.pdf. [18] BYP Group estimates based on analysis of Australian Bureau of Statistics. (2017 & 2011). Labour Force, Detailed, Quarterly, May 2017 and Census 2011. Australian Bureau of Statistics: Canberra. [19] Screen Australia Drama Report, 2015-16.

Aspirations for New South Wales in 2040

03.

We are operating in an era of rapid change and unprecedented uncertainty.

We don't, for example, know whether cars will be flying by 2040; indeed, we don't even know how many will be driverless. The nature of our jobs is changing rapidly. A recent study by Deakin University[20] suggested "cyborg psychologist" as a future job[21] in Australia.

It would be unwise to try painting a precise picture of New South Wales' 2040 industry structure. New industries could emerge that are beyond our imagination today. Existing industries that now seem on solid ground may wither. Nations not currently among the state's major trading partners may jump into view.

In 2040, our economy will be 70 per cent larger than it is today, even if we grow at our potential growth rate – around 2.5 per cent in real terms – from here. The industrial structure delivering this growth will have changed. Services will make up an even larger share of our Gross State Product (GSP), particularly in healthcare, education and 'caring industries' such as aged care.

Mining and manufacturing may both represent less of our annual output.

We can more easily project the make-up of the state's people: that depends on births, deaths and interstate and overseas migration. The government's population projections assume that New South Wales' population will be around 30 per cent larger by 2030, at around 9 million people and headed towards 11 million by 2040.

To avoid the risk of getting precise predictions wrong, we have developed sensible aspirations about the NSW economy and society of 2040. This chapter addresses these in the context of seven overarching economic and wellbeing categories: the economy, our people, cities, the regions, business, the environment and performance of government.

[20] 100 Jobs of the Future report, 2019: 100jobsofthefuture.com/report [21] Cyborg psychologists would help "people who have synthetic organs, robotic limbs and body implants" to come to terms with their new body parts.

The nation's first trillion-dollar economy

The NSW economy will be the nation's first $1 trillion state economy by 2030 and the first $2 trillion economy after 2040, even if it grows only at its long-run average nominal rate from here.

We should aspire to pass these marks more quickly, including by undertaking the actions and strategies outlined in this 2040 Blueprint.

FASTER GROWTH IN PRODUCTIVITY

- As Nobel prize-winning economist Paul Krugman has said, "productivity isn't everything but, in the long run, it is almost everything"[22]. Putting aside changes in the working population, growth in productivity is what drives New South Wales' economic growth. Sustainable growth in potential GSP will ensure high living standards for a growing population.

WE SHOULD ASPIRE TO HAVE THE NATION'S FASTEST GROWING ECONOMY ON AVERAGE OVER THE CYCLE

- There will be periods when other states grow more quickly than New South Wales – particularly the resource states of Queensland and Western Australia – but sustained growth in GSP above the national average will ensure that employment keeps growing and that living standards are rising.

HIGHER GROWTH INDUSTRIES

- The NSW economy should move in the next two decades towards higher growth industries such as advanced manufacturing. That said, services will remain the dominant contributors to the state's output – particularly education and healthcare, but also tourism and financial and other professional services.

A MORE DIVERSIFIED EXPORT BASE

- Coal remains the state's largest single overseas export commodity, but the state should aspire to grow a more diversified export base over time. The changing climate means the economy increasingly will move to non-fossil fuel exports, including hydrogen. The state's service exports also should become more diverse, with a broader base of overseas education exports, in particular.

DIVERSIFIED TRADING PARTNERS

- Similarly, over time, the state's trading partner mix will change. An ageing population means that Japan, currently the state's largest single overseas destination for commodities, may take a smaller share of total exports. Other economies, including China and India, may take a higher share. There also is scope for higher exports to previously untapped markets.

ATTRACTIVE TO FOREIGN INVESTORS

- New South Wales already attracts more foreign investment than any other state, but we can aspire to be even better. Development of innovative, fast-growing industries of the future will attract investment capital from overseas, as will growth in GSP above the national average. Moves to address complicated planning and regulatory systems will keep New South Wales number one for foreign investment inflows.

Healthy, productive people

The main aspirations here are that the citizens of New South Wales can improve their current high standard of living, that they be well-educated and skilled for the higher-income jobs of the future, that they be flexible enough to adapt to changing workforce needs.

SUSTAINABLE POPULATION OF NSW AND SYDNEY

- This means having the transport, education, health, housing and other infrastructure and public services necessary to support the growing population and particularly the increased population in the major cities, including Sydney.

A WORLD-CLASS EDUCATION SYSTEM

- We should aspire to provide world-class education from pre-primary right through post-graduate and vocational studies, as well as opportunities for life-long learning as workforce needs change. This aspiration means having even *more* talented and dedicated teachers.

NIMBLE AND AGILE WORKFORCE

- The state has a well-educated and skilled workforce, but we face rapid change in skills demand as the state's industrial base changes and technology and increased automation disrupt workplaces. Skills shortages are already making construction projects more difficult to execute.

HIGH STANDARD OF LIVING

- The state enjoys a standard of living above the Australian average and adaptation to the demands of the jobs of the future should allow this to continue. Cost of living pressures from areas like housing and energy will have to be addressed.

HIGH INCOME AND SUSTAINABLE JOBS

- The emerging industrial structure of the state should deliver high-value-added jobs for an educated workforce. That in turn should keep workers in high-paying jobs. Increasingly, these jobs will be in the services sector, but industries like advanced manufacturing, defence and aerospace will also provide them.

SUPPORT FOR THE VULNERABLE

- Not everyone in our society is able to work or study as productively as they wish. As a high-income society with an egalitarian ethic, we should aspire to support the vulnerable and disadvantaged.

FIRST NATIONS WELLBEING AND INCLUSION

- First Peoples make up 2.9 per cent of the NSW population. The aspiration here is that the state's First Peoples have opportunities to self-determine and have access to the same level of services as all New South Wales citizens, particularly in education and healthcare.

[22] Paul Krugman, Professor of Economics and International Affairs Emeritus at Princeton University and a columnist for The New York Times.

Liveable and connected cities

The state's infrastructure planning assumes that New South Wales will have five major urban centres, the three cities of Sydney (Eastern, Central and Western Sydney), Newcastle and Wollongong. The following characteristics form the underlying aspirations for the five major cities of the state in 2040.

ENHANCED LIVEABILITY

- Sydney has been voted one of the world's most liveable cities (Figure 6). We should maintain this standing with careful planning that includes joined-up leadership across government and extensive infrastructure provision. Increasingly, citizens of New South Wales may choose to live outside the Sydney area to enhance their lifestyles, with better housing affordability and access to jobs. A focus on the arts enhances liveability and makes places more desirable.

SUSTAINABLE LAND USE PATTERNS

- We should use our infrastructure more efficiently and sustainably and with lower disruption by locating more housing around existing built up areas.

RELIABLE AND FAST CONNECTIVITY

- Technology is changing so quickly that the state needs to remain agile and agnostic in its technology choices. The world's most liveable and connected cities rely on good communications, so the state should not lock itself into technology that risks becoming obsolete quickly. The efficiency of connectivity also is dependent on fast and reliable transport networks.

INFRASTRUCTURE TO MEET OUR NEEDS

- The recent national audit of Australia's infrastructure[23] needs found that even with the current record level of spending there would still be infrastructure shortages into the future.

SYDNEY AS A GLOBAL CITY

- Sydney's reputation as a great global city already draws millions of tourists. We should aspire for Sydney also to be known as a hub for education and innovation and for financial services in Asia.

DISTINCT CULTURAL IDENTITY

- Research[24] shows that leading global metropolitan regions are capitalising on the 'experience economy', fostering engagement and emotional connections with public space, tourist sites, commercial areas and places of cultural and historic significance.

Rank	Economist Intelligence Unit	Monocle	Mercer
1	Vienna, Austria	Zurich, Switzerland	Vienna, Austria
2	Melbourne, Australia	Tokyo, Japan	Zürich, Switzerland
3	Sydney, Australia	Munich, Germany	Vancouver, Canada (=3rd)
4	Osaka, Japan	Copenhagen, Denmark	Munich, Germany (=3rd)
5	Calgary, Canada	Vienna, Austria	Auckland, New Zealand (=3rd)
6	Vancouver, Canada	Helsinki, Finland	Düsseldorf, Germany
7	Toronto, Canada	Hamburg, Germany	Frankfurt, Germany
8	Tokyo, Japan	Madrid, Spain	Copenhagen, Denmark
9	Copenhagen, Denmark	Berlin, Germany	Geneva, Switzerland
10	Adelaide, Australia	Lisbon, Portugal	Basel, Switzerland
		Sydney, Australia (13th)	Sydney, Australia (11th)

Figure 6: Liveability rankings by city
Source: Economist Intelligence Unit, Monocle, Mercer.

[23] *An Assessment of Australia's Future Infrastructure Needs*, Infrastructure Australia, August 2019. [24] *Culture, Value and Place Vol 2: Greater Sydney Case Study*. By Dr Tim Moonen, Professor Greg Clark, Caitlin Morrisey and Jake Nunley. The Business of Cities Ltd. August 2018.

Productive, vibrant regions

Around 40 per cent of the residents of New South Wales live outside greater Sydney

Populations of some smaller regional towns have, however, been shrinking recently, partly because large cities provide more long-term employment opportunities. The state should aspire to have sustainable regional communities underpinned by productive employment and high class public services, connectivity and infrastructure.

VIBRANT REGIONAL ECONOMIES

- We should aspire to have growing populations within our communities. That will require sufficient employment and educational opportunities for people to remain in these communities, with people moving to the regions as well as away from them. This is particularly so for migrants, who tend to congregate in the major urban areas.

AN AGRICULTURAL INDUSTRY SUPPLYING THE GROWING MIDDLE CLASS IN ASIA

- The pool of middle class citizens in Asia will continue to expand (see chapter 4). Aiming to be Asia's 'food bowl' is unrealistic given the giant continent's huge food needs[25]. But New South Wales can and should aspire to be 'Asia's delicatessen' – a trusted source of high-quality, high-value products.

REGIONAL TRANSPORT INFRASTRUCTURE

- By 2040, a more efficient state transport infrastructure should allow more agricultural products, in particular, to reach more overseas markets more quickly. The Western Sydney Airport will help communities and businesses at either end of air links; more distant producers need closer transport and logistics hubs.

WORLD-CLASS TRANSPORT LINKS

- The state covers 800,000 square kilometres, more than 10 per cent of Australian territory. That leaves us with obvious challenges in maintaining high-standard regional infrastructure. By 2040, however, we should aspire to have our regional areas as liveable as the major urban areas.

ENHANCED CONNECTIVITY

- The tyranny of distance will continue to present a challenge to regional transport and communication service levels – but, by 2040, the current wide gap in standards should be narrowed. We should aspire to make the regions better connected with the major urban centres, both electronically and physically.

[25] Estimates suggest that all of Australia currently feeds about 60 million people; Asia contains around 4,600 million people.

Innovative, world-class businesses

New South Wales has a productive manufacturing sector that employs hundreds of thousands of people.

As in most regions of the developed world, manufacturing has maintained output growth but fallen as a share of total production. It now represents just 5.4 per cent of state output, down from almost 11 per cent in 1990.

Like all of Australia, the state faces significant cost disadvantages, particularly in production phases exposed to global supply chains. The aspiration is for more of the state's industrial activities to be in high-value added activities like design, where the state has comparative advantages.

INNOVATIVE INDUSTRIAL BASE

- Rapidly changing technologies, including automation, robotics and artificial intelligence, mean our industries must be flexible to keep up with change. Innovation is the key: in the years to 2040, the level of spending on research and development needs to lift significantly. We should aspire to export new, high-value technologies to the world.

GROWTH INDUSTRIES

- By 2040, the state's industrial base should have transitioned towards higher-growth industries with elevated research and development inputs, highly-skilled workers and extensive domestic supply chains.

EXTENSIVE SERVICE EXPORTER

- We should aspire to be a significant exporter not just of education and tourism, but of other high-value activities like financial services and professional services such as architecture and business administration. There also is huge upside for exporting health services, particularly to the growing Asian middle class.

ATTRACTIVE DESTINATION FOR BUSINESS

- We should be recognised as a standout destination for cultural tourism, major events and creative industries, being a showcase in global content ranging from screen production to major cultural events.

WORLD-CLASS CENTRES OF ARTS AND TECHNOLOGY

- Deliberate and strategic co-location of culture and creative practices within the state's emerging centres of technology and innovation will create vibrant 'live-work-play' environments that attract and retain skilled talent.

Sustainable environment and resource management

Without a sustainable environment, there are no liveable cities, productive jobs and high living standards, nor an innovative industrial base. Rising temperatures will require determined action in NSW to mitigate potential threats, particularly around our energy and water supplies.

RELIABLE AND AFFORDABLE ENERGY

- New South Wales is a major exporter of coal, much of it for power generation in China and Japan. By 2040, the state will likely have to diversify its energy sources to a more sustainable mix that includes renewables (wind, solar and wave) and alternatives in a technology-agnostic fashion. Alternative export industries should emerge by this date, such as hydrogen.

SECURE WATER SUPPLIES

- Climate change means the state will confront more frequent and more severe droughts[26]. Well before 2040, the state should aim to transition to more secure water storage options and expand desalination capacity and other alternative sources of supply. We also should look at more efficient uses of water by households and industry.

FLEXIBILITY TO DEAL WITH CHANGING CLIMATE

- By 2040, the aspiration is that the state will take the steps necessary to mitigate emerging risks from climate change. The actions of the Commonwealth Government and other jurisdictions will play critical roles here.

[26] Commonwealth Government (2019) Drought in Australia: Australian Government Drought Response, Resiliance and Preparation Plan.

> The NSW Government is the largest single customer in Australia and probably still will be in 2040.

Enhanced performance of government

The NSW Government is the largest single customer in Australia and probably still will be in 2040. Its enormous purchasing power can drive innovation and create extensive production chains in New South Wales. The state also has significant power to control public sector employment.

A MORE EFFICIENT TAX SYSTEM

- By 2040, the state's tax system should be much more efficient.

PROCUREMENT TO DRIVE INNOVATION

- The Government should by 2040 be using the power of government as a customer to drive innovation and value chains by making procurement decisions strategically, rather than simply on the basis of cost.

LIGHTER-TOUCH REGULATION

- By 2040, approvals for key areas of activity should be expedited. More of the state's underused natural resources should be unlocked. We want Sydney in particular to be known as the place to come for jobs of the future.

INNOVATION AND AGILITY IN PLANNING

- The planning system cuts across all aspects of economic activity and can either enhance or curb creativity and innovation. We should aspire to world-class standards and governance arrangements as well as joined-up leadership across government.

AN ENVIRONMENT CONDUCIVE TO INVESTMENT

- Regardless of financial assistance, we should aspire to create an environment that makes businesses want to invest and create jobs here rather than interstate or overseas.

EFFICIENT DELIVERY OF GOVERNMENT SERVICES

- New South Wales should always aspire to deliver public services to an acceptable standard in a cost-effective and sustainable manner. This basic imperative will become even more important over the next twenty years as demands on public services grow – particularly, as the population grows and ages, in healthcare.

POSITIVE EMPLOYMENT IMPACTS

- The NSW Government is the largest single employer in the country. The Government should use this power to promote a diverse public sector workforce, particularly for people living with a disability and for First Peoples.

Megatrends and challenges moving towards 2040

04.

The global changes now underway – in technology, automation, the climate, skills, jobs of the future, demographics, cities, urbanisation, social cohesion and geopolitical risks, among others – will inevitably change New South Wales too. We also face challenges and opportunities in areas that we control: a complex planning system, complicated regulations on business, an inefficient tax system and a high cost of living.

These challenges will need to be addressed if the state is to prosper to 2040 and beyond.

Five global megatrends will help shape NSW

Five global megatrends have helped shape this 2040 Blueprint. Each appears likely to continue for some years though the speed of the changes will vary. Dealt with well, these trends will throw up challenges but also opportunities for New South Wales. The rapid growth of the middle class in Asia, for instance, can be a bonanza for our food and service exports.

Asian customers are spending more

The world's middle class – people with incomes between US$11 and US$110 per day[27] – is growing quickly. These people, mostly in China and India, have the income to make purchases beyond basic needs. As such people's incomes grow, they typically begin buying high-protein foods, which New South Wales can supply. Higher incomes also prompt rising demand for sophisticated services like tourism, education and professional activities. The OECD estimates that around two-thirds of the global middle class will reside in Asia by 2030[28].

More broadly, the recent turn towards greater trade restrictions and tariffs, particularly in China and the US, is troubling. Figure 7 shows that the measured value of world trade has begun to fall in the past 18 months. Some parts of the NSW economy could benefit from US-China trade skirmishing for now, as China demands more raw materials, but this will not always be the case.

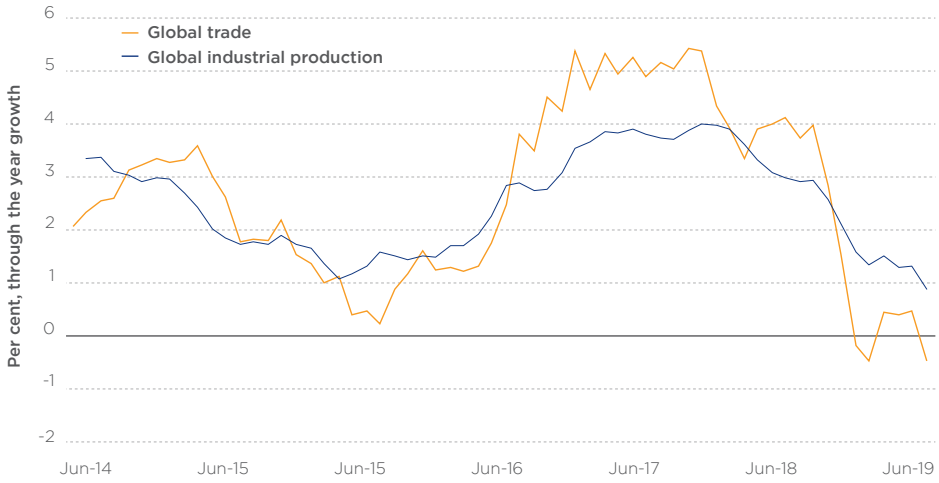


Figure 7: Growth in world trade and production has slowed
Growth in global trade and industrial production, through the year (%)
Source: CPB Netherlands Bureau for Economic Policy Analysis.

The natural environment is under stress

The primary driver here is climate change and humanity's collective contribution. These drive temperatures higher and make droughts more frequent and severe. The Intergovernmental Panel on Climate Change[29] predicts that, without coordinated global action to reduce greenhouse gas emissions, there could be a 4 degree rise in temperatures by 2100 relative to pre-industrial norms.

Much of the east coast of Australia remains gripped in the worst drought in a decade, with water supplies dwindling. Such droughts will probably happen more often in the years to 2040.

Our response to drought and higher temperatures will help to determine how much food – and the types of food – we can produce for export from New South Wales. We will need to secure water and energy supplies at the lowest possible cost that still allow us to retain a healthy environment. Policy indecision around energy by the Commonwealth and state governments has left Australia with an unreliable and expensive power supply.

Climate change will probably also raise the frequency and intensity of floods and storms.[30] And rising temperatures, drought, sea level rises and changes in ocean chemistry also threaten native plant and animal life[31].

Digital technology will keep changing our lives

Technology has been changing our working lives more often and more quickly in recent decades. It is behind a new flood of data in workplaces, new automation of not just industrial but office work and an increase in freelance and casual work arrangements.

Many people conclude that these changes will raise unemployment. Yet such an effect is not showing up in New South Wales' unemployment rate.

Adoption of digital technology could reduce travel times and the need for investment in new infrastructure, as well as the physical space needed for such investment.

And changes in technology are nothing new. They've taken place for centuries, albeit at different rates and affecting disparate sectors of the economy. The most profound technological changes of the past have lowered prices, raised living standards and generated more jobs than they have destroyed; the latest changes may have just the same effect.

With a predominantly serviced-based economy and a highly-educated workforce, New South Wales is well-placed to benefit from the next wave of technological change. Oxford Economics[32] found that *"New South Wales looks rather less vulnerable than either Victoria or South Australia. In this state, the labour market has become less dependent on manufacturing jobs in recent years, while manufacturing productivity has improved"*.

[27] $US in 2011 purchasing power parity. See www.brookings.edu/blog/future-development/2018/09/27/a-global-tipping-point-half-the-world-is-now-middle-class-or-wealthier [28] oecdobserver.org/news/fullstory.php/aid/3681/An_emerging_middle_class.html [29] climatenexus.org/international/ipcc/comparing-climate-impacts-at-1-5c-2c-3c-and-4c [30] Climate Council of Australia (2019) *Weather Gone Wild: Climate Change-Fuelled Extreme Weather In 2018*. [31] Commonwealth Government (2019), Drought in Australia: Australian Government Drought Response, Resilience and Preparedness Plan. [32] cdn2.hubspot.net/hubfs/2240363/Report%20-%20How%20Robots%20Change%20the%20World.pdf

NSW will age faster without migrants

The state's population is already older than the national average and it is ageing. We're not attracting enough migrants to offset the effect on ageing of slowing in the aggregate fertility rate. Sydney, with its high cost of living, is currently losing around 20,000 people each year to other states.

Ageing is a nationwide problem. By 2060[33], just 60 per cent of Australians may be of working age, down from 66 per cent in 2018. That will leave us with fewer people working and paying taxes to fund schools, roads, hospitals and other government services.

However, Australia's challenge will be far smaller than that of some European and Asian nations. And skilled migration can help minimise this effect. On average, our new migrants are both younger and more productive than the existing inhabitants. So they slow the ageing of our population while lifting our economic output. To succeed, however, we need to make sure that New South Wales remains attractive and affordable to prospective skilled migrants.

Change can create new social problems

While we embrace change, we must deal with its social effects. Australians keep moving to cities, weakening social vitality in some regions. Social change and new technologies have helped to erode trust in traditional institutions too. Economic change has hit hard some of the more disadvantaged in society.[34] First Peoples' welfare and rights continue to demand attention.

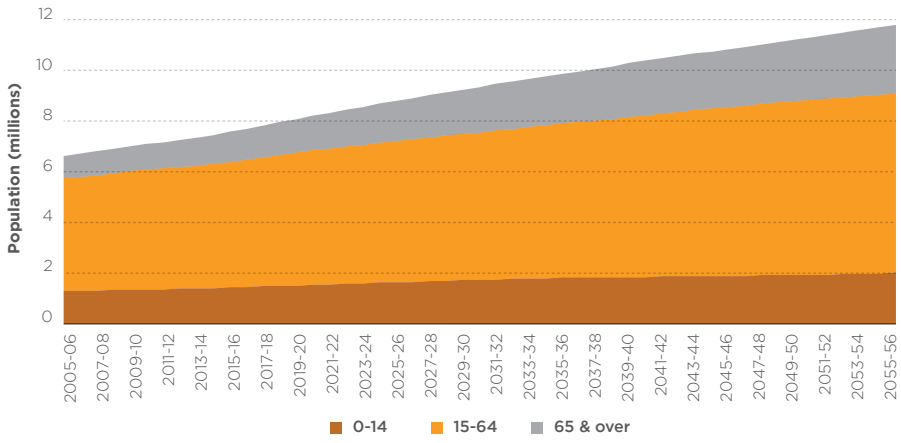
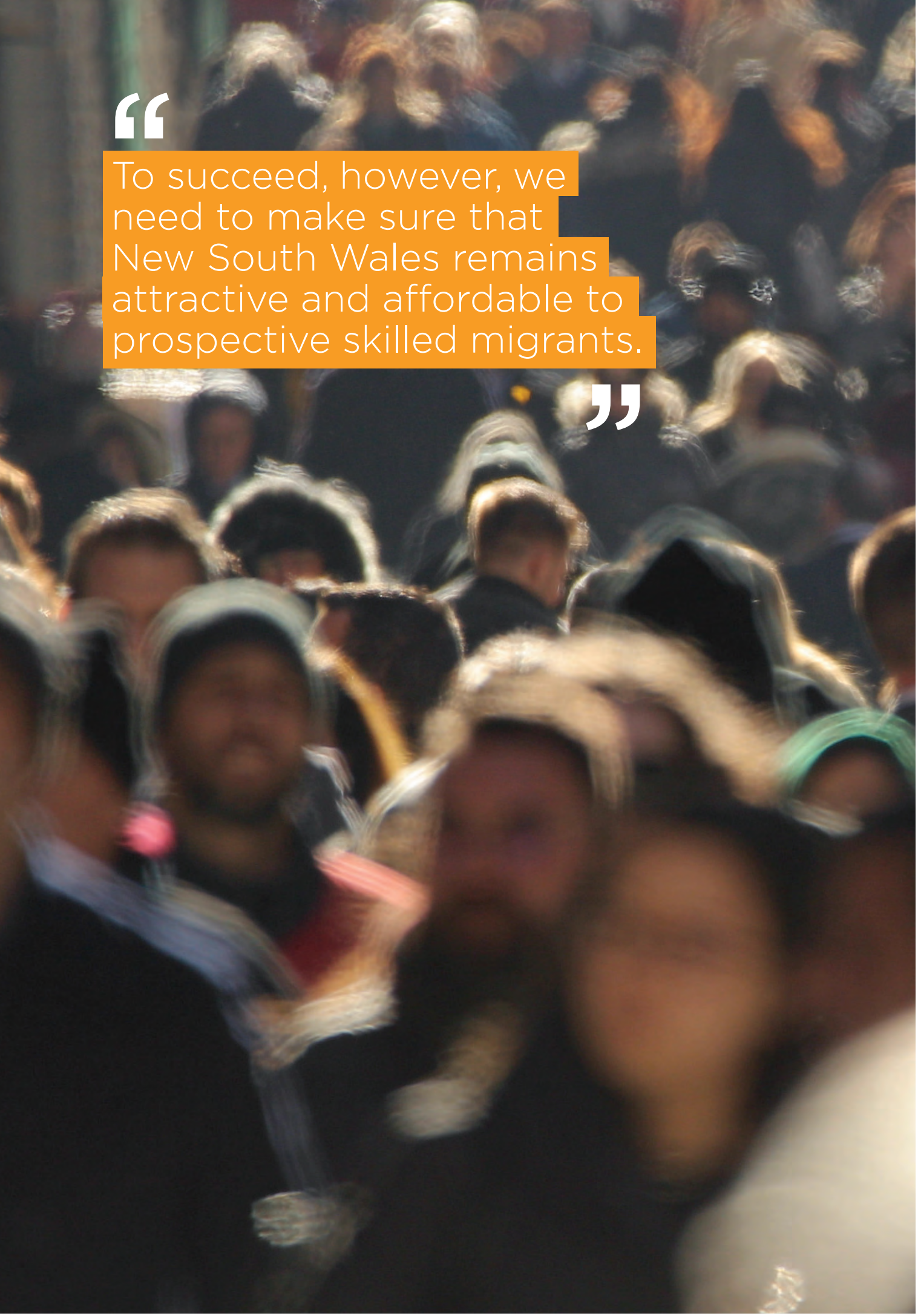


Figure 8: NSW will age, but slowly
Projected population and age profile for New South Wales, as at 2019-20 NSW Budget. Figures are for 31 December of each year. *Source: ABS, NSW Treasury*

[33] This is a net figure. It comes from the CSIRO's *Australian National Outlook 2019*, which cites projections by the Productivity Commission in its 2013 research paper, *An Ageing Australia: Preparing for the Future*.
[34] CSIRO (2019), *Australian National Outlook 2019*.


“
To succeed, however, we need to make sure that New South Wales remains attractive and affordable to prospective skilled migrants.
”

Domestic issues for attention

Along with its many advantages, New South Wales has challenges. Stakeholders raised many of them as we consulted on this 2040 Blueprint.

Many of these challenges are being addressed – a critical task if New South Wales is to prosper. Many need more work if we're to build the economy of 2040 and beyond.

The state's main domestic challenges include not only the trade, environmental, ageing, technology and social pressures outlined above, but also:

SLOW GROWTH IN PRODUCTIVITY

New South Wales' level of productivity is high. *Growth* in productivity, however, has slowed, as in other advanced economies[35]. It averaged 2.1 per cent per year in NSW from 1993-94 to 1998-99, but slowed to just 0.8 per cent per year between 2003-04 and 2011-12 and has averaged only 0.9 per cent since 2011-12.

COST OF LIVING PRESSURES

Sydney is Australia's only global city and therefore has cost of living challenges. This stems partly from the attractiveness of New South Wales and particularly, Sydney, as a global destination for migrants. Infrastructure and housing have failed to keep up with rising demand owing to this rapid population growth. This has not only placed pressure on resources, compromising liveability, but pushed up prices for houses, energy, water and other privately-delivered essential services like child care.

DETERIORATING EDUCATION OUTCOMES

In key respects, the NSW education system is not immune from deteriorating national education standards. We can boost students' learning by improving teacher effectiveness, giving better teacher feedback and boosting appraisal systems[36]. International Monetary Fund research[37] suggests that developing our students' curiosity, critical thinking and complex problem-solving will boost productivity.

SKILL MISMATCHES

In parts of the New South Wales workforce, too many jobseekers lack the skills that employers need. One problem is overqualification: around 20 per cent of workers in Australia are reportedly over-qualified[38], while industries such as construction sometimes can't find the skilled people they need.

AN INEFFICIENT AND VOLATILE TAX SYSTEM

As Figure 9 shows, the states' activity-based taxes tend to be among both the most volatile and the most economically damaging. Transfer duty is notably inefficient: among other things, it deters workers from moving to places where the work is, while its revenue to government jumps up and down with the property market. Insurance taxes often encourage under-insurance and non-insurance, increasing risks for those affected. Payroll tax has the potential to be an efficient tax, but differential rates between states and territories and between larger and smaller businesses reduce its efficiency.

[35] "[S]ince 2004, productivity growth slowed across nearly all advanced economies." Danny Bahar, 'Productivity Is Key to Economic Growth: Why Is It Slowing down in Advanced Economies?', *Brookings Institution Blog*, 2017 <www.brookings.edu/blog/up-front/2017/09/25/productivity-is-key-to-economic-growth-why-is-it-slowing-down-in-advanced-economies/> [accessed 27 October 2019]. [36]OECD (2017), *Getting Skills Right: The OECD Skills for Jobs Indicators*, OECD Publishing, Paris. [37]IMF, Technology and the Future of Work, www.imf.org/external/np/g20/pdf/2018/041118.pdf [38]OECD (2017), *Getting Skills Right: The OECD Skills for Jobs Indicators*, OECD Publishing, Paris.

CONGESTED URBAN ROADS AND PUBLIC TRANSPORT

Sydney's roads and railways are straining from rapid population growth. On one estimate[39], congestion cost Sydney $6.1 billion in 2015 and will cost it an annual $12.6 billion by 2030.

POOR REGIONAL CONNECTIVITY

Stakeholder feedback indicated some of the state's regions are poorly served by infrastructure, particularly digital telecommunications.

AN 'INFLEXIBLE' PLANNING REGIME

Stakeholders consistently nominated the planning system as "inflexible" and an impediment. Good planning systems help determine the fate of fast-growing cities such as Sydney. Sydney ranks high on global liveability measures, but it is behind its peers on measures such as the time it takes to subdivide land[40].

OUT OF STEP REGULATION

Stakeholders agreed that regulations based on particular technologies or business models are bound, eventually, to needlessly block change, requiring costly regulatory catch-up.

HIGH ENERGY PRICES

Wholesale electricity prices rose across the National Electricity Market (NEM) by 130 per cent between 2015 and 2017. The price paid for electricity traded in the NEM also more than doubled, from about $8 billion to $18 billion and household bills increased by up to 20 per cent in 2017 alone. Reasons for price increases include coal-fired power station closures, rising input prices and generators' market concentration.

PATCHY COLLABORATION BETWEEN UNIVERSITIES AND BUSINESS

Australia performs poorly in university-business collaboration and in commercialising research and innovation. In the CSIRO's Australian National Outlook 2019 report[41], Australia's best global ranking was for collaboration between small businesses, in which we were 21st of 29 countries. We ranked 27th of 27 on collaboration between large business and higher education.

LOW DIGITAL AND CYBER CAPABILITY

Cybercrime remains a pervasive threat to Australia's national and economic prosperity. A single, successful cyber-attack can have devastating repercussions ranging from theft of intellectual property to a loss of consumer confidence and trust.

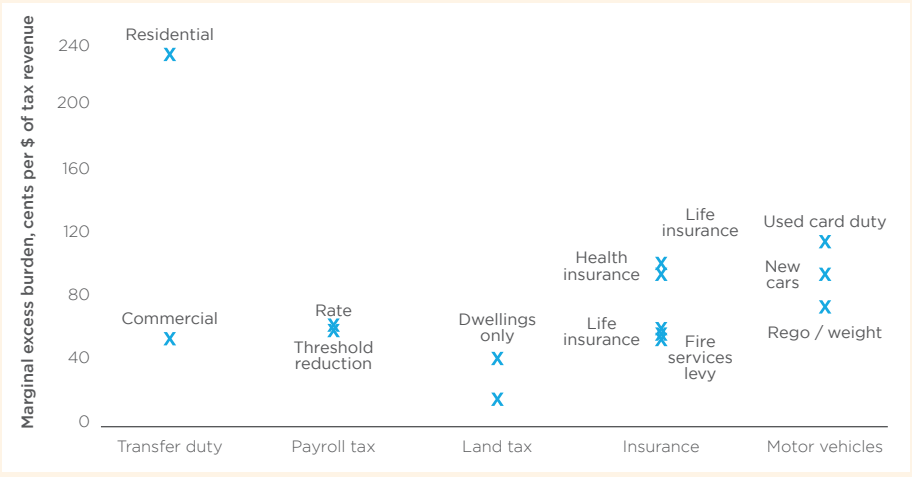


Figure 9: Taxes can be costly
Economic cost of selected NSW state taxes (%).
Source: CoPS, 2018.

[39] IMF, Australia Country Report No. 18/44, www.imf.org/en/Publications/CR/Issues/2018/02/20/Australia-2017-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-45631 [40] Productivity Commission, as above. [41] *Australian National Outlook 2019*, CSIRO.

05.

Eight criteria for future growth industries

This chapter identifies the likely New South Wales industries of the future.

Predicting the future is a near-impossible task. But we can consider how the structure of the economy might change over the next twenty years. For example, we know that existing New South Wales public infrastructure such as technology hubs and precincts will support innovative growth industries. And some well-established industries are positioned to experience rapid growth.

With limited policy levers, state governments routinely offer industry assistance in various forms, as outlined later in chapter 6. Such engagement, however, often is done in an ad-hoc manner. The efficacy of such engagement can be improved by enhanced governance arrangements.

The Office of the NSW Chief Scientist and Engineer and the Industry Development team have developed criteria for industries to be considered those of the future and suitable for support.

These criteria have not been adopted as government policy, but they are a guide, or filter, to the suitability of particular activities and are not intended to be prescriptive. *The criteria are:*

Industries of the future

- **High spending on research and development (R&D)**, an above average rate of implementation of new technologies and processes and key measures of R&D spending that are in the top 20 per cent of industries or higher.
- **Disruption of existing industries** according to the Accenture Disruptability Index[42] – for instance, where new entrants to a sector are triggering innovation and fairer pricing.
- **Highly skilled workers,** such that the share of workers in an industry whose occupations require a high degree of technical knowledge and the share of workers with post-high school education, are both above the national average, as well as creative and critical thinking.
- **Existing investment in place to support growth** in physical or intangible assets, systems and regulatory frameworks to support the industry, like a robust and credible regulatory model and ease of access to necessary transport links and logistics to major export markets.
- **Potential industry strength.** For example, associated R&D capabilities for that industry must be highly ranked by NSW universities.
- **High growth.** Forecast international growth of the industry is well above the international average.
- **Export orientation.** The international market size is more than 50 per cent bigger than the size of the Australian market, or more than 50 per cent of local production is exported.
- **Extensive supply chains**. The complexity of core products or services produced by the industry is high and, where economic and feasible, the activity supports local production, employment, investment and service provision.

[42] *Disruption Need Not Be an Enigma*, Accenture, 2018.

With this framework in mind, probably the most important driver of trends in the NSW economy will be a shift towards more technology and even more so for services

Activities associated with coal are likely to decline in importance. Agriculture should be a growth opportunity, particularly in high-quality produce, driven by technology and developments in biotechnology. The growth in services will be driven both by the availability of technology and emergence of new products, but also by an ageing society.

While technology change and disruption will continue, the experience of the past 20 years suggests that the economy and society will adapt to these changes with relative ease.

There are risks of more adverse outcomes, obviously, but the state's resilience and flexibility over the last two decades augurs well. It also is clear that there will be significant opportunities for growth and new industries and jobs, particularly for improving productivity and efficiency in mature sectors via digital technologies.

There will also be opportunities in potentially new technologies and industries as modern methods decentralise production to the customer. There will be opportunities in bioengineering and synthetic biology, driven by demand for food and agribusiness. Defence and space technologies are also preferred industries of the future, driven partly by growing federal defence budgets. We have the chance to rethink opportunities around resources – mining, agriculture, energy and water – which should lead to more informed thinking about the circular economy.

The following discussion is framed across three broad categories:

1. Building on our strengths
2. Serving our domestic needs
3. Looking to a vibrant future

Building on our strengths

Finance and fintech

Sydney's role as Australia's financial hub ranks among our state's greatest assets.

New South Wales plays home to 45 per cent of Australia's financial services output. That makes finance the single biggest contributor to the state's economy, with 13 per cent of our economic output – and it directly employs 183,000 people.

Technology, one of our five megatrends, is already rapidly changing the finance sector, creating risks and challenging the ways businesses operate. Transactions now increasingly happen online rather than in-person and banks are moving to instant funds transfers.

That same technology is creating new opportunities that we must encourage. Some businesses are experimenting with cryptocurrencies and blockchain technology. The Sydney-based Reserve Bank of Australia, already a pioneer of polymer banknotes, now talks of developing an e-dollar. Artificial intelligence and data analytics are changing the way that institutions deal with customers and information. And quantum computing may begin transforming financial services again well before 2040.

This rapid change underlines the need for New South Wales' financial services businesses to keep adapting and innovating. Sydney is home to around 60 per cent of Australia's financial technology (fintech) companies and has also developed into a centre for regulatory technology (regtech) and insurance technology (insurtech). As other cities push for prominence in financial services, Sydney needs to outperform to maintain and improve its position among the world's financial hubs.

Mining

Mining and resources are important parts of the NSW economy. We have large and diverse mineral and gas deposits, many exploration projects and a burgeoning renewable energy sector. Asia's quest for cleaner air should drive up global gas demand in the next two decades – though it also threatens demand for thermal coal.

The CSIRO[43] said that most of Australia's near-surface resource assets have already been discovered and exploited. Opportunities to extract minerals from deeper reserves can be exploited with new technologies and skills. Regional New South Wales has long been a significant source of resources such as coal, gold, lead and copper; now lithium and rare earths loom as lucrative industries.

While community, agricultural and environmental opposition still surrounds onshore coal seam gas (CSG) activity, in 2014 the NSW Chief Scientist and Engineer found many of the risks associated with CSG extraction could be addressed using quality controls, regulation, training and the latest technologies.

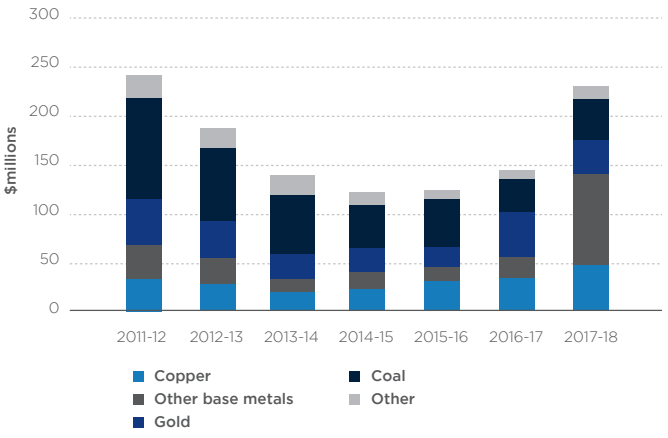


Figure 10: NSW mineral exploration
Source: Australian Bureau of Statistics, NSW Treasury.

[43] *Australian National Outlook 2019*, CSIRO, 2019.

Education

Our education system needs to focus on producing graduates who are workforce-ready – not just academically and technically strong, but ready to transition straight into productive jobs. That readiness will demand not just technical excellence but also the so-called softer skills, such as creativity, communication, resilience and particularly the ability to learn further skills throughout life. Happily, such skills will serve them through working lives that may span more years than the jobs of their parents, across a wide range of jobs and industries.

NSW students

We must aspire to improve our performance on multiple education indicators:

- Global test scores such as PISA
- Collaboration between levels of education, from schools to vocational training to universities
- Engagement with business
- Focus on life-long learning and reskilling of older workers
- Skilling the young.

Modular learning will equip students more quickly for available jobs, without requiring commitment to multiple years of learning. The so-called STEM (science, technology, engineering and maths) disciplines need to be prominent if we are to produce candidates able to move smoothly from education into advanced technology-using and technology-producing jobs of the future.

NSW schools have identified that they also need to find effective ways to integrate creativity in learning across the curriculum to prepare young people for future jobs[44]. Young people are learning and developing skills in a changing economy which increasingly values creativity, innovation and critical thinking.

Characteristics such as confidence, risk-taking, discipline, collaboration, persistence, communication and critical and creative thinking are all strengthened by creativity in learning. Business leaders and employers regularly cite these skills as vital to succeeding in jobs of the future across the workforce: some studies predict that 40 per cent of today's jobs will have disappeared in 10 to 15 years' time, due to automation and technology[45].

A study by the Commonwealth Government's Productivity Commission[46] has found that an increase in literacy and numeracy scores of one skill level (out of 5) is associated with an increased likelihood of employment of 2-4 percentage points and 10 per cent higher wages. Additionally, an improvement in PISA scores of one-half of a standard deviation in maths and science is shown to increase GDP per capita by 0.87 per cent a year on average.

If we can move such indicators up, this work suggests, we will help to ensure that future workers can move with greater agility between roles, are not battered so harshly as technologies change and industries rise and fall, and enjoy more prosperous lives.

International education

Australia has the third-largest international student population of any nation in the world. Some of the world's brightest minds are drawn by the country's dynamic and multicultural education sector, world-class teaching, infrastructure and research facilities and global connections. International students enter a safe, supportive and inclusive environment where course standards are guaranteed through national quality assurance frameworks and government regulation.

Proof of this quality is seen in Australia's rank in the 2018 Global Talent Competitiveness Index – 11th out of 119 countries. The index assesses the policies and practices that enable a country to attract, develop and retain the technical and vocational abilities and the global knowledge skills associated with innovation, entrepreneurship and leadership.

The NSW Government has already established *StudyNSW* to increase the number of international students studying with New South Wales education providers, both public and private. It aims to improve the quality of their experience and recognise their contributions to the community. Alongside Technical and

Further Education (TAFE) institutions, New South Wales has almost 1,200 community-based and private registered training organisations and is the largest public provider in Australia. These institutions are internationally recognised for the qualifications they provide and their pathways into local industry and higher education.

We also have a significant opportunity to grow our edtech industry (the use of technology to deliver and improve educational outcomes). More than 1,000 online education providers in Australia already generate $3.3 billion in revenue and as online learning grows, they represent an economic opportunity to export edtech software and services.

Tourism, major events and business events

Overseas travellers are already attracted to the significant tourism assets of New South Wales: pristine national parks and coastal environments, vibrant arts and cultural experiences and world-class cultural, sporting, entertainment and conferencing venues and institutions. The Sydney Harbour Bridge and the Opera House act as cornerstones and icons of this tourism package. The result is that more people visit NSW than any other state or territory in Australia. China is the largest source of tourists, followed by the United States, but there is potential for rapid growth in other markets, including Europe and India.

Tourism's export growth should accelerate even as new overseas destinations provide competition.

As demand for nature-based tourism rises, we need to maintain our wonderful natural assets. We also need to promote the state better, particularly to heritage and cultural tourists. For example, New South Wales has the largest number of First Nations people and Sydney is a globally unique centre of First Nations' artistic excellence.

People visiting and living in Sydney are highly engaged in the arts and there is a strong appetite for cultural programming, events and celebrations. Sydney and New South Wales play host to numerous sporting events and exhibitions and international and national conferences, conventions and business events at its world-class conference venues. Beyond the immediate tourism and visitation benefits, business events provide a platform for knowledge-sharing, inter-jurisdictional collaboration and networking.

Arts, culture and creative industries

In 2016-17 New South Wales creative industries contributed $16.4 billion to state production and employed approximately 120,000 full time workers[47]. Demand for arts and cultural product is increasing, evidenced by the significant growth in cultural and heritage tourism: 13.6 million cultural and heritage visitors to New South Wales in 2018 spent $14 billion[48] between them.

The prosperity of New South Wales will increasingly rely on investments and innovations across disciplines, many of them combining creative activity with technology and engineering know-how. Some examples of value adding include:

- Industrial design in advanced manufacturing
- User experiences techniques such as data visualisation and gamification in medical technology
- Arts and cultural activities to support positive ageing
- Augmented reality to assist in crop disease identification
- Visitor and event experience design to improve tourism experiences.

In the virtual reality, augmented reality and games development industries, industry stakeholders observed a market opportunity in so-called 'serious games' in fields such as defence and aerospace, health, disability, education, e-safety and creative ageing[49].

Strategies that showcase and grow the state's arts and cultural offering will directly service this growing demand. By building its profile as a global cultural destination, New South Wales stands to gain jobs, investment and exports, all while growing productive cultural exchange and long-term international relationships in many different industries.

[44] *Future Frontiers – Education for an AI world*, Department of Education and Melbourne University Press 2017. [45] Mark Scott, Secretary for the Department of Education, Create NSW Arts 2025 Summit. [46] Productivity Commission, Literacy and Numeracy Skills and Labour Market Outcomes in Australia, 2014: www.pc.gov.au/research/supporting/literacy-numeracy-skills/literacy-numeracy-skills.pdf [47] *The Economic Value of Arts, Screen and Culture* report by KPMG, commissioned by Create NSW 2018. [48] Cultural and Heritage visitors to NSW, Destination NSW, year ending December 2018. [49] For example NSW-based games company, Bohemia Interactive includes the US Marine Corps, US Army and UK Ministry of Defence as its customers.

Serving our domestic needs

Digital and cyber security

Digital technology is one of the fastest growing global sectors[50]. It is one of the global economy's most powerful enablers, driving productivity growth in industries from health to agriculture. As well as enabling industry, it is driving new industry challenges, including workforce development and cyber security.

Cybercrime affects individuals, business and governments. Cyber security has emerged as one of the most high-profile, cross-sectoral and rapidly evolving challenges in the digital environment, alongside the need for general digital capabilities. Its rise has stimulated innovation in all sorts of products and solutions that counter malicious activity. Australia's cyber security industry now employs around 19,000 Australians. Over the next decade, it has the potential to almost triple in size, with revenues forecast to soar from just over $2 billion in 2018 to $6 billion by 2026.

The digital and cyber security sector relies on a steady supply of highly skilled employees, low barriers to trade and accommodating regulatory approaches from government. To ensure that New South Wales meets cyber security skill needs, the NSW Government has developed the *2018 NSW Government Cyber Security Strategy*[51] and the *2018 NSW Cyber Security Industry Development Strategy*[52].

Medtech, health and biomedical sciences

Medtech, health and biomedical services produce a diverse range of products, innovation and technology ranging from common medicinal supplies (such as syringes, medical gloves, etc) to highly complex technologies such as hearing implants, ophthalmic devices and medical software. The New South Wales industry is Australia's largest, home to more than 1,000 medical technology companies.

The New South Wales industry generates an estimated $4.8 billion in revenue per year and employs around 7,000 people. It is estimated[53] the medical technology industry has the potential to create an additional 28,000 jobs and $18 billion in GDP nationally by 2025. Telehealth, e-health, remote-area health and better use of patient data all offer the state extraordinary opportunities, both to improve our lives directly and to expand the industry.

Recognising the growth opportunities, the NSW Government consulted with medical technology stakeholders in the state to develop the NSW Medical Technology Industry Development Strategy, launched in 2018. We should continue to reduce the barriers to new products being brought to the market and focus on increasing collaboration by industry participants and researchers to develop stronger capabilities.

Waste management – the circular economy

The Environmental Goods and Services (EGS) sector includes organisations delivering waste, wastewater, water, energy management, renewable energy, adapted goods, biodiversity and landscape products and services. In addition to environmental and economic benefits, research shows that a strong and mature EGS sector has spill-over productivity gains that compound along supply chains and across industry sectors.

New South Wales is home to 43 per cent of Australia's EGS businesses and 44 per cent of its 'innovative' EGS businesses

Fuelled by significant investment in research and development, a global environmental technology, boom has seen global patents for green innovations grow four times faster than average. The EGS sector is growing at a faster rate than the wider global economy, with the global market for environmental goods in 2020 predicted to reach triple its 2011 value.

New South Wales is home to 43 per cent of Australia's EGS businesses and 44 per cent of its 'innovative' EGS businesses – double Victoria's share. The Innovation in the NSW Environmental Goods and Services (IEGS) report[54] valued the sector at $43.9 billion in 2017-18.

The significant waste challenge and opportunity has grown with the recent international trend for nations to ban or restrict imports of waste. The Australian Plastics Recycling Survey 2016-17[55] found over 3.5 Mt of plastic is consumed in Australia each year, with a national plastics recycling rate of under 12 per cent.

The IEGS report found that New South Wales has significant research and industry strengths and potential for innovation-led growth. Competitive advantages in subsectors include energy, heat and water management, renewable energy, solid and waste water services, soil and water remediation and air and climate protection. Associated research strengths include photovoltaics, rechargeable batteries, water filtration and treatment and environmental remediation.

The NSW Environmental Protection Authority (EPA) has developed a NSW Circular Economy Policy; it provides a framework for implementing initiatives to improve product life cycles and reduce waste and pollution and can be strengthened by complementary industry initiatives. Supporting a vibrant ESG sector in New South Wales will help to cut waste, make sustainable recycling markets bigger and more efficient and improve the waste infrastructure network.

New South Wales, together with the Commonwealth and other jurisdictions, has committed to set a timetable to:

- Ban the export of plastic, paper, glass and tyres
- Reduce plastics waste and diversion to landfill
- Build capacity to recover value from waste and generate high-value recycled products.

[50] www.brookings.edu/research/trends-in-the-information-technology-sector/ [51] www.digital.nsw.gov.au/sites/default/files/NSW%20Cyber%20Security%20Strategy%202018.pdf [52] www.industry.nsw.gov.au/__data/assets/pdf_file/0003/193665/NSW-cyber-security-industry-development-strategy.pdf [53] NSW medical technology industry development strategy, 2018: www.industry.nsw.gov.au/__data/assets/pdf_file/0005/182840/NSW-medical-technology-industry-development-strategy.pdf [54] Productivity Council, 'Innovation in the NSW Environmental Goods and Services Sector' (NSW Government, 2019). [55] 2016-17 Australian Plastics Recycling Survey National Report: www.environment.gov.au/protection/waste-resource-recovery/publications/australian-plastics-recycling-survey-report

Looking to a vibrant future

Advanced manufacturing

As manufacturing adapts to disruption, manufacturing businesses that use new technology or advanced business models are increasingly being termed advanced manufacturers. The definition relates to the sophistication of a business' processes rather than its products. It signals a shift away from competing on cost to emphasising value creation.

Advanced manufacturing encompasses technologies including additive and precision manufacturing, advanced materials, robotics, artificial intelligence, virtual and augmented reality, advanced sensors, data analytics and quantum technology. Its many sectors include aerospace, defence, automotive, medical technology, digital technology, clothing and food.

Around half of the value added by the state's advanced manufacturers is derived either before (e.g. design) or after (e.g. sales and services) production, as Figure 11 shows. Indeed, New South Wales' high wages mean the state's natural advantage no longer rests at the production stage.

Advanced manufacturers are research intensive and apply novel technologies, systems and processes in their supply chains and products to subvert traditional industries, for example, by replacing traditional products and services, or enabling a step change in the productivity of competing supply chains, products or services. They tend to have long supply chains and drive advanced technology ecosystems in supporting components and servicing.

Historically, New South Wales has had a well-established manufacturing sector. But it is now under pressure from aggressive international competition on both price and quality. This competition shows in the relatively low proportion of advanced technologies, products and services that Australia exports to overseas markets. In Harvard University's international rankings of economic complexity, Australia ranks 93 out of 133 countries, falling from 57 in 1995[56]. High rankings have been shown to be predictive of future economic growth[57].

Yet the advances in technology which underpin advanced manufacturing offer opportunities for businesses to develop knowledge-intensive, high value technologies, products and services for domestic and international markets. For example, the growth in novel manufacturing techniques including 3D printing enables new cost-competitive opportunities in bespoke product design, rapid prototyping and novel components and materials. This presents a promising opportunity for New South Wales to re-capture market strength in the design and servicing portions of the manufacturing supply chain.

To accomplish this, New South Wales must pursue a long term, coordinated and focused approach, with manufacturers, government and the research sector engaging and collaborating with each other:

- Manufacturers must acknowledge opportunities and threats posed by new manufacturing technologies and adopt advanced technologies, processes and systems to add value to their products or services.
- Government must encourage, incentivise and facilitate collaborative research, development and commercialisation of advanced technologies.
- The research and education sector must improve collaboration with manufacturers to research, test, prototype and commercialise technologies, processes and systems; and open their high-quality teaching capabilities to address critical workforce skills gaps.

In May 2018, the NSW Government launched the Advanced Manufacturing Industry Development Strategy which identifies challenges to address barriers and accelerate the growth of the advanced manufacturing industry in New South Wales. The strategy implementation plan engages industry, government and the research and education sector and proposes initiatives including: providing seed support; supporting targeted high impact research partnerships with clear end-user outcomes; making commercial connections; providing collaboration ecosystems and platforms; and creating financial incentives to translate research into commercial outcomes.

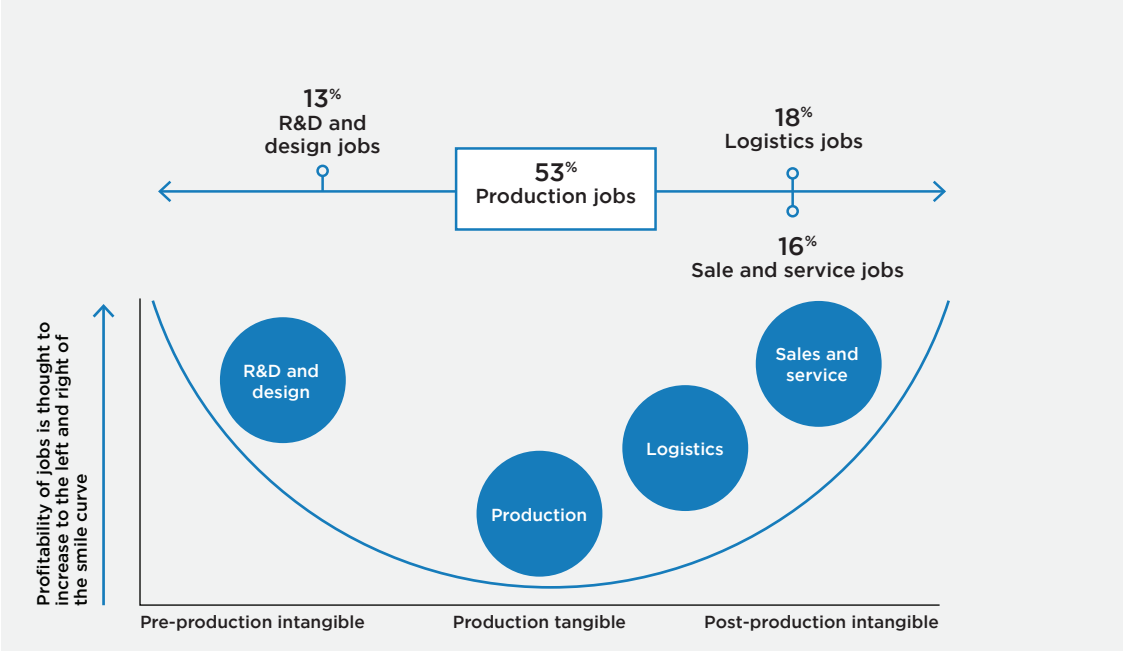


Figure 11: Manufacturing's 'Smile Curve'
Advanced manufacturing value-add by stage of activity *Source: Advanced Manufacturing Growth Centre.*

Agtech, food production

The OECD Development Centre[58] estimates the Asian middle class will encompass more than three billion people by 2040. As people transition from earning working class to middle class income, they consume more of products like higher-protein foods, domestic services including housing and infrastructure (including schools) and services such as education, tourism and healthcare.

The NSW food and beverage manufacturing industry is well-established and innovative. It already sends a large proportion of our exports to the Asian economies poised for fast middle class growth. There also is huge upside for education and tourism, services already in high demand. But other countries with established links in Asia also are positioning to meet this demand.

There is a global dietary shift away from grains and cereals towards meat, dairy, fruit and vegetables. The changing climate and current water insecurity notwithstanding, New South Wales' climates suit crop-growing. We also have a world-class regulatory system for food safety.

Transport infrastructure and smart logistics are key to building scale and comparative advantage in emerging markets for premium, provenance-protected food goods[59]. Long-term NSW Government infrastructure investments such as commitments to the Western Sydney Airport and the agribusiness precinct of the Western Sydney Aerotropolis and $55.6 billion over four years to 2022-23 in major transport infrastructure, will maximise the benefits of expanded food exports.

In 2013-14, NSW agricultural businesses spent more than A$32 million on research and development, representing 22 per cent of national R&D spending by businesses in the sector. At the same time, food product manufacturers spent A$215 million, or 36 per cent of the national total[60].

The NSW Government investment in agricultural R&D is led by the NSW Department of Primary Industry's (DPI) GATE (Global Ag-Tech Ecosystem) in Wagga Wagga, a collaborative research and technology facility designed to cultivate and develop agtech ideas. There is a long-term opportunity to increase the state's exports of premium and niche foods, such as alternative proteins, functional foods and beverages, new grain varieties, wine, craft beer and dairy products such as milk powder.

Constraints to agricultural and food industry expansion are many. They include water and energy security and affordability, the availability of sufficient arable land and the likelihood of more frequent droughts resulting from climate change.

[56] Harvard University Growth Lab, Atlas of Economic Complexity (2017), Australia country profile available at atlas.cid.harvard.edu/countries/14.[57] César A. Hidalgo, Ricardo Hausmann, *The building blocks of economic complexity*, Proceedings of the National Academy of Sciences Jun 2009, 106 (26) 10570-10575. [58] The Organisation for Economic Co-operation and Development (OECD) Development Centre oecdobserver.org/news/fullstory.php/aid/3681/An_emerging_middle_class.html [59] www.nswfarmers.org.au/NSWFA/Content/IndustryPolicy/R_and_D/Supply_chain_transformation_and_export_readiness.aspx [60] www.industry.nsw.gov.au/invest-in-nsw/industry-opportunities/agribusiness-and-food/research,-technology-and-innovation


“
New South Wales has well-established defence industry capability and capacity at the beginning and end of the value chain.
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Aerospace and defence

The aerospace and defence sector has exhibited strong global growth. This growth is forecast to continue, led by strong demand for commercial aviation from the growing international middle classes and increased global military expenditure in response to geopolitical tensions[61]. The Commonwealth Government is investing $195 billion in defence technology over the period to 2026[62].

The global aerospace and defence industry is dominated by major prime contractors based in the United States, France, the United Kingdom, Italy, Canada and Japan. While Australia lacks a local aerospace and defence prime, many international primes have a significant presence in Australia and are reliant on long and diverse advanced technology supply chains which include many small and medium businesses in New South Wales.

Through its procurement policy for defence contracts, the Commonwealth Government also seeks to maximise the involvement of Australian industry in the international defence supply chain and to secure sovereign defence industrial capabilities as a strategic priority[63]. This approach is defined in the Australian Government's 2016 Defence Industry Policy Statement[64], the 2018 Defence Industrial Capability Plan[65] and initiatives such as Defence Innovation Hub and the Next Generation Technology Fund (NGTF) which support the commercialisation of Australian defence R&D.

New South Wales has well-established defence industry capability and capacity at the beginning and end of the value chain, from engineering research and development through to early commercialisation and ongoing maintenance and support services.

The defence industry and its supporting industries employ 36,000 people across New South Wales[66]. We are home to the largest number of defence bases and capabilities of any state or territory, including major sustainment hubs for the Australian Army at Holsworthy Barracks, the Royal Australian Navy at Garden Island and the Royal Australian Air Force at Williamtown.

As identified in the NSW Government's 2017 Defence and Industry Strategy, New South Wales needs to seize opportunities to grow the local aerospace and defence supply chain and secure a significant portion of major federal defence investments. Other states have been successful in attracting significant defence industry activity through focused and well-resourced investment attraction activities.

The NSW Government has also developed a *Defence Industry Sector Investment Attraction Plan* to identify which defence sector opportunities can be developed and guide investment attraction activities targeting major aerospace and defence primes and upcoming government defence procurements. This plan also aligns with the attractive industry ecosystems offered by the Western Sydney Aerospace and Defence Industries Precinct at the Aerotropolis and the Williamtown Defence Aerospace and Aviation Precinct.

[61] Deloitte (2019) *Global aerospace and defensce industry outlook* www2.deloitte.com/content/dam/Deloitte/global/Documents/Manufacturing/gx-eri-2019-global-a-and-d-sector-outlook.pdf [62] www.defence.gov.au/WhitePaper/. [63] 2016 Defence Industry Policy Statement (p23) www.defence.gov.au/WhitePaper/Docs/2016-Defence-Industry-Policy-Statement.pdf [64] 2016 Defence Industry Policy Statement, www.defence.gov.au/WhitePaper/Docs/2016-Defence-Industry-Policy-Statement.pdf [65] 2018 Defence Industrial Capability Plan, www.defence.gov.au/SPI/Industry/CapabilityPlan/Docs/DefenceIndustrialCapabilityPlan-web.pdf [66] invest.nsw.gov.au/sector-opportunities/defence

Space

Space-derived products, services and applications are used by a multitude of industries in Australia, including communications, transportation, energy, aviation, advanced manufacturing, robotics, agriculture, construction and information technology.

As space-related technologies are rapidly adopted by industries seeking to improve their productivity and as the financial and risk barriers to participation in the space industry decrease, the global space industry is experiencing significant growth. It is forecast to reach over US$1 trillion by 2040. Consumer-focused commercial space activities have grown quickly in recent years, so that they now represent 77 per cent of all space undertakings, outstripping government-funded programs.

Australia's economy relies heavily on space related technology, almost all of which is currently procured overseas. Australia's reliance on space technology will continue to grow as we transition to more future-focussed industries and as the Internet of Things powers more and more industry. To address this need, the Australian Space Agency has a goal of tripling the size of the space industry in Australia and doubling the number of jobs by 2030.

With 30 per cent of people employed in the Australian space industry based in New South Wales, the state is well placed to benefit from this transition. Space in Australia is still an emerging industry however, with few networks or support levers. Space technologies are enablers and so supporting the industry's growth will have a catalytic effect on the broader economy.

Hydrogen

Hydrogen is emerging as a major economic opportunity for Australia to lead in the global transition to low emission sources of energy. Australia has the potential to become a major hydrogen supplier, with production projected to reach 100 million tonnes of oil equivalent of hydrogen which equates to 3 per cent of global gas consumption today[67]. Capitalising on growing global demand for hydrogen, Australia could build a hydrogen export industry worth $1.7 billion annually by 2030 and accounting for 2,800 jobs.

New South Wales is actively contributing to the development of a National Hydrogen Strategy led by the Commonwealth Government, which will consider international trends and best practice, reducing red tape and encouraging innovation. Other states have released their own hydrogen policies and dedicated funding programs to accelerate the development of a domestic hydrogen market and unlock export potential.

We are well-positioned for the production and export of hydrogen, with access to abundant renewable energy resources, existing transport and export infrastructure and proximity to export markets with the support of a highly skilled workforce and strong research capabilities. As at September 2019, there are 1,171 megawatts committed large scale solar projects in New South Wales and a significant pipeline of 15 gigawatts of proposed renewable projects. When completed, these projects will double the current installed generation capacity of New South Wales in supplying clean power for hydrogen production.

Hydrogen industry facilities could be located in regional areas in providing potential opportunity to aggregate with the development of transport, logistics and utility infrastructure. The regional hydrogen supply chain could provide co-locational benefits to other industries such as agriculture, manufacturing, mining and waste management in further driving economic development and job growth.

[67] International Energy Agency, World Energy Outlook 2018 and Australian Government Chief Scientist, media release, available at www.industry.gov.au/news-media/australias-hydrogen-potential-a-message-from-the-chief-scientist

The hydrogen industry will help existing industries to move to hydrogen fuels where economic, while skilling up workers. For example, the $15 million Jemena Power to Gas Project aims to demonstrate how existing gas pipeline infrastructure at Western Sydney can be repurposed to store and transmit hydrogen, while showing its adaptability across the NSW gas network.

Our well-established energy trading relationships give New South Wales advantages in meeting the clean energy needs of countries such as China, Japan, South Korea and Singapore. To capitalise on the state's competitive advantages, we need to start building domestic industry capability and capacity. This could include supporting early investment for demonstration projects across the whole hydrogen value chain of production, transport, storage and use.

06.

We think of the Commonwealth Government and Reserve Bank of Australia as chief controllers of our economic fate.

Meanwhile, the state government has enormous scope to influence the New South Wales economy directly and, in particular, indirectly, through its effect on education, infrastructure and other economic services that drive productivity.

State governments have the power to make high-impact change everywhere from building regulation to the control of taxi services.

They hold most of the powers to take actions which directly boost productivity growth. The national Productivity Commission's 2017 *Shifting The Dial*[68] report made 28 reform recommendations to lift productivity growth – and only six of them were outside the direct control of state governments.

The NSW Government can pull seven main policy levers to enhance economic performance:

Lever 1: Human capital

Employment and skills development, the education system, including the tertiary sector, industrial relations and the complex and often contentious issues around population and migration.

How we get there

Lever 2: Institutions

The performance of government, including via procurement policies and the government's promotion of a so-called Global NSW and the state's distinct cultural identity and 'brand'.

Lever 3: Fiscal policy

The state's taxation powers and the ability to spend the revenue raised and relations with the Commonwealth Government.

Lever 4: Infrastructure

Ensuring that the transport network and other public services can support a growing population, that the right infrastructure gets built and maintained at least cost and that it encourages innovation and world's best practice.

Lever 5: Innovation

The establishment of mixed arts and technology creative precincts, government incentives to encourage investment in research and development, investment in incubation infrastructure and government acting as a facilitator for collaboration between industry, universities, government and the community.

Lever 6: Energy and natural resources policy

Includes a focus on specific areas affecting energy policy, water resilience and the environment.

Lever 7: Industry development and sector strategies

Aiding the development of potential high-growth, high-skill industries and establishing rules and ongoing evaluation processes for industries selected for assistance .

[68] *Shifting the Dial 5 Year Productivity Review*, Commonwealth Productivity Commission, 2017.

Lever 1: Human capital

Population and skills

We need to address the skill shortages and mismatches in the current workforce.

These problems are exemplified by the construction industry, where rising government infrastructure demands and still-high levels of residential construction have tightened the labour supply/demand balance. But they also hamper growth everywhere from the IT sector to tourism.

The Commonwealth Government plays a key role in labour supply in cities and regions. It manages the annual cap on the skilled migrant intake. In late 2019 that skilled intake stands at 70,000 per year[69]; the revised annual cap for total migration is now 160,000 a year, down from 190,000 previously. New South Wales needs to remain an active participant in the COAG process – to devise a workable national policy on population, to help shape the make-up of the list of professionals and skilled workers admitted in the intake and to ensure that the lists of the Commonwealth and state governments respond quickly to the changing demand for labour.

Recent migrants could receive incentives to settle in regional areas, through means such as expedited permanent residency status or post-study working visas. This would help to ease some of the pressures on Sydney's infrastructure and services and make regional communities more sustainable. Again, it is important that New South Wales work with the Commonwealth Government to arrange this.

New South Wales should take advantage of the current construction boom to identify skills shortages, address them through training and capability building and support technology upskilling. The state should also collaborate with industry to build the capability, diversity and capacity of asset managers in line with modern asset management practice.

Recommendation 1.1:

Work with the Commonwealth Government to examine incentives for new migrants to move to and remain in regional areas of New South Wales, as well as the implications.

Recommendation 1.2:

Develop a timely and responsive skilled migration list that regularly integrates the New South Wales list with that of the Commonwealth Government and use real-time data to identify skills in demand.

Recommendation 1.3:

Address construction industry skill shortages through increased investment in training and capability building.

Education

The future prosperity of our people begins with education. It is through the various tiers of our education system that children and young adults first learn the most basic of skills, such as reading and writing. It also should build in them the broader abilities that make them not only job-ready, but sufficiently nimble and flexible to move successfully through multiple jobs. The system also should equip graduates with the ability to undertake a lifetime of learning.

Our curriculum should focus not only on the basics, but on the essential "Four Cs": creativity, communication, critical thinking and collaboration. Instead, our teaching seems rigid and inflexible. Teacher quality is sometimes raised as a problem, despite our teachers being paid at levels 30 per cent above the OECD average[70].

We have an opportunity to take what are admirable basics and turn them into educational advantages. We can reform the way teachers are accepted into university and thus raise teacher quality. We should ensure that New South Wales has flexibility to reward better teachers with higher pay, as Gonski[71] recommended. And the curriculum should adopt a focus on lifelong learning, as well as the basics.

We should aspire to have a vocational education system that is flexible and adaptive and that integrates constructively with industry. Also, we should aspire to close the chasm that has opened up in both educational standards and reputation between the vocational system and our universities.

Recommendation 1.4:

Undertake education reforms, particularly those aimed at more flexible remuneration to help improve teacher performance.

Recommendation 1.5:

Work with industry and with the Commonwealth and state governments to improve the performance of the vocational education and training system, including via the recently-formed Commonwealth stakeholders' panel.

[69] Shifting the Dial 5 Year Productivity Review, Commonwealth Productivity Commission, 2017. [70] OECD 2019. *Education at a Glance 2019: OECD indicators*. OECD Publishing, Paris, doi.org/10.1787/f8d7880d-en. [71] David Gonski, *Through Growth to Achievement; Report of the Review to Achieve Educational Excellence in Australian Schools*, 2018.

Lever 2: Institutions

Support the work of the NSW Productivity Commissioner

In mid-2018, the NSW Government appointed a NSW Productivity Commissioner and Commission staff to spearhead a reform agenda focused on four core themes:

- Raising the ease of doing business
- Lowering the cost of living
- Making housing more affordable
- Making New South Wales the easiest state to move to.

Much has been done in achieving these core objectives. The NSW Productivity Commissioner is examining, as part of a White Paper process, the efficiency of the state tax system, the planning system and the performance of the vocational education and training (VET) system, among other matters. The 2040 Blueprint suggests that government support the broad objectives of the Commission in enhancing the productivity of the NSW economy and in the specific policy areas above.

On planning, the Commissioner's discussion paper *Kickstarting the Productivity Conversation*[72] said that:

"Debate in the community has reflected a growing concern about our ability to accommodate such rapid growth. These concerns are not without basis: the demands of a growing city are significant and governments need to think differently about how we plan for growing communities, especially if we are to address the agglomeration diseconomies outlined in the section above. Sydney risks becoming more congested and less liveable if governments don't address these challenges."

"But, where government can adapt its processes, update regulatory settings and deliver the infrastructure and services that meet community needs, population growth offers the opportunity to build a thriving international metropolis and harness the productivity potential of a dynamic and bustling city."

On regional planning, the NSW Productivity Commission's discussion paper said that "to effectively support productivity improvements in our regions and build on their existing strengths, it is worth considering the regional-specific barriers to growth in those areas. For instance, there is lower density in the regions, so there could be further potential to reduce the requirements of the planning system and to tailor zoning to regional circumstances."

On vocational education, the recent Joyce review on behalf of the Commonwealth Government[73] identified six broad issues that should be addressed:

- Continuing variation in quality between providers and concerns about the relationship between the regulator and providers
- A cumbersome qualifications system that is slow to respond to changes in industry skills needs
- A complicated and inconsistent funding system that is hard to understand and navigate and which is not well matched to skills needs
- A lack of clear and useful information on vocational careers for prospective new entrants
- Unclear secondary school pathways into the VET sector and strong dominance of university pathways
- Access issues for Aboriginal and Torres Strait Islander Peoples and 'second chance' learners seeking skills that will help them obtain and stay in meaningful work.

The NSW Productivity Commission's understanding of the issues in the VET sector have been informed extensively by this and other reviews and by its own analysis.

Recommendation 2.1:

Work with the NSW Productivity Commissioner to remove or reduce issues that currently impede better economic outcomes, including those related to planning, regulation and vocational education.

Procurement: Government as a customer

Government has significant scope to adopt many productivity-enhancing behaviours already adopted in the private sector. For example, conditions in parts of the private sector-dominated economy like financial services, telecommunications, entertainment, the media and the retail sector have changed materially.

Government has significant scope to adopt many productivity-enhancing behaviours already adopted in the private sector

While there is an incentive to deliver a value-for-money solution for taxpayers in the purchase of goods and services from the private sector, government should adopt a broader definition of value. For example, government procurement that plays a role in fostering innovation and entrepreneurship may, in fact, have longer-lasting benefits than simply opting for the lowest-cost choice. Government behaviour may also alter outcomes in the "circular economy".

Government decision-making typically is risk averse, but it can be less so. Significant progress has been made on improving decision-making, but government can aim to consistently adopt evidence-based decision-making. Government particularly needs to better collect and use data, ensuring as broad a range of data as possible. Implicit in this too, is the expectation that government will establish a credible system of post-implementation evaluation, as has been recommended by the Commonwealth Productivity Commission (PC)[74].

More government decisions should go through a rigorous, evidence-based process. A good example of such a rigorous government decision-making framework is the requirement that projects funded from the Restart infrastructure fund must have a benefit-cost ratio greater than one. Such benefit-cost analysis can occur more broadly, with business cases required and projects' effectiveness evaluated after they happen. These processes can improve the quality of government interventions and investments.

Recommendation 2.2:

Freshen the parameters of NSW Government procurement to ensure that government purchasing better fosters innovation.

Recommendation 2.3:

Ensure that government decision-making is evidence-based, underpinned by the best available and non-traditional data and analysis.

Recommendation 2.4:

Make better use of data and digital technology in delivering government services, especially health services.

[72] *Kickstarting the Productivity Conversation*, Office of the NSW Productivity Commissioner, October 2019. [73] *Strengthening Skills, Expert Review of Australia's Vocational Education and Training System*, The Honourable Steven Joyce, 2019. [74] *Shifting the Dial 5 Year Productivity Review*, Commonwealth Productivity Commission, 2017.

Better promotion of 'Global New South Wales'

Ask a visitor for their image of New South Wales and they are odds-on to name the Opera House or the Sydney Harbour Bridge. Our cultural identity and 'brand' is tourism-oriented. There is a need for a new 'Brand NSW' that appeals to foreign investors, business visitors and international students, not just tourists. It needs to appeal to entrepreneurs looking to invest and hire. It needs to focus on Sydney's importance as a financial sector hub and the advantages and attractiveness of the regions.

An important element of this 'Brand NSW' should be our rich First Nations arts and culture. We have opportunities across the region to showcase unique and diverse First Nations stories, histories and sites of significance that are tens of thousands of years old, locally and as part of a joined-up narrative that tells the First Nations people's story of our state. Large and diverse populations of Asian and Pacific Islander communities across Sydney and beyond support New South Wales' position in the Asia-Pacific. Many artists and creatives from these communities create work that celebrates their cultural practice and tradition.

Sydney has a tremendous opportunity to better promote its Asia-Pacific identity and to be a cultural leader of the region. New South Wales is one of the most culturally diverse places in the world – a meeting point for eastern and western cultures, comfortable adopting new ideas, full of a hybrid vigour that helps to bring our streets, communities and public spaces alive. Our unique arts and culture give us the chance to relaunch the brand to investors and travellers alike. New South Wales' identity needs to move from a tourism and consumption-led identity to a community-owned identity built around culture, trade and innovation.

Other factors that will influence the ability of NSW businesses to develop export markets include our transportation services, telecommunications infrastructure and supporting financial and professional services. Policy issues, including trade, will also be influential. The 'gravity model' of trade tells us that trade increases with closeness – that is, we should expect to trade more with near-neighbours than with more distant places.

Recommendation 2.5:

Develop a revised approach to NSW trade and investment to better promote 'Brand NSW'.

Recommendation 2.6:

Better integrate tourism promotion with promotion of Sydney and New South Wales as a place to invest, do business and study.

Lever 3: Fiscal policy

Create a more efficient state tax system

Inefficient taxes, including transfer duty, payroll tax and insurance taxes, provide around 60 per cent of New South Wales' own-source tax revenue. In the short to medium term, NSW taxation should focus on reducing distortions and economic costs in this system, with an emphasis on reducing insurance taxes and stamp duties. Our tax system's ability to adjust to new technologies and ways of working is currently limited; that puts at risk the sustainability of our tax base.

In the short to medium term, NSW taxation should focus on reducing distortions and economic costs in this system, with an emphasis on reducing insurance taxes and stamp duties

Other problems threaten the tax base. For example, competition among the states and requests for special tax arrangements to remedy regional decline have limited all states' payroll tax revenues.

New South Wales will continue to face these risks. And the Goods and Services Tax (GST) applies to a declining proportion of consumption, eroding this revenue source's ability to maintain pace with the costs of state services.

The NSW Productivity Commissioner is examining the state's taxation system on the way to producing a Productivity White Paper in 2020. That paper will look closely at ways to mitigate the economic damage caused by the more inefficient activity-based taxes, including transfer duties.

Recommendation 3.1:

Support the NSW Productivity Commissioner's examination of the state taxation system.

More cooperative and productive federal financial relations

The current system of federal financial relations is contested and anachronistic. Federal funding arrangements have grown too complex and too restrictive. For some states, their share of federal funding can discourage reform. Through fiscal discipline and strong economic management, New South Wales has become the engine room of the national economy, but instead of being rewarded for our success, New South Wales has been penalised at a federal level, with the Commonwealth and other states reaping the benefits. Reforms are more likely to succeed when the states and the Commonwealth collaborate.

To this end, the NSW Government has commissioned a review of the federal financial system, the NSW Review of Federal Financial Relations. The six-person panel is chaired by David Thodey AO and will report to government in 2020. The review aims to deliver a roadmap to more sustainable funding arrangements and greater financial autonomy for the state. The review will reinvigorate the conversation between states and the Commonwealth over current funding arrangements and provide a much-needed state perspective. The panel is charged with finding ways to give states that embrace reform more autonomy and more flexibility, making dynamic federalism a reality.

Recommendation 3.2:

Support the NSW Review of Federal Financial Relations with the aim of enhancing the reliability and predictability of Commonwealth Government funding.


NSW
Transport

Lever 4: Infrastructure

The NSW Government is already delivering Australia's largest public infrastructure program. As this program continues, New South Wales can break new ground in cost-effective, innovative and best-practice delivery.

There always is room for improvement. For example, regional transport infrastructure should be improved. Also, we should continue to invest in the key north-south and east-west links, overcome pinch-points that prevent use of higher productivity vehicles and decongest bottlenecks in the rail network where freight movements conflict with passenger services in Sydney and other gateways to make it easier for primary producers to reach overseas markets.

Project selection has long been at risk of politicisation, so careful governance of project selection is needed. New South Wales should leverage its robust infrastructure planning and investment framework with the Infrastructure NSW's State Infrastructure Strategy, 5 Year Infrastructure Plan and Infrastructure Investor Assurance Framework to ensure we get the best out of our existing infrastructure and choose the best new projects for the future.

The NSW Government has adopted a successful asset recycling scheme which has contributed to funding new economically productive assets. But the state should examine other creative ways to fund and finance spending, such as public private partnership arrangements and value capture where the opportunity presents. The state should also investigate options to decongest facilities, increase accessibility and recover outlays for transport infrastructure and services by adopting more innovative, integrated approaches to charging for trips on the road and public transport system.

New South Wales needs to build a better process and evaluation of its infrastructure needs. Consistent with the strategic directions in the 2018 State Infrastructure Strategy, Government's development of an Asset Management Policy will embed an asset management mindset and planning approach that considers the full lifetime benefits and costs of the infrastructure and not just the cost, quality and time of delivery. This requires a holistic understanding of ways to 'manage before we build', including a greater emphasis on service, policy and better use of existing infrastructure responses to future challenges before investment in new infrastructure.

The state must also address the skill and labour shortages, particularly in construction, which have emerged as infrastructure-building has ramped up, by continuing to deliver against the Ten Point Commitment to the Construction Sector. The Government should examine advances in streamlining approvals processes, particularly for state-significant projects. We also need to ensure that infrastructure governance addresses emerging risks of climate change, as well as technological and societal change. Similarly, we should invest in building the capability, diversity and capacity of asset managers.

Recommendation 4.1:

Examine infrastructure governance to identify ways to stabilise long-term infrastructure policies, provide investment certainty, address risks and encourage innovation.

Recommendation 4.2:

Improve freight networks from regional New South Wales to global gateways to increase exports.

Lever 5: Innovation

Targeted investment in research and development capabilities

Although the quality of research and teaching at New South Wales universities is strong, NSW and Australian universities have lagged behind their international counterparts in translating outcomes into technologies, products and services that support NSW businesses and stimulate the economy. This Australian weakness in research translation shows in the level of advanced technologies, products and services the Australian economy produces – for instance, in the Harvard study[75] cited earlier, where Australia ranks 93rd out of 133 countries in economic complexity.

To secure our economic future, New South Wales must significantly improve its economic complexity. A key driver of greater economic complexity is better research translation and commercialisation to improve uptake of advanced technologies, systems and processes in NSW businesses. Areas of particular strength in New South Wales where research translation and commercialisation could be further improved include quantum computing, autonomous systems, artificial intelligence, medical technologies, the circular economy and advanced instrumentation.

Better research translation and commercialisation can be encouraged with appropriate incentives. Possible incentives include providing seed funding, supporting targeted high-impact research partnerships with clear end-user outcomes, making commercial connections, providing collaboration ecosystems and creating financial incentives to translate research into commercial outcomes. To be effective, industry, research and training initiatives need to be aligned. This requires industry and universities to establish ongoing collaborations in research, development and commercialisation of novel technologies, products and services, with the support of government.

Internationally, putting industry and research organisations in the same physical space has proved effective in driving collaboration, innovation and commercialisation. Dedicated precincts offer shared facilities and equipment and help create innovation ecosystems, a common sense of identity and strong formal and informal networks and partnerships amongst members in industry, universities and government.

The Innovation Precincts established by the NSW Government, including the lighthouse precincts for priority activation, will help support this ecosystem approach. These precincts target specific industry sectors of critical importance to New South Wales' future social and economic prosperity, including advanced manufacturing, defence, agriculture, digital technology and health technology.

While improving research translation outcomes, the Innovation Precincts will also:

- Help workers to develop their skills in collaboration with industry
- Make it easier for government to invest in shared facilities and in training and research
- Attract domestic and international industry to New South Wales.

These precincts will support an innovation and entrepreneurship culture that can help to address some of the biggest challenges in the NSW economy by bringing different parties together. These initiatives are supported by the formation of

the Waratah Research Network in 2018. The network aims to boost government and university sector collaboration on state priorities and emerging issues and better leverage university research.

Other approaches can also increase research and development. They include better strategic coordination between universities, government and business for funding opportunities and having a 'front door' for stakeholders to understand how they can work with government on R&D. We also can better leverage the government's own R&D investment commitments. These strategies form part of the important work being undertaken by the expert panel being overseen by the Hon Gabrielle Upton MP.

Recommendation 5.1:

Support the work being undertaken by the expert panel being led by the Hon Gabrielle Upton MP, as part of the review of the state's research and development landscape.

A supportive innovation ecosystem

Driving innovation also requires a business climate that supports the new models of enterprise and corporate restructuring and allows small companies to set up and grow. New South Wales is Australia's most innovative state with a strong culture of entrepreneurship. Sydney is the second highest ranked city in the Asia–Pacific region for innovation and New South Wales is home to almost 50 per cent of all Australian start-ups.

The Sydney Startup Hub and the Sydney Technology and Innovation Precinct provide a supportive environment for entrepreneurs providing affordable work space for start-ups and early-stage companies. The Sydney Startup Hub provides 17,000 square meters of net lettable floorspace and the Technology and Innovation Precinct will grow the stock of affordable work space for start-ups and early-stage companies in Sydney's CBD with an initial commitment of 50,000 square metres of net lettable floorspace.

Information failures are common in new industries where there is immature organisation for collecting, analysing and sharing information about innovation opportunities. Public support may be needed to provide coordination mechanisms that spread information and create partnerships that overcome knowledge barriers between different actors and along supply chains. Matching and sequencing ecosystem elements, collaboration and conditions including sector and cluster groupings and place-based approaches are key public sector interventions.

As a major customer, the NSW Government can play a role in encouraging key public service delivery agencies such as NSW Department of Primary Industries, NSW Customer Service, NSW Health and Transport for NSW to share their data. Such data-sharing can be an important spur to innovation. They can also provide these institutions with the flexibility to commercialise their know-how, access venture capital and develop explicit policies and programs to support entrepreneurs.

Recommendation 5.2:

Use the development of precincts and industry strategies to concentrate research strengths, drive collaboration between researchers, training and development providers and business and speed up innovation.

Recommendation 5.3:

Leverage Commonwealth Government investments to establish research, development and commercialisation facilities in the Innovation Precincts which can be used by industry, research and training organisations.

Recommendation 5.4:

Establish risk management frameworks to let NSW Government bodies pilot innovative solutions and share government data with the broader public.

Recommendation 5.5:

Support the growth and success of early stage innovative businesses by developing programs to incentivise businesses to invest, innovate and hire.

[75] atlas.cid.harvard.edu/

Lever 6: Energy and natural resources policy

Energy policy

There currently is no energy policy at the federal level, following the demise of the Commonwealth Government's preferred National Energy Guarantee (the NEG) in 2018. Nor is there a consensus on the best way forward, including for diversifying the state's energy industry further away from coal. This presents an opportunity for the NSW Government to step into the effective policy vacuum and develop a state-specific energy policy. Such policy should be flexible enough to adapt if and when an agreeable framework is adopted at the federal level.

The state policy should be concerned with domestic energy security:

- Covering both electricity and gas, the latter as a transition energy source
- Contributing to the competitiveness of NSW industry
- Creating potential for exports, building on New South Wales' advantage in renewable energy generation.

There also is huge potential for investment in the hydrogen industry. Hydrogen is developing as a store of energy that generates no carbon emissions when used.

Recommendation 6.1:

Work with the Commonwealth Government and the states to agree a national energy policy, which should consider a mix of energy sources such as nuclear, gas, coal and renewables.

Recommendation 6.2:

Develop a policy on hydrogen production and export.

Enhance the security of gas supplies

The energy strategy should consider gas, including the challenge of developing New South Wales resources. New South Wales has significant reserves of gas but a relatively low share of production in Australia.

We have far fewer household connections than other states. Figure 12 shows that the electricity sector plans more generation to come from renewable sources, rather than gas.

Gas-fired electricity generation will likely be needed to supplement intermittent energy sources, particularly to meet demand in critical peak periods. Gas prices in New South Wales are driven by the export market. Western Australia has succeeded in keeping gas prices down through its gas reservation policy, to the apparent benefit of both consumers and industry.

But the possible cost of this approach may have been to make the development of some new sources of supply uneconomic.

Engage in a sensible conversation about nuclear energy

An informed conversation needs to be had on the use of non-carbon energy sources, including the use of nuclear energy for power generation. The Commonwealth Government recently announced a review of the current moratorium on the use of nuclear power in Australia for other than scientific purposes.

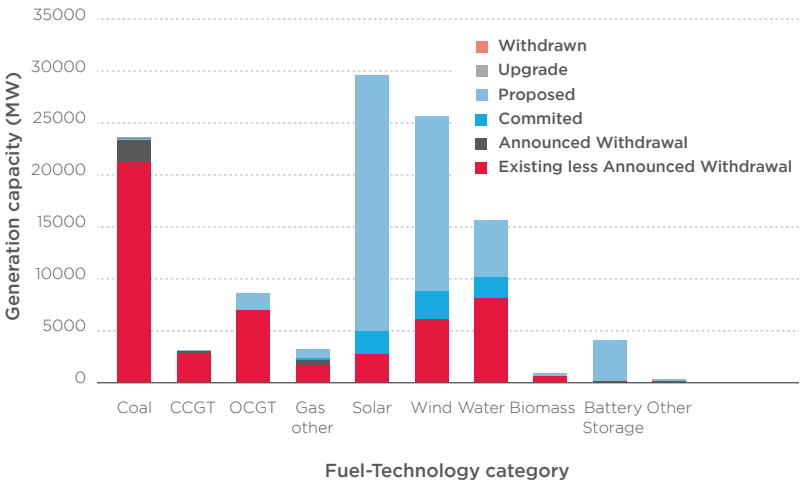

Figure 12: NSW's next energy sources for electricity generation
New energy sources in New South Wales, projections to 2030, generation capacity in megawatts**.** *Source: AEMO.*

The NSW Parliament is also conducting a review into nuclear energy.

The debate around nuclear options should be encouraged, with particular attention on smaller scale modular reactors. It is recognised, however, that design, development and construction of a nuclear power facility is expensive relative to renewable sources.

Adoption of nuclear energy is uneconomic in the absence of a price on carbon. and Australia currently lacks the skills and expertise necessary to construct nuclear energy facilities. All the while, sources of renewables power are becoming cheaper in relative terms. Figure 13 shows that renewables have made consistent gains in recent years and now represent more than 15 per cent of all energy in the state, from around five per cent in 2008-09.

Develop water strategies to enhance resilience

The state is facing a lengthening drought and broader problems with water security. We need to discuss and plan for greater water resilience and drought mitigation.

Water resilience and food security are strongly linked. Some evidence even links water security resilience to economic growth, in part because water resilience reduces the acute and chronic impact of water-related hazards like droughts. Better water security will create more planning certainty for commercial users of water such as farmers, miners and power generators.

Additionally, secure and sustainable water supplies may encourage investment in industries that would otherwise move elsewhere or remain relatively small-scale. For instance, water insecurity may inhibit the growth of the agriculture industry, effectively reducing our potential food exports to Asia. Furthermore, water security is emerging as a global issue and building industry strength in water management represents an export opportunity for New South Wales.

We should also invest greater effort to:

- Develop and extend technologies and strategies to minimise water loss – for instance, by using more sensors in the water and wastewater reticulation systems
- Ensure water, stormwater harvesting and recycling policies are fit for purpose and optimally deployed
- Develop and extend our abilities to produce drinkable water, via desalination or other technologies.

Land, energy and water costs are already reshaping industry practices, including for example, vertical farming techniques. The state should make a systematic assessment of costs and benefits of new techniques and efficiency opportunities such as increased use of robotics and artificial intelligence and of our governance arrangements for technical and non-technical aspects of urban water supply.

Recommendation 6.3:

Adopt a longer-term policy on drought that moves capital towards enhancing water resilience and better drought-proofing properties.

Recommendation 6.4:

Develop a state-wide policy to enhance water security, with a clear position on investment in water recycling and desalination.

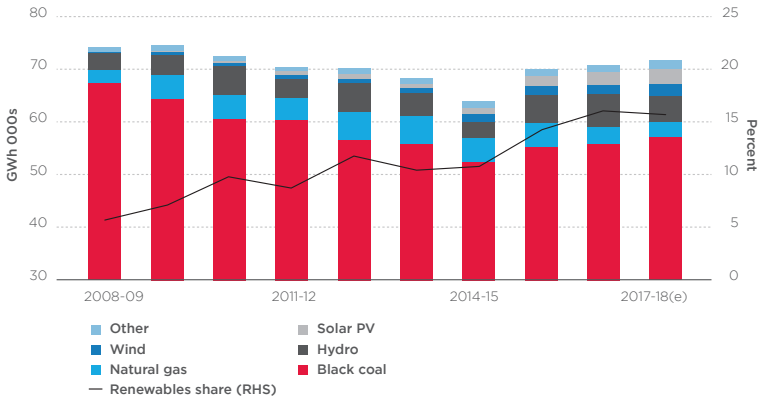

Figure 13: NSW renewables rising
Trends in NSW energy sources for electricity generation, 2008-09 to 2017-18. *Source: Commonwealth Department of the Environment & Energy, NSW Department of Planning, Industry & Environment.*

Lever 7: Industry development

Economic development should put an economy on a path to higher growth by improving the productivity of firms and people. The result should be higher incomes and living standards for all, deep prosperity and growth that is robust, shared and enduring. If New South Wales is to achieve its key policy priorities to deliver great opportunities and quality of life for all citizens across the state, the NSW Government will need to refresh its approach to economic development to reflect a more coherent and holistic understanding of how to expand the economy and opportunity.

Creating a good investment climate

Like other jurisdictions, the NSW Government provides industry assistance in both indirect and direct forms. It:

- Provides information
- Supports industries in building their capabilities
- Supports industry and research networks
- Provides grants, concessional loans, regulatory relief and tax concessions
- Offers specific project investment incentives
- Helps pay commercial rents
- Provides public infrastructure like innovation hubs and precincts
- Assists with training.

The NSW Government should craft engagements only with well-defined outcomes. Then it can work out whether subsequent activities are meeting their policy objectives and developing the economy.

To effectively develop priority industries, the Government should support specific projects that, for example, fill gaps that private firms are not filling. Projects should also help build a strong business ecosystem for these priority industries, encourage innovation and help businesses to sell, buy and invest on world markets.

An overarching framework for providing such assistance is missing, however and some decisions about the provision of industry support want for clarity and consistency. Moreover, there is no explicit limit used to manage the annual cost to government. The amount of assistance is constrained only by broader budget circumstances. It would be prudent to improve governance arrangements by imposing specific budgets.

By adopting such a framework, government could help to ensure that its direct assistance is given consistently and in a way that lines up with the government's policy and industry development priorities. That in turn will make the state's industry development initiatives more effective.

Recommendation 7.1:

Establish an industry taskforce to work across government to support New South Wales' transition to high-growth future industries.

Recommendation 7.2:

Adopt the criteria for future growth industries outlined in Chapter 5 to help identify priority industries and tailored development initiatives.

Recommendation 7.3:

Set funding governance arrangements and selection guidelines for project specific assistance to ensure efficient resource allocation and consistent decision making.

Prioritise NSW future growth industries for economic development

FINANCIAL SERVICES

Sydney already dominates Australian financial services and is an important financial hub in Asia. The global financial sector is changing rapidly, however and threats to Sydney's global standing as a financial centre could emerge if the sector does not stay nimble. The NSW Government needs to keep promoting Sydney as a regional finance hub and encouraging further development of emerging technologies for fintech and regtech like blockchain, artificial intelligence and quantum computing.

Recommendation 7.4:

Create a digital finance and fintech industry development strategy.

Recommendation 7.5:

Develop a digital emerging technology industry strategy with a focus on artificial intelligence, blockchain and quantum computing.

AEROSPACE AND DEFENCE

New South Wales can capitalise on huge global opportunities to develop the defence and aerospace industries. The development of the Western Sydney Aerospace and Defence Industries Precinct at the Aerotropolis and the Williamtown Defence Aerospace and Aviation Precinct present New South Wales with a unique opportunity to cluster high-tech aerospace and defence industries, including major prime contractors and a healthy ecosystem of small and medium businesses. New South Wales' 2017 Defence and Industry Strategy and the Defence Industry Sector Investment Attraction Plan offer a pathway to attracting a meaningful portion of the aerospace and defence supply chain to the state.

Recommendation 7.6:

Commit to sustainably resourcing implementation of the 2017 Defence Industry Strategy and the Defence Industry Sector Investment Attraction Plan.

Recommendation 7.7:

Develop targeted advocacy strategies for NSW to offer the necessary capabilities required for upcoming short-term and long-term major defence procurements.

SPACE INDUSTRY

The global space industry is experiencing growth that is predicted to continue over the coming decades. New South Wales can benefit from increasing international and national investment in the sector. Our state is home to the largest share of the Australian industry, generating 50-75 per cent of Australian's space-related revenue. We are home to 41 per cent of Australia's space related businesses and account for 50 per cent of Australia's space export revenue. But the industry is young and disconnected and it lacks the industry support mechanisms of more established industries.

Recommendation 7.8:

Release a Space Industry Development Strategy, including an initiative to support technology testing and space qualification by start-ups, small and medium businesses and researchers.

ADVANCED MANUFACTURING

The NSW Government has developed an advanced manufacturing strategy to address barriers and to speed up growth in the industry's capability and capacity. The strategy draws on best practice from Australia and overseas and offers a whole-of-state approach to build a 'match-fit' advanced manufacturing industry in the state. If successfully executed, this will provide an important foundation for economic strength and innovation in New South Wales. The strategy adopts a 10-year program with four core pillars focused on:

- Improving networks in advanced manufacturing
- Putting advanced manufacturing technologies, systems and processes into action more quickly
- Supporting advanced manufacturing workforce and skills development, in close collaboration with industry
- Establishing collaborative advanced manufacturing research, commercialisation and training based on a hub and spoke model – that is, a core facility with linkages to industry centres of expertise around the state.

Recommendation 7.9:

Commit to long term funded initiatives to support the productivity benefits of transitioning to advanced manufacturing models identified in the NSW Advanced Manufacturing Industry Development Strategy and support innovation to scale new advanced manufacturing opportunities.

ENVIRONMENTAL GOODS AND SERVICES

International experience indicates that effective programs in this field have focused on two aims: providing investment certainty and using regulatory and procurement levers and market settings to drive innovation and demand for sustainably sourced and developed goods and services.

The NSW Environmental Protection Authority's (EPA) NSW Circular Economy Policy provides a framework for implementing initiatives to improve product life cycles and to reduce waste and pollution. Complementary industry initiatives can strengthen it. By supporting the growth of a vibrant environmental goods and services sector in New South Wales, we can cut waste, drive sustainable recycling markets and improve the waste infrastructure network. The NSW Government should work with the Commonwealth Government to devise strategies for dealing with waste and take advantage of emerging opportunities in waste management and the circular economy.

Recommendation 7.10:

Create an environmental goods and services development strategy.

Recommendation 7.11:

Work with the Commonwealth Government and other jurisdictions to build on the progress made at the recent COAG gathering to better deal with waste.

CYBER SECURITY

The cyber security industry offers significant opportunities for the state's economic development. By combating cybercrime, a thriving digital and cyber security industry will help drive productivity.

Recommendation 7.12:

Realise the ambitions of the NSW Cyber Security Industry Development Strategy by committing to ongoing support of the NSW Cyber Security Innovation Node.

MEDICAL TECHNOLOGY

The medtech industry in New South Wales generates an estimated $4.8 billion in revenue per year and employs around 7,000 people. While the sector is growing, there are significant opportunities to accelerate this growth. It is estimated that the medical technology industry has the potential to create an additional 28,000 jobs and $18 billion in GDP nationally by 2025[76].

Recommendation 7.13:

Establish medtech commercialisation and accelerator programs in priority areas of capability.

TOURISM AND THE VISITOR ECONOMY

Tourism is a significant opportunity for businesses and industries in regional New South Wales to diversify and become more resilient. The NSW Government established six new Destination Networks to improve industry engagement and collaboration in regional New South Wales. Each Destination Network now has a Destination Management Plan that explains the competitive positioning of the various visitor destinations in the region and the priority projects identified by the industry that will underpin future growth.

This is supported by an overarching strategic framework known as the Statewide Destination Management Plan. The NSW Government is also investing in growing the visitor economy in regional New South Wales through the $110 million Regional Tourism Infrastructure Fund and the $300 million Regional Growth-Environment and Tourism Fund.

Recommendation 7.14:

Develop programs to build capability and support the diversification of businesses in regional New South Wales to capitalise on growth in tourism, including through nature-based and eco-tourism.

AGTECH AND FUTURE FOODS PRODUCTION

Leading businesses in the New South Wales food and beverage manufacturing industry are developing new products in response to increasingly sophisticated consumer demand. They are adapting advanced manufacturing techniques and technologies to increase productivity and find new markets. New businesses are emerging in niche food sub-sectors with massive growth potential, such as alternative proteins, food as medicine, functional and free-form foods and hemp as food. The state's primary producers are embracing home-grown agricultural technologies to give them a competitive edge.

Recommendation 7.15:

Develop programs to build capability and support businesses to maximise the commercial and export potential of new food, food technology and agtech products emerging from the state's universities, research organisations and businesses.

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Appendix 1 References

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Appendix 2
Stakeholders consulted

- Advanced Manufacturing Growth Centre (AMGC)
- AECOM Australia
- American Chamber of Commerce in Australia (AmCham)
- ANZ Banking Group
- ARUP
- Australian Bankers' Association (ABA)
- Australian Hairdressing Council (AHC)
- Australian Industry Group – Canberra (Ai Group)
- Australian Industry Group – NSW
- Business Council of Australia (BCA)
- Business Events Sydney
- Clifford Chance
- Committee for the Economic Development of Australia (CEDA) – National Economic Council
- Committee for the Economic Development of Australia (CEDA)
- Committee for Sydney
- Commonwealth Deregulation Taskforce
- Commonwealth Treasury
- Create NSW
- Defence industry contractor (undisclosed)
- Deloitte Australia
- EY
- Herbert Smith Freehills
- Housing Industry Association (HIA)
- Infrastructure NSW
- NSW Innovation and Productivity Council (IPC)
- Jobs for NSW
- John Holland Group
- McKinsey & Company
- Moir Group
- National Australia Bank
- National Farmers' Federation – NSW
- National Farmers' Federation
- The Nous Group
- NSW Business Chamber
- NSW Chief Information and Digital Officer, Greg Wells
- NSW Chief Scientist & Engineer, Professor Hugh Durrant-Whyte
- NSW Health
- Plenary Group
- Pacific Services Group (PSG) Holdings
- PWC Australia
- Royal Botanic Gardens and Centennial Parklands
- Simon Kucher and Partners
- Sydney Business Chamber
- Sydney Metro
- Sydney School of Entrepreneurship
- Tamworth Regional Council
- University of Newcastle
- University of Technology Sydney
- Western Sydney Local Health District

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