



THE UNIVERSITY OF  
**SYDNEY**

**Professor Stephen Garton** *FAHA, FASSA, FRAHS*  
Senior Deputy Vice-Chancellor

23 November 2020

Mr Peter Fraser  
Chief of Staff  
Office of the Hon. Andrew Gee MP  
Minister for Decentralisation and Regional Education  
Minister Assisting the Minister for Trade and Investment  
Federal Member for Calare

By email: C/- [amelia.bitsis@dfat.gov.au](mailto:amelia.bitsis@dfat.gov.au); [jordan.aitken@dfat.gov.au](mailto:jordan.aitken@dfat.gov.au)  
cc. [peter.fraser@dfat.gov.au](mailto:peter.fraser@dfat.gov.au)

Dear Mr Fraser,

Thank you for your email following Minister Gee's Decentralisation Summit held on 3 November 2020. It was a pleasure to represent the University of Sydney at the summit and we welcome the Government's commitment to expand its regional development strategy and make it more coherent.

While undoubtedly metropolitan based, the University's commitment and contribution to communities across regional, rural and remote NSW is longstanding and much more significant than many people realise. We currently have hundreds of staff and affiliates based at teaching and research facilities beyond the Great Dividing Range - including in Orange, Dubbo, Broken Hill, Lismore, Narrabri and Marulan. Meanwhile, our faculties and schools have extensive teaching and research partnerships with diverse government, private and community organisations in regional NSW and beyond. Thousands of our students complete placements with regional employers each year, while our network of alumni living in regional, rural and remote communities is extensive.

None of this would be possible but for the existence of various Commonwealth funding programs that support these activities outright or substantially. This includes the Commonwealth Department of Health's very substantial long-term commitment to strengthening healthcare in rural, regional and remote communities through the Rural Health Multidisciplinary Training (RHMT) program. We have partnered with the Commonwealth in this program and its predecessors well before establishing our Broken Hill Department of Rural Health in 1996.

We agree that strengthening collaboration between industry, universities and all levels of government will be critical to the success of the Commonwealth's decentralisation strategy. We have developed the attached initial high-level responses to your four questions through targeted consultation with some of our staff with relevant expertise and experience.

Our answers build on the key points I stressed at the summit. These included the critical importance of public policy and funding programs providing clear and stable support for the development and ongoing operation of education and research infrastructure in regional areas (teaching facilities, laboratories, workshops, equipment, accommodation, centres for collaborative industry/university research excellence etc) as well as the hard and soft 'services' infrastructure that is so important if regional communities are to attract or generate new job-creating industries.

In this initial feedback, we have not provided specific examples of business/university collaboration that have contributed to positive economic and social outcomes, or suggested particular interventions the Commonwealth should be considering. There are simply too many examples of success, across too many fields, to do them justice. We would though, be happy to identify case study examples in defined categories of activity of interest to the Commonwealth, and to suggest specific policy interventions for consideration.

In the meantime, for context about the contribution universities make to the economy and jobs, we have attached a summary report of a comprehensive study of our education and research activities (including in regional NSW) in 2019. This report, undertaken by ACIL Allen Consulting, concluded that in 2019 alone, the University contributed \$5.9 billion to the national economy and supported the equivalent of almost 36,000 jobs. Critically, most of these jobs occur beyond our campuses, in sectors including retail, construction, tourism, health services, real estate and hospitality. The report also found that every dollar invested in our research returns an extra \$7.80 for the economy, with research activities from 2019 set to add close to \$2.2 billion to the economy. Cumulatively, the study found that since 2006, the University has contributed \$68 billion to the Australian economy.

We have also attached, again for context and your interest, an opinion piece published in the Australian Financial Review today by [Thomas Maschmeyer, Professor in Chemistry in our Faculty of Science](#), and recipient of the Prime Minister's 2020 Prize for Innovation, highlighting the key barriers to the commercialisation of home-grown research in Australia, including its regions.

Finally, thank you for the opportunity to nominate a member of our academic staff to contribute to the development of a green paper. We would like to nominate [Professor Donald McNeill](#), incoming Associate Dean Research, in our School of Architecture, Design and Planning ([d.mcneill@sydney.edu.au](mailto:d.mcneill@sydney.edu.au)).

Professor McNeill has substantial relevant knowledge and expertise. In collaboration with my office, he is also well placed to coordinate the School's and wider University's engagement with the green paper process.

We trust this initial feedback is helpful and look forward to working with Minister Gee, his department, Regional Development Australia, and other stakeholders to help develop this important policy framework to build prosperity in regional Australia.

Yours sincerely,

(signature removed)

Stephen Garton

#### **Attachments**

**A:** The University of Sydney, responses to Minister Andrew Gee's Decentralisation Summit follow-up questions, November 2020

**B:** ACIL Allen Consulting, 'Economic Impact of the University of Sydney', April 2020

**C:** Professor Thomas Maschmeyer, 'Break home-made hurdles that stop technology development', Australian Financial Review, 23 November 2020

## The University of Sydney, responses to Minister Andrew Gee's Decentralisation Summit follow-up questions, November 2020

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1. **Outline the role that universities can play in the context of encouraging and facilitating regionalisation, including:**
  - a. **Businesses relocating their operations to regional Australia**
  - b. **Businesses establishing a new presence in regional Australia**

It will be important for the strategy to define key terms like 'region', 'industry' and 'business' clearly - so that target audiences understand the geographic areas that are within its scope. In this regard we welcome the fact that Regional Development Australia recognises the economies surrounding major cities (for example the Hunter, Illawarra, Central West and Central Coast in NSW) as distinct regions.<sup>1</sup> With travel times from these areas to Sydney typically in excess of two hours, it is completely appropriate that they are covered by the strategy.

Moreover, if the purpose of the strategy is to stimulate economic growth and jobs in the regions, the case is strong for it to adopt a broad definition for the terms 'business' and 'industry', which includes government and not-for-profit employers as well as private sector firms. Here we note that the Department of Education, Skills and Employment is close to adopting an expansive definition of 'industry' for the purposes of the Government's National Priorities and Industries Linkages Fund (NPILF).<sup>2</sup> To avoid confusion, and in the interests of consistency, it would make sense for the Government's decentralisation strategy to use the definition of 'industry' that it adopts for the NPILF.

There is an extensive and constantly growing international body of research that confirms the important role that universities can play in regional economic development. For example, one very recent (Sept 2020) report on a longitudinal study of 284 European regions from 2000 to 2017 finds clear evidence that increasing the number of universities in a region promotes stronger economic growth, with the quality of the universities' research and their degree of specialisation in the STEM disciplines found to be the primary drivers of the positive impact.<sup>3</sup> That study identified three main areas for governmental policy interventions:

- Set up incentives (in the form of grants for research, infrastructure and knowledge transfer, or tax benefits) to stimulate the creation of new universities in regions, alongside the expansion of existing ones.
- Stimulate closer connections between industries and universities at the local level, by supporting joint research projects between companies and universities.
- Create the conditions in a region to attract more students and academics, especially in the STEM fields, which are more strongly correlated to economic growth.

Many other studies document the multiple and interlinked ways by which universities' education, research, and industry and community engagement activities contribute to economic development in regional areas. Much of this research emphasises the role of universities as anchor institutions that underpin local innovation ecosystems. It also emphasises the reality that knowledge transfer from universities to industries does not follow a simple, linear path. Rather, the process is fluid, complex, iterative, and involves many different actors and pathways.

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<sup>1</sup> <https://www.rda.gov.au/my-rda>

<sup>2</sup> <https://www.dese.gov.au/NPILF>

<sup>3</sup> Agasisti T., Bertolotti A., Higher education and economic growth: A longitudinal study of European regions 2000-2017, [The Journal of Socio-Economic Planning Sciences](#), Elsevier, September 2020.

One critical factor apparent from the literature, however, is the importance of geographic proximity for the process of knowledge transfer and research commercialisation.<sup>4</sup> The NSW Government's Innovation and Productivity Council considered much of the relevant international evidence recently when advising the NSW Government on the conditions required to establish and grow vibrant innovation precincts across NSW.<sup>5</sup> We contributed to that report, which we commend to this strategy process and discuss further in our response to question 4 below.

**2. How can we drive closer collaboration between businesses and universities in regional Australia?**

**3. What actions can the Government take to accelerate collaboration between businesses and universities in regional Australia?**

We have addressed these two questions together due to their overlaps. The findings of studies like those mentioned above are consistent with our experience seeking to contribute to regional development over many decades. The availability of clear and stable financial incentives is also essential to help stimulate and foster collaboration between business and universities - whether in metropolitan or regional areas.

However, while targeted financial incentives are important drivers of collaboration, our experience is that such investments are far more likely to succeed where a range of underpinning infrastructure is in place at levels and standards of sufficient quality to attract businesses, individuals and their families to regional areas. The Commonwealth Government also has a critical role to play (working with local, territory and state governments and other stakeholders) to create and maintain the basic conditions needed for regionalisation to prosper.

Some of the vital infrastructure 'building blocks' required to underpin regionalisation include: water and food security; clean air and access to healthy local environments; affordable housing; reliable and cheap electricity; fast, safe and affordable transport linkages (road, rail and air) to economic hubs in Australia and overseas; high speed internet connections; access to quality child care, schools and tertiary education options; access to good health, aged care and other social services at standards equivalent to those available in metropolitan areas; and sporting, recreational, arts and other entertainment infrastructure. We know these factors are important 'attractors' for skilled professionals from our longitudinal studies of the factors influencing where medical and health students choose to live following graduation.

The COVID-19 experience has demonstrated that where such infrastructure is in place, relocating to regional areas can be a very attractive proposition for industries and individuals whose work does not depend on being physically present in a city permanently. The seismic shift that has occurred during the pandemic in business' and workers' attitudes towards flexible working arrangements (enabled by the NBN etc) presents an enormous opportunity for Australia's regions interested in growing their populations and economies.

Examples abound in Australia and overseas of the types of actions governments can take to strengthen collaboration between businesses and universities, whether in metropolitan or regional areas. Many effective programs are already in place and we would be happy to provide further details if required.<sup>6</sup>

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<sup>4</sup> See for example, Bramwell, A., Wolfe, D.A., Universities and regional economic development: The entrepreneurial University of Waterloo (2008), [Research Policy](#)

<sup>5</sup> <https://www.treasury.nsw.gov.au/nsw-economy/nsw-innovation-and-productivity-council/our-publications/nsw-innovation-precincts>

<sup>6</sup> Cth: [ARC Centres of Excellence](#); [ARC Industrial Transformation Fund](#); [ARC Linkages Program](#); [ARC Special Research Initiatives](#); [ARC Linkage, Infrastructure, Equipment and Facilities](#); [CSIRO SME Connect](#); [National Collaborative Research Infrastructure Strategy and Funding](#); [Medical Research Future Fund](#); [Future Drought Fund](#); [Advanced Manufacturing Fund](#); [Business, Research and Innovation Initiative](#); [City Deals](#); [Cooperative Research Centres Program](#); [Industry Growth Centres Program](#); [Building Better Regions Fund](#); [Regional Growth](#)

However, we fear that the long-term decline in the nation's R&D intensity<sup>7</sup> poses a key structural impediment to future economic development in regional and metropolitan locations.

Australia's level of R&D intensity peaked at 2.25 per cent of GDP in 2008–09 and has been declining for more than a decade. Our most recently reported R&D intensity figure of 1.79 per cent in 2017–18 was well below the OECD average of 2.34 per cent.<sup>8</sup> The main causes of this declining trend are falling rates of business and government investment in R&D. The higher education sector contribution to national R&D intensity is also likely to reduce significantly in the short- to medium-term due to the downturn in revenues occurring and predicted from the decline in international student enrolments. As noted above, the international literature demonstrates that regional economic development is most likely to be strong where there is extensive and growing investment in R&D occurring within regional communities.

We therefore believe the Government's regional development strategy needs to be underpinned by a commitment to reverse Australia's declining rate of research intensity and to put the nation back on a path to being competitive with the world's leading economies.

- 4. How effective are innovation hubs or jobs precincts (co-located with regional university campuses) in:**
- a. attracting businesses to the host destination, and**
  - b. supporting the growth of localised industries in that location.**

Both the Commonwealth and NSW governments have recently (2017-18) looked very closely at the conditions required for innovation precincts to thrive, drawing on extensive consultations and evidence from Australia and overseas.<sup>9</sup> Professor McNeill and the University contributed to the research and thinking that fed into the NSW Innovation and Productivity Council's report: [NSW Innovation Precincts, Lesson from International Experience](#). We also engaged with the Commonwealth Department of Industry, Science, Energy and Resources' development of its excellent [Statement of Principles for Australian Innovation Precincts](#). We commend both reports to this process as complementary resources, which together provide possibly the most up-to-date and comprehensive analysis of the key conditions required for innovation precincts to prosper.

The Commonwealth's work on precincts found strong evidence that they improve collaboration and innovation outcomes that contribute to business, economic and jobs growth. Innovation precincts do this through the close geographic concentration they provide for businesses, researchers, educators and the community to form deep, trusting and mutually beneficial relationships. Moreover, the Commonwealth's research found exemplar precincts to be diverse in their characters but sharing common strengths. Key amongst these strengths was the presence of local leadership shared between industry, research and education sectors, combined with facilitation and long-term support from governments. According to the study's synopsis: *'Local leadership is necessary to: identify regional competitive strengths; set a vision and achieve consensus around a development strategy; and ensure research, education and training addresses industry and community needs.'*

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[Fund; Regional Jobs and Investment Packages; Regional Development Australia; Advanced Health Research Translation Centres; Next Generation Technologies Fund; NSW, Sydney Start-up Hub; Medical Devices Fund; NSW Health PhD Partnership Program; NSW Health Medical Research Hubs; Boosting Business Innovation Program;](#)

<sup>7</sup> (Research Intensity is measured by Gross Expenditure on Research and Development (GERD)) as a share of GDP)

<sup>8</sup> <https://publications.industry.gov.au/publications/australianinnovationsystemmonitor/science-and-research/international-comparison/index.html>

<sup>9</sup> <https://www.treasury.nsw.gov.au/nsw-economy/nsw-innovation-and-productivity-council/our-publications/nsw-innovation-precincts>, <https://www.industry.gov.au/data-and-publications/statement-of-principles-for-australian-innovation-precincts>

We have extensive experience as an anchor or contributing partner in many mature, emerging and embryonic innovation precincts across the Sydney Basin. Most of these are located close to major public teaching hospitals. From these experiences we agree strongly with the two reports' findings that local leadership and mechanisms for coordination of vision setting and strategy development are essential at every stage of a precinct's evolution. We would also observe that the most successful innovation precincts globally are dominated by 100+ year old research-intensive universities, which have built up critical mass, e.g. the University of Toronto and MARS Precinct, Stanford and Silicon Valley, and University College London and Imperial College London with their respective new innovation campus extensions.

As the Commonwealth's research on precincts found, *'There are many existing and planned innovation precincts in Australia... However, the scale of many of these... is much lower ... than in comparable countries in North America or Europe, and their full potential is arguably less widely understood among participants.'*

In addition to local leadership, another key finding of both reports, was that a critical obstacle to developing vibrant innovation precincts in regional areas is the challenge of how to build and grow the basic and applied research critical mass that is needed to underpin the innovation, knowledge transfer and commercialisation for which leading innovation precincts globally are renowned. Australia's population is relatively small and spread over a relatively large continent, with low population densities generally and especially in regional areas. Combined with our relatively low national levels of R&D investment and intensity, the particular obstacle Australia faces to building viable regional innovation precincts, is how to link businesses and institutions based at these sites seamlessly to national research infrastructure and capacity that we cannot afford to duplicate.

This barrier can potentially be addressed through a 'hub and spokes' approach to building regional research capacity, supported by excellent high-speed IT infrastructure and policy and funding initiatives that incentivise collaboration between regionally-based universities and firms, with metropolitan universities and other research organisations. The Australian Labor Party's *Collaborative Research Network* (CRN) program, which ran from 2010-2014, sought to address this 'lack of research critical mass' challenge cost-effectively, by supporting regional universities to develop their research capacities through mutually beneficial collaborations with metropolitan-based partners. An ACIL Allen evaluation of this unfortunately short-lived program found that even though quite small in scale, it succeeded in just a few years of operation, to help regional universities build their research capacities.<sup>10</sup> We see value in initiatives like the CRN being considered, as part of a broader strategy to lift Australia's overall level of R&D intensity.

Ends/

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<sup>10</sup> [https://docs.education.gov.au/system/files/doc/other/crn\\_acil\\_eval\\_final\\_report\\_april\\_2015\\_0.pdf](https://docs.education.gov.au/system/files/doc/other/crn_acil_eval_final_report_april_2015_0.pdf)





APRIL 2020

# Economic impact of the University of Sydney

Version 1.2





# Introduction

The University of Sydney (the University) is a leading higher education and research university and a significant economic and social institution in New South Wales and in Australia. It was founded in 1850 as Australia's first University and is ranked number one in Australia across a range of disciplines including in science, education, the arts and built environment.<sup>1</sup>

The University is one of the most significant institutions in NSW and provides the community with invaluable educational, research, economic, cultural and social benefits. The University adds significantly not just to the economic output of the economy through incomes, employment and increased productivity but to the social fabric of NSW and Australia.

The University has commissioned ACIL Allen Consulting (ACIL Allen) to assess the economic contribution and impact that the University has made to the NSW and Australian economies in 2019 as well as the historical contribution of the University from 2006 to 2019. This study assesses the economic contribution and impact that the University makes through its: (i) operations and capital expenditure, (ii) research activities, (iii) educational activities, (iv) students' expenditure, and (v) student's visitor's expenditure.

In assessing the economic contribution and impact of the University of Sydney, ACIL Allen has drawn on data provided by the University over the period 2006-2019.

The University of Sydney has grown significantly over this period with major improvements in not just facilities but in the breadth and quality of its research and educational offerings.

The significant increase in enrolments includes outreach to many communities and students that may have not otherwise pursued a higher education pathway.

Over the period 2006 to 2019:

- students' enrolments rose from 50,168 to 73,902
- graduates increased from 10,173 in 2006 to 14,150 in 2019
- University revenue grew from \$1.24 billion to \$2.64 billion
- the contribution of students' and visitor expenditure to the NSW economy increased from \$213 million to \$774 million.

Based on the University of Sydney's activity in 2019, its contribution to the Australian economy was:

- employment: **35,633** full-time equivalent (FTE)<sup>2</sup>
- economic output: **\$5.9 billion**
- research impact: **\$2.2 billion** net present value (NPV) with every \$1 dollar of research spend generating an **additional \$7.82 of GDP** (or \$6.05 in NPV terms)
- education impact: **\$900 million** (NPV).

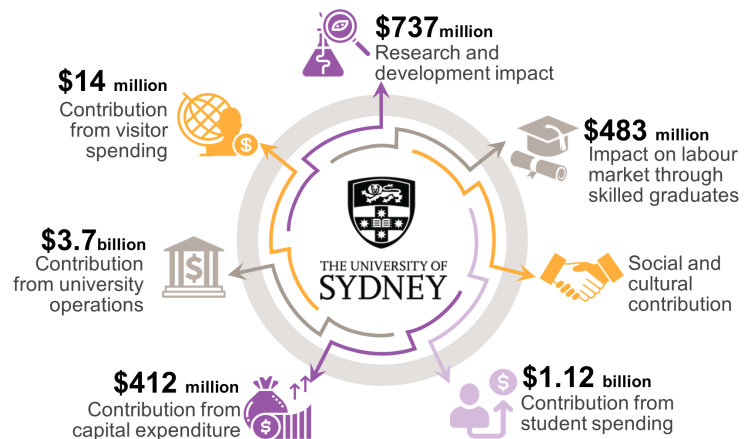
<sup>1</sup> QS World University Rankings 2019, Financial Times Business School Rankings 2018, Academic Ranking of World Universities (ARWU) 2019, US News and World Report.

<sup>2</sup> FTE years is a measure of employment over time. An employee year is employment of one full time equivalent (FTE) person for one year. Alternatively, it can represent employment of a 0.5 FTE person for two years.



# 2019

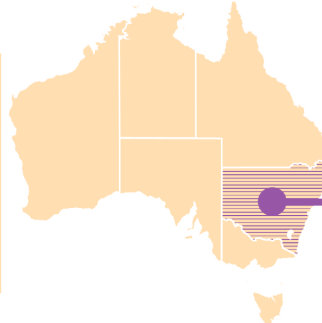
## The University of Sydney's contribution to the NSW economy from activity in 2019



## University contribution to the NSW and Australian economy: 2019

### AUSTRALIA (inc NSW)

Employment: **35,633 FTE**  
 Economic Output: **\$5.9 billion**  
 Research Impact: **\$2.2 billion (NPV)**  
 Education Impact: **\$900 million (NPV)**

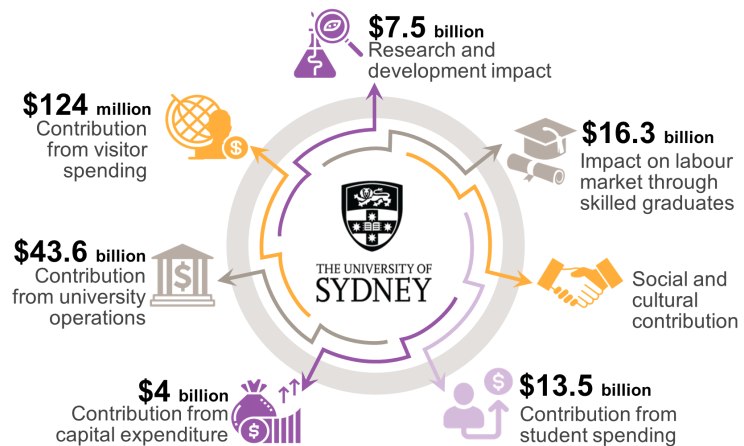


### NEW SOUTH WALES

Employment: **31,270 FTE**  
 Economic Output: **\$5.3 billion**  
 Research Impact: **\$737 million (NPV)**  
 Education Impact: **\$483 million (NPV)**

# 2006 –2019

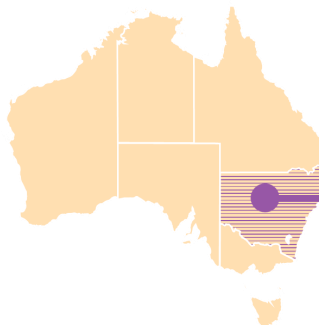
## The University of Sydney's contribution to the NSW economy from activity over the period 2006–2019



## University contribution to the NSW and Australian economy: 2006-2019

### AUSTRALIA (inc NSW)

Employment: **376,404 FTE years**  
 Economic Output: **\$68.3 billion**  
 Research Impact: **\$20.9 billion (NPV)**  
 Education Impact: **\$22.7 billion (NPV)**



### NEW SOUTH WALES

Employment: **329,680 FTE years**  
 Economic Output: **\$61.2 billion**  
 Research Impact: **\$7.5 billion (NPV)**  
 Education Impact: **\$16.3 billion (NPV)**

# Economic contribution of University related expenditure

The economic contribution of University related expenditure includes the expenditure by the University, expenditure by the University's students and visitors, and the flow on impacts to other sectors of the NSW and Australian economies. The economic and employment contribution to the NSW and Australian economy arising from this expenditure in 2019 and over the longer period 2006 to 2009 is outlined in this section.

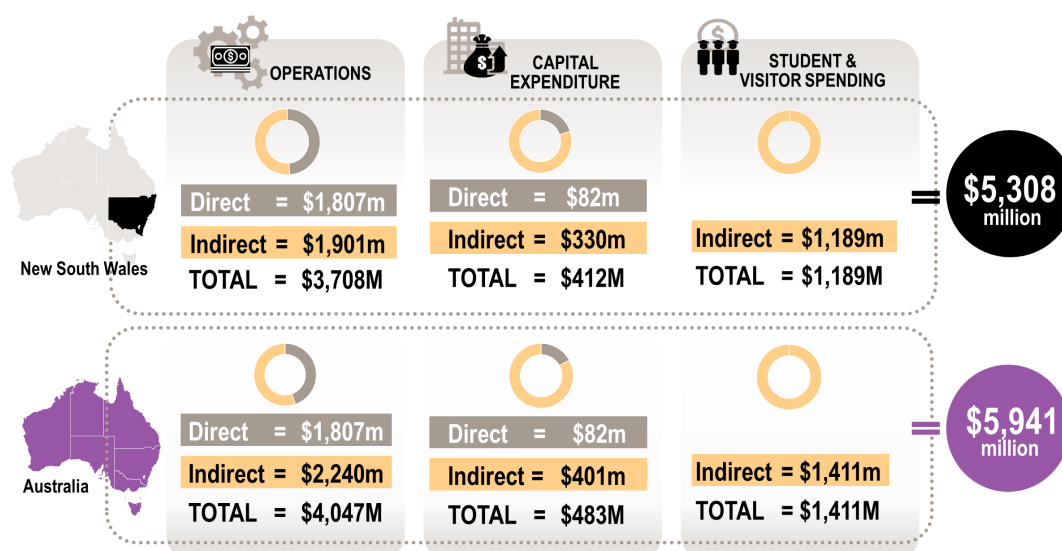
## ECONOMIC CONTRIBUTION IN 2019

ACIL Allen estimate that the contribution of the University-related expenditure to the **NSW economy in 2019** was around **\$5.3 billion**. This is a significant contribution and is equivalent to 0.85 per cent of NSW GSP in 2019. It comprises:

- a direct contribution of around **\$1.89 billion**
- a production induced contribution of around **\$1.56 billion** associated with the value added embodied in the production chain
- a consumption induced contribution of around **\$1.86 billion** associated with spending by workers employed throughout the supply chain.

ACIL Allen estimate that the contribution of the University-related expenditure to the **Australian economy** (including NSW) in 2019 was around **\$5.9 billion**, this contribution is equivalent to 0.31 per cent of Australia's GDP in 2019 (see Figure 1).

**FIGURE 1:**  
Economic contribution of the University related expenditure in 2019



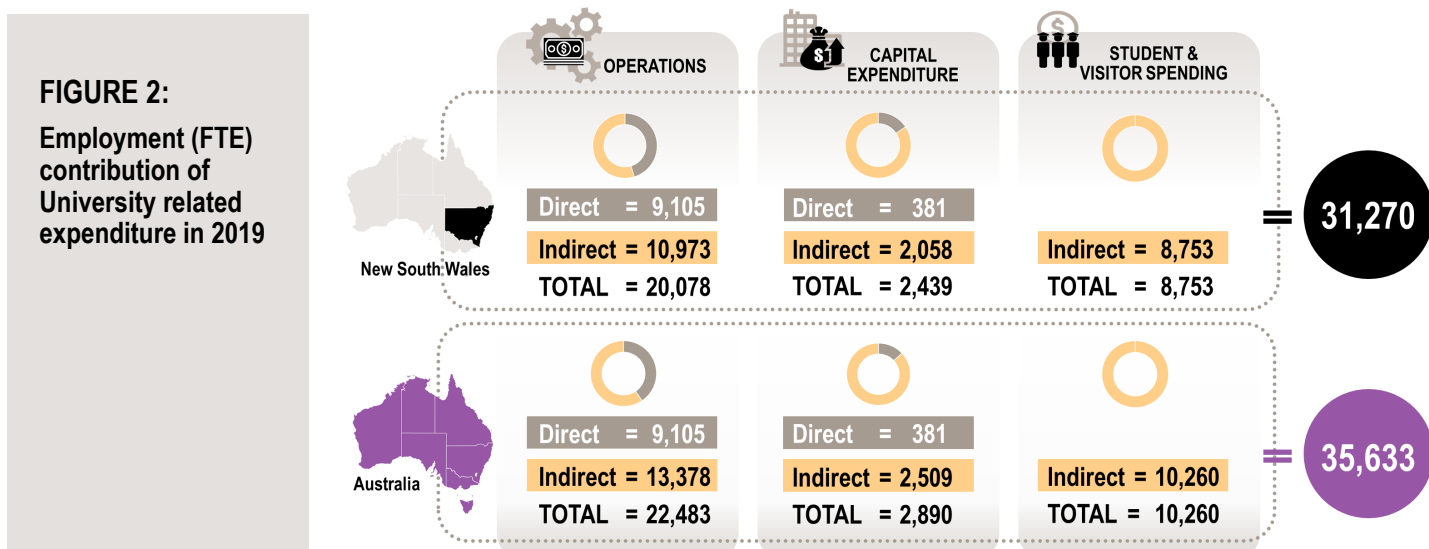
## EMPLOYMENT CONTRIBUTION IN 2019

The University also makes a significant contribution to NSW in terms of employment. Besides directly employing a significant number of people, the expenditure related to the University creates a number of indirect jobs as a result of:

- University employees and student spending money in the community
- spending by businesses that supply goods and services to the University.

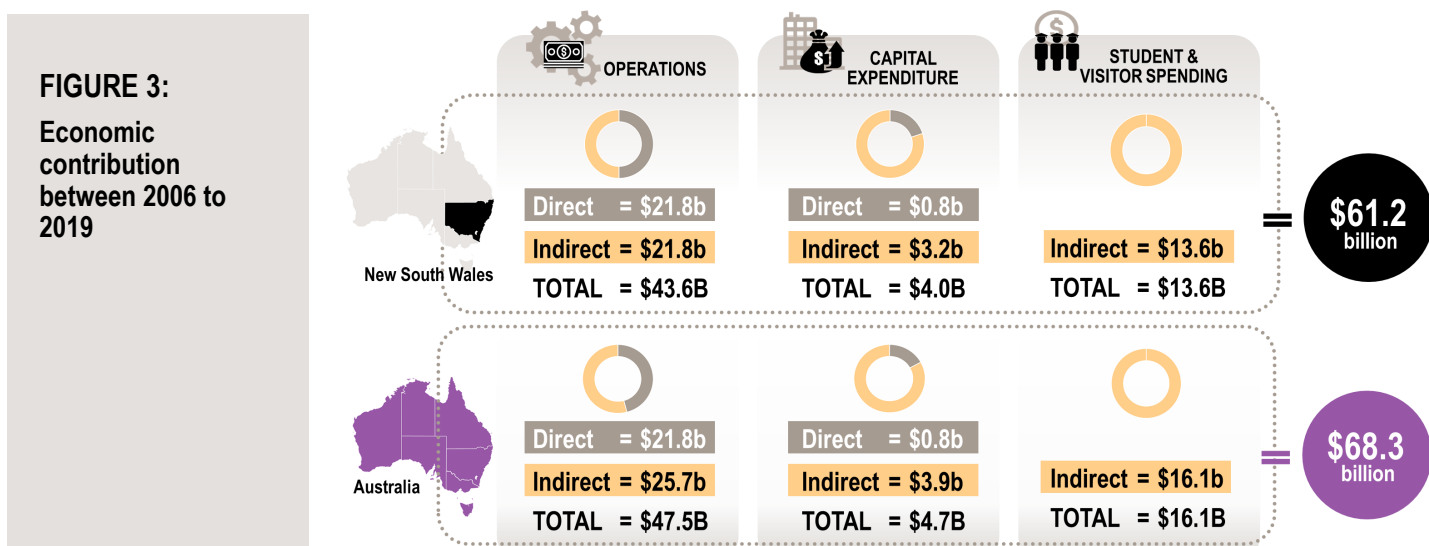
ACIL Allen estimate that **31,270 FTE** years were supported directly and indirectly in NSW in 2019 by the University which was a 40 per cent increase on the number supported in 2006. The number of FTE years Australia-wide is estimated to be **35,633** (see Figure 2).

The largest employment contributions result from the operations of the University and student expenditure, which contributed around 20,078 FTE years and around 8,666 FTE years, respectively to the NSW labour market during 2019.



## ECONOMIC CONTRIBUTION BETWEEN 2006 TO 2019

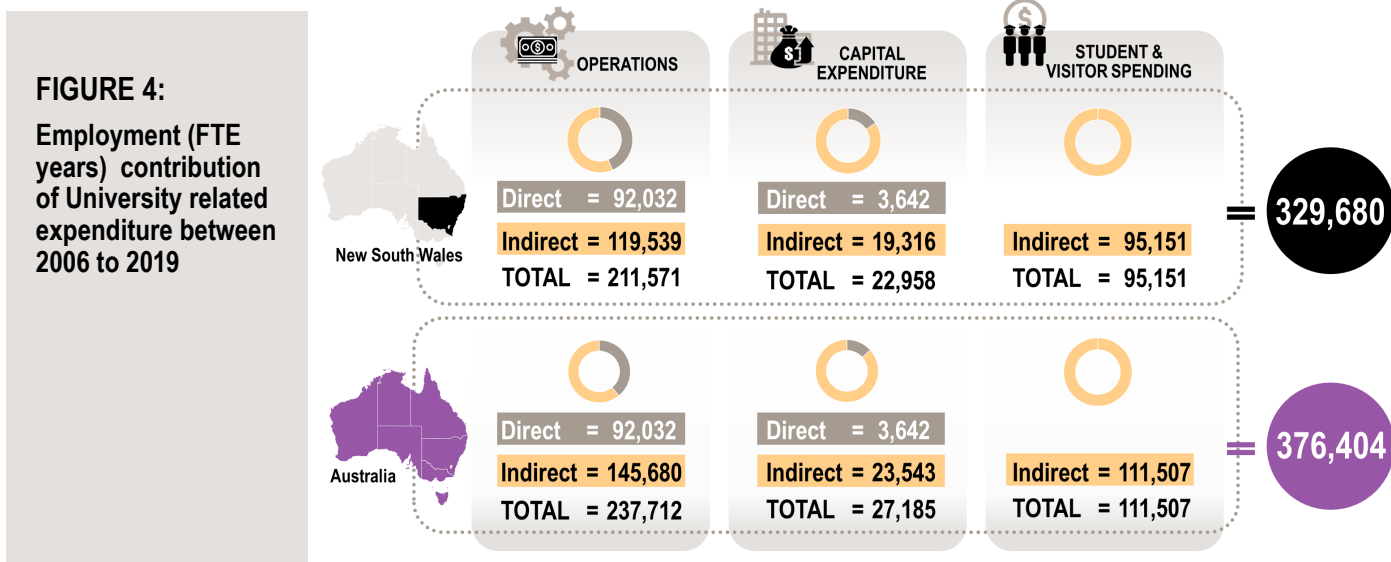
Looking over a longer period between 2006 and 2019, the University related expenditure contributed **\$61.2 billion** to the NSW economy and contributed **\$68.3 billion** to Australia overall during these years (see Figure 3). More than 70 per cent of the contribution was from the University's operations, with student expenditure accounting for 22 per cent.



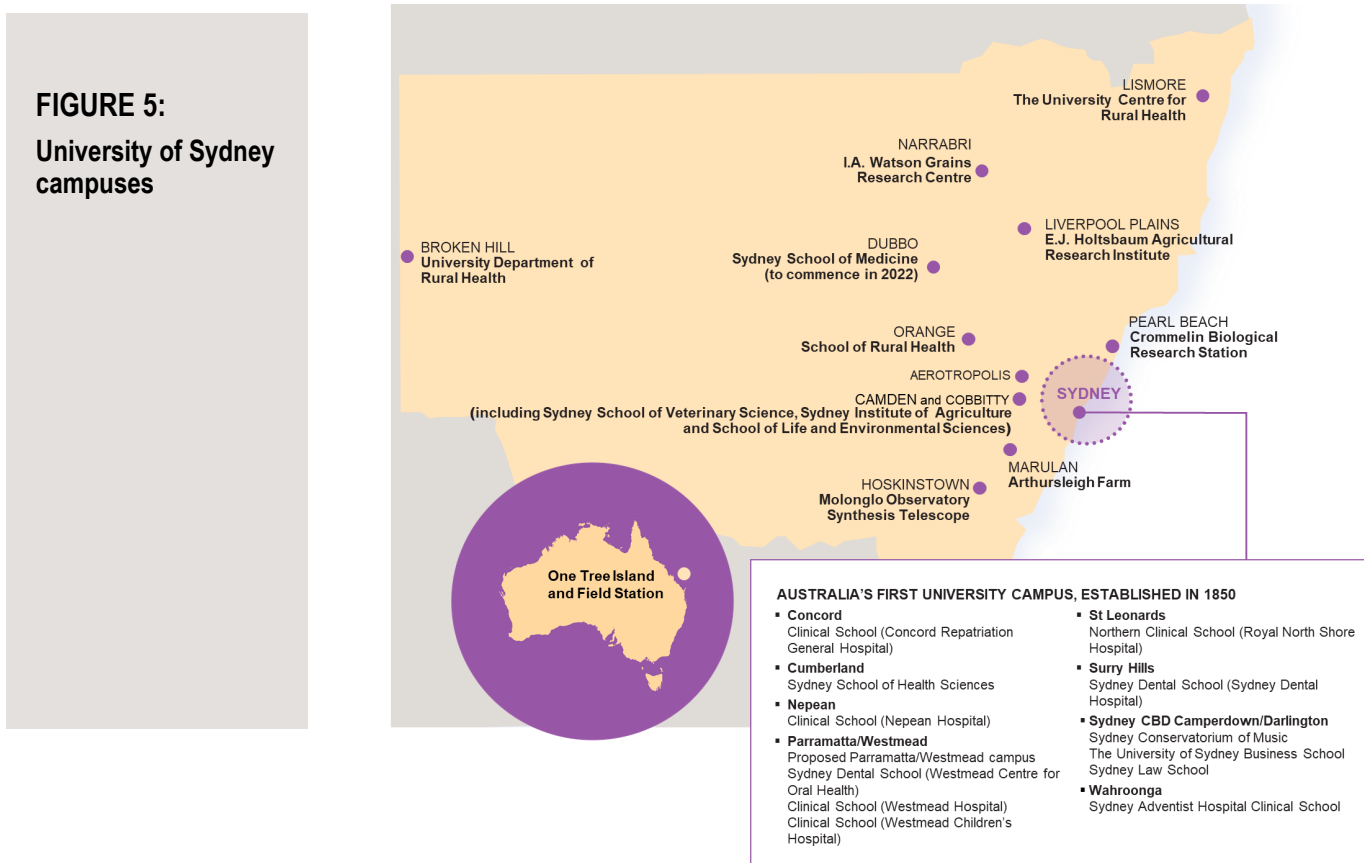


## EMPLOYMENT CONTRIBUTION BETWEEN 2006 TO 2019

The numbers of jobs arising from University expenditure between 2006 and 2019 is shown in Figure 4. In total, between 2006 and 2019, University-related expenditure supported a total of **329,680 FTE years** in the NSW economy and 46,724 FTE years in the rest of Australia.



The University also makes a significant contribution to NSW in terms of employment in both metropolitan and regional areas with campuses at Camperdown/Darlington, Cumberland, Camden, Cobbitty, Rozelle, Sydney Medical School and Teaching Hospitals, Surry Hills, Parramatta/Westmead and Sydney CBD as well as a presence in 11 other regional centres and locations across NSW (see Figure 5).



# Economic contribution of the University's research activities

The University of Sydney is rated as one of the leading Universities in Australia and in the top 5 per cent of Universities in the world. The University is also ranked in the top 50 in the world for more than 35 subjects and on a range of rankings is first in Australia in a number of fields including graduate employability, architecture and the built environment, oncology, veterinary science, education, arts and humanities, transportation science and technology.<sup>3</sup>

All 22 fields of research undertaken by the University of Sydney have been rated as above, or well above, world standard by the Australian Research Council with 11 achieving the top rating of “well above world standard” and 11 rated “above world standard”.<sup>4</sup>

The contribution of the University's research was assessed by estimating the effect of the research on the future productivity and economic output of the NSW and Australian economies over the period 2006 to 2037 – compared to what would have been produced if spent on less productive investments in the economy.

## Impacts of 2019 research

The University's 2019 research is projected to **increase the real economic output for:**

- NSW by more than **\$737 million** (in NPV terms) over the period 2019-2037
- Australia by a total of nearly **\$2.2 billion** (in NPV terms) over the period 2019-2037.

Every \$1 dollar of research spend at the University in 2019 generated an additional **\$7.82** of GDP (or **\$6.05** in NPV terms).

For every **\$1 dollar** of Government research funding the University receives it spends an additional **\$1.52** to undertake the research in terms of full operating costs.

## Impacts of research between 2006–2019

The University's research between 2006 and 2019 are projected to **increase real economic output for:**

- NSW by a total of **\$7.5 billion** (in NPV terms) over the period 2006-2037
- Australia by a total of **\$20.9 billion** (in NPV terms) over the period 2006-2037.

Every \$1 dollar spent in research at the University between 2006 and 2019 has generated an additional **\$6.43** of GDP (or **\$4.94** in NPV terms).



<sup>3</sup> Times Higher Education (THE) World University Rankings 2020, QS World University Rankings 2020, QS World University Rankings 2019, Financial Times Business School Rankings 2018, Academic Ranking of World Universities (ARWU) 2019, US News and World Report.

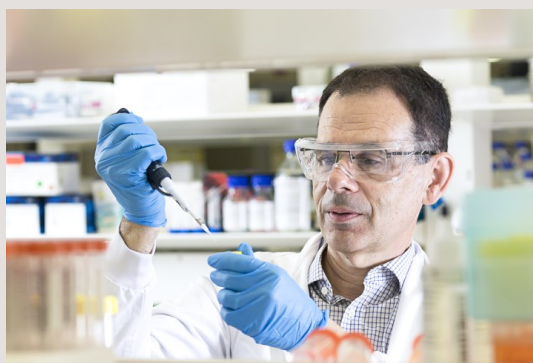
<sup>4</sup> Australian Research Council, 2019, 2018 Excellence in Research for Australia (ERA).



The biggest impact of the University's research over the period 2006-2037 is in health care services, the education and training sectors (\$14.8 billion), agriculture (\$3.7 billion) and the manufacturing sector (\$2.4 billion).

The cumulative employment impact of the University's research activities between 2006 and 2019 is estimated to be **13,056 FTE** years in NSW over the period 2006 to 2037 and **34,215 FTE** years across the whole of Australia.

### REPAIRING SKIN



University of Sydney McCaughey Chair of Biochemistry, Prof Anthony Weiss AM, founded Elastagen Pty Ltd in 2005 to commercialise his breakthrough in a process to manufacture a protein called tropoelastin (essentially a form of a synthetic skin) to treat patients with severe burns and chronic wounds.

In 2018, Elastagen announced that it was to be acquired by Allergan plc, one of the world's 20 largest biopharmaceutical companies. This deal, worth more than \$A350 million, is one of the largest transactions ever completed in the Australian life science sector. ACIL Allen estimate that the benefits just to burns victims and the health system in Australia alone over the next ten years are more than \$114 million.

### HELPING PEOPLE LIVING WITH CHRONIC LUNG DISEASE BREATHE EASY

Chronic obstructive pulmonary disease (COPD) is a leading cause of death and disease burden in Australia following heart disease, stroke and cancer.

Professor Jennifer Alison, from the University of Sydney, has led a team of researchers and clinicians from across Australia to develop innovative approaches to improve the care of people with COPD. This includes an online evidence-based rehabilitation Toolkit for health care professionals to improve their capacity in assessing and treating patients with chronic lung disease. The Toolkit involves exercises, psychosocial support and education on disease management. Aboriginal and Torres Strait Islander peoples in Australia are a key group impacted by COPD. To address this, Professor Alison and Prof Graeme Maguire developed the 'Breathe Easy, Walk Easy (BEWE) Program' in partnership with the Lung Foundation Australia to support the provision of pulmonary rehabilitation in rural and remote areas of Australia. The project is strongly supported by the Poche Centre for Indigenous Health at the University of Sydney.





# Economic impact of the University's education activities

The contribution of the educational activities undertaken by the University was assessed by estimating the effect of the University on the future productivity of the NSW and Australian workforce through the output of graduates over the period 2006 to 2037 over and above what would have been generated if invested in less productive areas.

## Impacts of 2019 education activities

The University's 2019 education activities are projected to **increase the real economic output** of:

- *NSW* by a total of **\$483 million** (in NPV terms) over the period 2019-2037
- *Australia* by a total of **\$900 million** (in NPV terms) over the period 2019-2037.



## Impacts of 2006-2019 education activities

Over the longer term, the University's 2006 to 2019 graduates are projected to **increase the real economic output** of:

- *NSW* by a cumulative total of **\$16.3 billion** (in NPV terms) over the period 2006-2037
- *Australia* by a cumulative total of **\$23 billion** (in NPV terms) over the period 2006-2037.

The University's past and current graduates are projected to increase total employment in NSW by **31,254 FTE** years over the period between 2006 and 2037 and by **42,663 FTE** years across Australia.

## SOCIAL AND CULTURAL CONTRIBUTIONS

The University of Sydney's impact on society extends far beyond what can be measured in purely economic terms. The University has extensive outreach and engagement with the community, industry, not-for-profits, government and makes an invaluable contribution to society from a cultural, social and environmental perspective. This includes building local community capacity in Sydney and other communities and by enriching the quality of life of people through the arts, culture, sport and through innovation and creativity.

The University of Sydney has also played a fundamental role over the last 150 years in helping to build a more just and equitable society by enabling people from all backgrounds, including the more marginalised in society, to reach their potential and increase participation in higher education.



## Community engagement, arts and culture

Examples of the University's engagement and broader social and cultural contribution include:

- **The INSPIRED campaign** – is an example of the strong engagement and connection that the University of Sydney has with its alumni and broader community in Australia and overseas. More than 64,000 individual donors have contributed more than \$1 billion to the INSPIRED campaign making it the most successful philanthropic campaign of any university in Australia.
- **The Sydney Policy Lab** – aims to connect experts from across the University from different domains to focus on public policy research and development on major challenges relevant to Sydney, the region and Australia.
- **The Sydney Knowledge Hub (SKH)** – established in 2019, the SKH provides co-working spaces for external partners in industry, government and community organisations to promote innovation, collaboration and engagement with researchers and students at the University.
- **Sydney Genesis** – supports startups by providing mentorship, cash grants to assist in commercialising products or services and assistance with gaining media coverage and exposure. The Genesis program has supported over 1,000 startups since its commencement in 2008 and around 80 mentors, mostly from the private sector, provide their time and advice to startups.

### PERFORMING ARTS, THEATRE AND MUSIC



Since 1975 the **Seymour Centre** has not only played host to a broad array of local and international artists but as a “university” performing arts centre it has been a major promotor and presenter of theatrical innovation and experimentation supporting the artists of the future. In 2019 the Seymour Centre hosted 613 performances and had over 250,000 visitors and over the last five years the Seymour Centre has presented over 3,000 performances with around 1,181,000 visitors.

The **Sydney Conservatorium of Music** has had a significant influence on Australia's musical landscape for over 100 years, providing a comprehensive musical education to thousands of students and hosting performances of international standard. In 2019 the Sydney Conservatorium of Music held over 1,750 events and public performances with almost 59,000 patrons, on average around 55,000 patrons a year attend around 1,700 events and performances at the Sydney Conservatorium.



## Equity and participation

The University of Sydney was founded in 1850 on the principle of providing people from all backgrounds with the opportunity to undertake higher education. This is reflected in the University today where significant measures have been taken by the University leadership and staff to embed diversity and inclusion into the culture of the University. In 2019, the University and its foundations invested **approximately \$106 million in scholarships and prizes** to support students in their education.



### WIDENING PARTICIPATION OF UNDERREPRESENTED GROUPS

The Widening Participation and Outreach Program (WPO) is the University's flagship program aimed at engaging with schools, equity groups, Aboriginal and Torres Strait Islander students and students in regional NSW. The WPO program involves a series of events and activities for young people that are underrepresented in higher education to enhance their learning potential, build their academic capacity and experience university life and spark their interest in studying at university. In total 11,525 students participated in 35 individual WPO events in 2019 involving 421 primary and high schools and there were 22,845 student engagements with the WPO program in 2019 compared with 3,920 in 2009.

## Aboriginal and Torres Strait Islander peoples

As Australia's first university, the University of Sydney has a strong commitment to support Aboriginal and Torres Strait Islander peoples by helping to increase their participation in higher education and partner with communities to provide services and undertake research to help close the gap in health and other areas.

The Wingara Mura-Bunga Barrabugu (WMBB) is the University-wide strategy for Aboriginal and Torres Strait Islander education, research, participation and engagement. This strategy is complemented by the Unfinished Business Action Plan which outlines the priorities that the University will take in 2020 towards addressing work that is still to be done under the 2012 WMBB strategy and setting the foundations for future initiatives.

### WINGARA MURA-BUNGA BARRABUGU (WMBB) SUMMER PROGRAM



The Wingara Mura-Bunga Barrabugu (WMBB) Summer Program is a week-long residential that offers Aboriginal and Torres Strait Islander students from around Australia the opportunity to live on campus and take part in activities and workshops that help them explore the opportunities of higher education in a real world setting.

177 Aboriginal and Torres Strait Islander students participated in the program in 2019 from across 101 high schools. After completing the program 90 per cent of students felt confident in their ability to succeed academically.



## Sustainability

The University of Sydney has a strong commitment to the environment and sustainability through its on-campus activities, education programs and world leading research. In 2020 the University of Sydney ranked 1st in Australia and 2nd in the world by Time Higher Education (THE) against the United Nations Sustainable Development Goals.

In February 2015 the University set a three-year goal in its carbon reduction strategy ensuring the carbon footprint of its listed equities was 20 per cent below a composite benchmark and achieved this in 2017.

As of September 2019, it was a record 55 per cent below the composite benchmark, 21 percentage points lower than the 34 per cent measured in 2018. Since 2014 the listed equity portfolio's carbon footprint has fallen 71 per cent in absolute terms.

The University's installation of solar panels on 20 buildings at the Camperdown/ Darling campus, saw solar panels generate 1,000 MWh of electricity in 2019 saving 900 tonnes of avoided CO<sub>2</sub> emissions, equivalent to the emissions of over 200 cars or 100 homes.

The University also seeks to establish itself as a place that drives social and environmental change where sustainability is integrated into our campus life through the implementation of world-leading research and education.



In the areas of Environmental Studies all four areas of research at the University (including Environmental Science, Ecological Applications, Environment Science and Management and Soil Sciences) are rated at well above world standard. Engineering research at the University is also rated well above world standard and areas such as Environment and Design and Earth Sciences are rated above world standard.

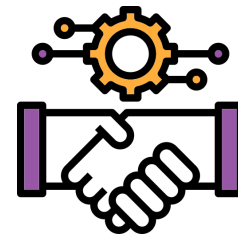


### WASTE RECYCLING

Sydney University's Nanoscience Hub (Sydney Nano) was established in 2015 with \$110 million of University funds and \$40 million from the Commonwealth Government. Prof Thomas Maschmeyer, the inaugural director of Sydney Nano, developed a process that uses water at high temperature and pressure to transform low rank coal, waste biomass and plastics into oils, waxes and chemicals. Licella Holdings was established with support from the University to commercialise the research and the company now employs more than 40 people in NSW and is in the process of building commercial scale hydrothermal plants in Australia and China with international joint venture partners.

## Community and industry engagement and partnerships

Strengthening engagement and developing strong partnerships with the community and key stakeholders underpins much of the work of the University of Sydney. This is reflected in the Australian Research Council's 2019 Engagement and Impact Assessment report which reviewed all 22 Fields of Research of the University and assessed 42 per cent of the University research as 'high' in terms of engagement, well above the average of the sector of 34 per cent.



The University of Sydney has a total of 145 Research Centres, Collaborative Networks and Centres of Excellence including ten multidisciplinary initiatives which bring together researchers from across the University in collaboration with industry and other partners.

These centres and initiatives have formed strong relationships with industry and other external organisations which have facilitated the commercialisation of research and the application of research in partnership with industry to help provide innovative solutions to improve environmental and economic outcomes.

### PARTNERSHIP WITH QANTAS



In 2012, Prof Salah Sukkarieh from Sydney University's Australian Centre for Field Robotics (ACFR) began a collaboration with Qantas to develop innovative software that would allow more efficient flight planning. Constellation, the new flight planning system, won the 2019 IHS Jane's Technology award for enabling flight efficiency and fuel savings.

Constellation is the most advanced flight planning system used by any airline in the world and is expected to help Qantas cut fuel use by as much as 1 per cent, potentially saving \$40 million and 50,000 tonnes of carbon dioxide emissions each year.

### RESEARCH FOR GENDER EQUALITY IN THE WORKPLACE

The University of Sydney's **Women, Work and Leadership Research Group** aims to expand knowledge and research expertise on women and work. Lead by Professor Marian Baird and Professor Rae Cooper, the group engages closely with industry, including through an Australian-wide survey of employees, to assess workforce trends and to bridge the gap between academia and policy. The group's research has made a significant contribution to both government and company policies about parental leave, women and leadership, flexible and equitable work arrangements and domestic and family violence leave. The Research Group is currently undertaking a study, in partnership with the retail sector and legal practitioners, to design gender equality into the future of their work practices.

A wide-angle photograph of the University of Sydney's main building, a grand Gothic Revival structure with multiple towers and a central clock tower. The building is made of light-colored stone and has a large central entrance. It is set against a clear blue sky with a few wispy clouds. The foreground shows a green lawn and a paved path leading to the entrance.

# About this study

This study measures the three main avenues in which the University of Sydney contributes to the economy:

- (i) through the goods and services purchased by the University, through its day-to-day operations, capital expenditure and through the expenditure of students and associated visitors (demand-side contribution)
- (ii) through the educational and research activities of the University supplies (supply-side contribution, eg research outputs and highly skilled graduates).

University teaching is essentially an investment in human capital. University of Sydney graduates are highly-skilled jobs and therefore the University contributes to increased labour productivity at the economy level and enhanced earnings for graduands at the individual level.

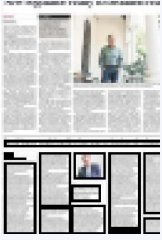
In addition, scientific research undertaken by the University generates economic impacts when the outputs of these research projects are adopted by industry to develop new products and processes, leading to increased productivity and the development of new products and services in the economy.

- (iii) the University of Sydney also provides important contributions to the social and cultural life in NSW and Australia by helping to shape the development of many aspects of the community, particularly in areas like the creative arts and culture, public debate and knowledge, the environment and community identity. The University also acts to improve the ability of the community to respond to issues by building community capacity for strong decision making, leadership and informed choices.

The economic contribution of the University related expenditure (including student expenditure) was assessed using NSW and Australian input-output (IO) models which measure the value-added contribution throughout the economy and the increase in economic output (Gross State Product (GSP) in NSW and Gross Domestic Product (GDP) for Australia).

The economic impacts of the University's research and educational activities were assessed using Tasman Global, ACIL Allen's in-house Computable General Equilibrium (CGE) model of the Australian economy.





23 NOV, 2020

## Break home-made hurdles that stop technology development

Australian Financial Review, Australia

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# Break home-made hurdles that stop technology development

### Opinion

**Thomas Maschmeyer**

What you never hear anyone explain is exactly why many great Australian innovations have to be exported to reach commercial success before they are then reimported for local consumption.

We have fantastic universities, excellent national laboratories, a wonderful array of globally successful companies, the security of contract law, wealthy investors and cashed-up superannuation funds as well as a technology-friendly population.

So, what is the missing link?

As a veteran of many technology translation start-ups here and overseas, and the recipient of the 2020 Prime Minister's Prize for Innovation, it strikes me that in Australia preferential support for the commercialisation of new technology is viewed negatively as "picking winners" and not as a deliberate strategy to enhance national competitiveness, create jobs and future-proof the economy.

The point is to back the future, not the past. Markets will pass verdict on established technologies and so they should. The often-heard clarion call of established players seeking market intervention when losing market share should be ignored.

Successful technology translation is characterised by completing the chain that starts with scientific discovery, links it to spin-outs or licences that finally attract large investments and concludes with IPOs by established players. But there are many home-made hurdles that interfere with this progression.

In the energy sector, for example, the Clean Energy Finance Corporation faces significant constraints. It is unable to co-fund anything that has not already been commercialised at a similar scale and on a similar feedstock elsewhere in the world.

While it is able to invest in overseas technology commercialised 50 years ago, such as waste incineration to generate heat, it is forbidden from investing in pioneering new Australian technology. This applied to the Cat-HTR process that recycles mixed end-of-life plastic waste and was developed by Licella Holdings, a private company

that I co-founded – even though it was in part this technology that helped me win the Prime Minister's Prize for Innovation.

State-based environmental protection agencies have different policies with different approaches on how new technologies can be treated. In NSW it is the investor who must wait on an EPA permission process that can take two years or more without any certainty of the outcome. This is a

process that discourages rather than encourages investment.

Similarly, there is an absurd definition of "waste". When waste is turned into a new finished product, under the lazy EPA playbook the new product is still defined as "waste"! That means a site can only process half of what it could process, driving up costs and complexity, and all for no gain.

Such hurdles result in nothing genuinely "new" being built in Australia. It has to be built overseas first.

How do other countries manage innovation? They very often have two regulatory systems, one for the country as a whole and one for so-called 'sandpits' – industrial parks – which have tougher reporting requirements, but where one can do new things under greater, sometimes even daily, scrutiny. This would be a simple change that could be readily endorsed across the political spectrum but would require alignment, including within the national cabinet.

Encouragingly, some small green shoots are appearing, such as at the NSW energy precinct around Dubbo, where regulations have been adjusted for faster, but still environmentally compliant, safe and community-spirited development of renewable energy projects.

Reaching the necessary economy of scale in deep tech means supporting innovation until it gets to a competitive volume.

It is here where publicly funded entities need to step in. The long-term strategic value of new IP is not addressed by simple market forces; these operate on too short-term a timeframe. Our international competitors acknowledge this and have appropriate policy settings in place from the unsophisticated – "Buy American" – to the nuanced – the EU's

€750 billion (\$1.2 billion) Green New Deal which co-funds new technology,

sharing the risk. That's not to mention Japan or China, which put vast amounts of public money into new technologies.

Such different and more favourable policy settings are among the chief reasons that my technologies are more prominent overseas and could possibly be forced to go overseas for good. For my renewable energy storage firm Gelion and its Endure battery technology, we are starting to look at manufacturing overseas and re-importing into Australia.

The need for Australian political and public leadership in innovation is paramount. Government has a critical role to play regarding strategic investment to foster the successful translation of home-grown Australian technology into commerciality.

We need greater flexibility in the way we permission new technologies. And a bipartisan legislative framework, which is granular not just broad spectrum. It is one of the big-ticket items for this generation of politicians – and time is running out.

*Thomas Maschmeyer is a professor of chemistry at the University of Sydney and co-founder of Gelion Technologies and Licella Holdings. In addition to receiving the 2020 Prime Minister's Prize for Innovation, he is the winner of the AFR Higher Education Award for Sustainability, announced last week.*

### We need greater flexibility in the way we permission new technologies.

Thomas Maschmeyer, pictured

