Queensland University of Technology

Submission to the Senate Select Committee Inquiry into Jobs for the Future in Regional Areas

Queensland University of Technology (QUT) welcomes the opportunity to provide our views on the matters raised by the Senate Select Committee Inquiry into Jobs for the Future in Regional Areas. The higher education sector is well positioned to support the wellbeing and prosperity of regional areas, in many different ways. Some of these capabilities are well entrenched but others are yet to reach their full potential. The main areas that QUT will give close consideration to in this submission are:

1. Direct engagement in regional areas;
2. Learning and teaching for regional jobs across all fields;
3. Digital learning opportunities for regional-based learners across the lifespan;
4. Research collaboration with government and industry;
5. Empowering entrepreneurship as a method of regional development; and
6. Utilising renewable energy transitions as substantial opportunities for the development of sustainable regional jobs.

1. Direct engagement in regional areas

1.1 Engagement with schools

Regional capability building begins long before our young people set foot in the workplace or the university lecture theatre.

QUT recently partnered with the Queensland Minerals and Energy Academy (QMEA) on a regional tour with the ambition to engage students from the Rockhampton region with science, technology, engineering and mathematics (STEM) and increase the pipeline of future Queensland STEM professionals. The tour saw QUT Student Ambassadors travel to Rockhampton to engage with students from Cathedral College, North Rockhampton High School and Rockhampton Girls Grammar. Over 600 high school students participated in a variety of workshops and career presentations and QMEA’s Powering our Future one day event.

In Brisbane, QUT collaborates with the Aviation Gateway Schools program, cross promoting opportunities for careers in aviation to schools, and sponsors peak body conferences. Support for conferences, such as the recent Australian Association of Mathematics Teachers Conference and the Grace Hopper ‘Hopper Down Under’ conference, help to ensure that regional teachers access professional development opportunities as well as to support regional student participation.

In 2018, the QUT Widening Participation Program funded 20,459 student engagements in regional areas.
1.2 Regionally-engaged research

Two multi-year funded projects in QUT’s Creative Industries Faculty have directly engaged with eight regional areas between 2014 and 2019. Funded by Arts Queensland, Writing the Digital Futures worked directly in regional and remote communities to improve digital literacy through twelve creative workshops and to leverage digital platforms to amplify the stories already being created in those communities. The research design supported the need of regional communities to be at the centre of the research. Regional voices proved integral to creating activities which respond to the capacity and the needs of the communities, optimising community engagement, data collection and knowledge transfer. The findings identified a widespread need and desire for skills in the fields of website design, self-publishing and multi-media platforms, particularly amongst adults wishing to re-skill and re-train after being made redundant. Over 90% of participants across all regional, rural and remote sites stated they preferred a mix of online and face-to-face activities for skills development. The use of creative workshops as a beneficial ‘Trojan horse’ for both creative skills development and data collection is especially successful in regional areas, as it creates an inclusive environment for community members with varying skill and employment levels, and encourages participation by people who may not normally attend a digital skills workshop or focus group.

A 2017-2019 project funded by the Tim Fairfax Family Foundation conducted creative consultation workshops with senior school students and teachers across Central Western Queensland (which is burdened with the highest youth unemployment rate in Australia) to investigate the creative skills that both groups identified as necessary for future jobs but that were currently absent from school and TAFE curriculum. Overwhelmingly both students and teachers identified interactive visual design, creative content creation and industrial design as highly prized skills. Most students did not want to leave their communities and wanted to develop skills that allowed them to either work remotely or to build creative industries in situ within their communities.

Over the course of both of these projects the two main concerns in all communities were job futures for young people and climate change.

2. Learning and teaching for regional jobs across all fields

Talent distribution between metropolitan universities and regional areas does not flow in only one direction. In reflecting this reality, universities should endeavour to prepare their students, of regional or urban origin, for the opportunities, lifestyle dividends, challenges and transitions they may encounter in undertaking work in regional areas. This can be achieved by developing curricula that prepares students for the regional workforce and for regional living, aligning teaching priorities with regional-relevant research strengths.

2.1 Developing curricula relevant to regional areas

In conjunction with the promotion of digital learning (see below), QUT believes that metropolitan-based educational institutions and training providers must ensure that curricula are relevant to living and working in regional contexts. Further, we consider it vital that all learners, including those who are currently metropolitan-based, are afforded an insight into the ways in which professional practice adapts to local conditions and contexts. QUT requires that all courses being accredited/reaccredited demonstrate a) industry consultation and b) that the course is delivering outcomes that the student requires to succeed in that field.¹ This process becomes increasingly important with increases in the size of the regional workforce.

Given the current maldistribution in the health workforce, it is vital that trainee health professionals are prepared for unique regional contexts, where some communities currently struggle to recruit and retain skilled health workers.\(^2\) Embedding explicit regional-relevant curricula, informed by strength-based models that engage with how occupational realities may be different to (rather than inferior to) metropolitan contexts, helps to prepare trainee health professionals for rural practice and to promote the benefits of regional living to metropolitan-based learners.\(^3\)

Teaching is another area of focus in which new graduates are in demand in regional areas. QUT equips education students to embark with confidence on teaching in rural and remote areas. The Education Faculty has developed a film medium, using Mt Isa teachers as participants, to document a variety of voices from leaders, teachers, parents, Indigenous Elders and the community, to celebrate and provide insights and stories of teaching in rural communities. The film is a learning material embedded in the new “Stepping In” unit – a first semester unit for all students in the new courses from 2019.

Further, exclusively rural-focused qualifications need to be developed and expanded to better support health professionals in rural practice, and encourage them to take up rural and regional positions. To this end, the Faculty of Health at QUT has worked in partnership with the Allied Health Professions’ Office of Queensland and James Cook University to develop and trial an integrated 2-level education program for rural allied health professionals, who remain the most in-demand group of health workers in regional and rural Australia.\(^4\) We welcome conversations about this program and opportunities for future development in this area.

2.2 Regional work integrated learning

Universities work in partnership with regional industry and small- and medium-sized businesses to support work-integrated learning (WIL) opportunities and internship placements for students.

WIL is already a key part of QUT’s regional engagement strategy. For example, QUT has worked with the Department of Education and Training (DET) to expand our rural professional experience opportunities throughout Queensland state schools. The project works with regional representatives to place students in the regions or locally, with the possibility of offers of employment in those regions. This approach is augmented with on-campus information sessions where students can meet with DET HR representatives to discuss employment. This approach is also being explored with independent schools.

Goondiwindi Regional Council has engaged final year undergraduate students completing their IT Capstone unit to develop an app that would enable community event coordinators to upload their activities on one system and have it be shared on numerous platforms. The Council was keen to partner with QUT to lift the profile of job opportunities in their corner of regional Queensland and beyond.

QUT has a longstanding position on the board of QMEA and has worked over many years at strategic and operational levels to support pathways to careers in the resources sector, a significant employer in regional Queensland. Through this relationship QUT has supported efforts

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to increase the financial and in-kind contribution of resource companies to advance STEM career opportunities for regional and indigenous students who are often unable by virtue of geography to access the abundance of opportunities available to urban students.

Opportunities exist for metropolitan universities to engage with regional employers to negotiate targeted placements for students who have come from their local regions, connecting real-world experienced graduates with job opportunities with regional employers. Moreover, there would be obvious utility in expanding such a program to explicitly provide such opportunities for rural and regional experiences to metropolitan students. The Committee might consider the virtues of providing suitable incentives to increase the number of regional employers willing to support student placements, and/or the provision of student stipends to subsidise rental expenses and other costs associated with their placement or relocation back to the region.

2.3 Aligning teaching priorities with regional-relevant research strengths

Teaching priorities should also anticipate future needs, leverage regional-relevant research strengths and encourage growth areas of innovation beneficial to rural and regional Australia.

QUT is exploring opportunities to align teaching priorities with our research strengths in fields such as robotics and agriculture. Our Science and Engineering Faculty is expanding its range of postgraduate offerings to include both new courses and new majors attached to existing postgraduate degrees. Whilst these programs are initially offered on campus, work is in prospect to make this content available through online education. Graduate education will also include short courses in these future-focused fields, units of which may be expanded into further study.

3. Digital learning opportunities for regional-based learners across the lifespan

Advancements in online learning technology and pedagogy have opened up opportunities for learning in an engaging, accessible and scalable mode of delivery to regional students. Responsive educational and training opportunities, provided to regionally-located workers, are vital in growing regional economies. Regionally-located education and training providers are important to achieving both wider economic objectives and providing full and equitable access to the opportunity for personal improvement. Australia must be committed to promoting and supporting access to education in regional areas, including higher education.

Regional students need to be able to choose from a range of relevant high quality educational and training options. Increasing offerings of qualifications and professional development courses online by universities, including fully online courses, provide opportunities for career growth through increased capabilities and capacity in management and leadership roles, and career changes to broaden the skill sets of regional workers. Digital learning options also provide 'just-in-time' and flexible learning opportunities, allowing individuals to study and work simultaneously, and choose their preferred time to engage in learning without having to leave their hometowns, and often without having to leave their homes.

Given the significant growth in online education and the assumption that the necessary infrastructure to support this will be widely accessible in regional areas in the future, the Committee may wish to give consideration to commissioning a rigorous evidence-based assessment of the likely future demand for online education in remote and regional areas. Given the technological capability to bring higher learning to any room anywhere, policy settings must not, either by design

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or effect, make it necessary for a learner to leave their home region to undertake most higher education courses of study.

3.1 Investment in infrastructure

Investments in both infrastructure and education are essential to the success of the regions in the future: it follows that the investment in education-enabling infrastructure is particularly vital. The expansion of digital learning to support educational advancement, knowledge-driven employment and community connectivity requires up-to-date, high-speed and high-quality internet access. Thus, we consider the current Government National Broadband Network plan to provide high speed internet access to all regional areas by mid-2020 essential in boosting employment opportunities in regional Australia.

However, great internet access alone is not sufficient to ensure that related opportunities are capitalised upon. The targeted development of information and communication technologies talent and skills, and community training in digital literacy and digital fluency are also essential for the growth of regional areas (as they are in urban areas). Digital development must be a priority area for investment and resourcing.

3.2 Prioritising access to digital upskilling and education for regional learners

QUT is committed to providing equitable, accessible training and education options across all levels of study and offering online courses specifically to address the geographical, social and financial barriers experienced by regionally-located learners.7

QUT creates and curates purposefully-designed academic content for fully online learning consumption in courses that specifically meet emerging employment demands. For example, our Science and Engineering Faculty provides equitable learning opportunities to regional Australia in the high-demand fields of Information Technology and Project Management.

QUT Online, which launched in 2017, delivers postgraduate online education offerings, widening access for a diverse range of learners who may previously have been precluded from participation due to their regional locations or other circumstances. This ensures that learners, regardless of geographic location, have access to postgraduate offerings that enhance employability and mobility. QUT also hosts corporate and executive education through our platform QUTEX.

4. Research collaboration with government and industry

Collaborations between university researchers, industry, government and regional communities are key to economic growth and regional prosperity. Such partnerships utilise the skills and expertise of researchers to support communities, stakeholders and employers to develop new industries and effectively recruit and retain the workforce required. The recruitment and retention of younger workers and families in regional communities is important for maintaining the generational health of populations, combating the development of ‘isolated’ ageing communities in regional areas, and providing viable futures that can be planned with clarity and confidence.8 Research has a significant – and as yet largely under-utilised – role to play in contributing to this goal.


These partnerships are most effective when premised on local community-directed approaches, genuine consultation with industry and communities, and collaboration embedded within long-term planning agendas. QUT suggests that policymakers supplement existing metro-directed development plans with effective and sustainable approaches to regional development emanating from within the regions themselves. Within the context of local community empowerment and support for locally-directed initiatives we highlight the role and value of entrepreneurship, both social and for-profit approaches, in building healthy, sustainable regional communities and creating new employment opportunities. To this end, QUT is pursuing avenues to trial entrepreneurial methods of development in regional Queensland to facilitate economic growth.

Authentic community-directed approaches can be achieved through consultation in higher education curriculum, evidence-based policy, utilising research collaboration as a means of social impact and employing entrepreneurial development methods.

4.1 Evidence-based policy

Strategic investment driven by evidence-based policy stimulates growth in any region. Growing student enrolment and industry engagement has influence on the Australian economy, as does the interaction between universities and policymakers. QUT has been involved in two recent ARC Linkages that feature strong collaborations with government and industry to examine the impact of the creative arts in regional, rural and remote communities in the areas of health, education, economic opportunities and development. The partners on these projects – *Australian Cultural and Creative Analysis: a population and hotspot analysis*¹⁰ and *The Role of the Creative Arts in Australia: a social impact model*¹¹ – include the Federal Department of Communication and Arts, Arts Queensland, Regional Institute Australia, Central Western Queensland Remote Area Planning and Development Board and Performing Arts Australia. The outcomes from this research present a focused argument for the creative arts and creative industries to be included in current ‘whole of government’ policy for regional Australia, and presents ways in which a more integrated framework for regional Australia can be designed that positions the creative arts as central to the success of regional communities. Further, these studies provide a model for future regional needs-directed research.

4.2 Research collaboration as a means of social impact

Research collaboration with government and industry can lead to meaningful social impact. The Reef Restoration and Adaptation Program (RRAP) is an integrated consortium of Australian institutions, including the Federal Government, tasked with developing solutions to help the Great Barrier Reef stay resilient and adapt in the face of inevitable climate change. In addition to environmental and cultural benefits, RRAP stimulates regional economies with the potential for several thousand permanent and many more part-time jobs. Given the Reef’s asset value of at least $56 billion, this project will bring enduring and significant social and economic benefit to regional Queensland communities.¹²

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10 See: Cunningham, S. (2019, June 3). An exploding creative economy shows innovation policy shouldn’t focus only on STEM. Retrieved from https://theconversation.com/an-exploding-creative-economy-shows-innovation-policy-shouldnt-focus-only-on-stem-93732
The Queensland Hydrogen Industry Strategy provides strong opportunities for job and industry creation in regional areas. The QUT Institute for Future Environments work on the first production and export of ‘green hydrogen’ from Australia to Japan is a major step towards the development of a new sustainable fuel export market that has enormous potential to grow a substantial regional workforce.

4.3 Industrial biotechnology and biorefining

The commercial production of replacements for chemicals, plastics and fuels from bio-based feedstocks, using technology such as fermentation and thermochemical conversion, has been established globally. Fortunately, Australia has a distinct comparative advantage in biorefining due to our climate and the production of great volumes of biomass material from agricultural sectors that can be used as feedstocks in the production of high-value chemicals, plastics and fuels. With canny targeted industry-attraction investments, biorefineries in Australia are well positioned to generate significant regional jobs, economic growth and diversification. With outputs that can be used as inputs to domestic industries as well as generate export earnings on global commodity markets, they are well placed to turn liabilities such as agricultural refuse and waste textiles into domestic feedstocks and new revenue streams. Biorefinery industries can significantly add value to agricultural outputs, diversifying agricultural producers’ revenue base. The Queensland future tropical biorefinery industry holds great promise, with the capacity for seven new biorefineries, located mostly in regional areas, to increase gross state product by $20 billion over the next two decades and support more than 6,000 new jobs. QUT is currently working on a range of projects with industry partners to grow bio-based product industries and jobs across Australia. The following projects provide a snapshot of some of the research work underway.

QUT has undertaken extensive research focussed on the development, scale up, demonstration and economic assessment of industrial biotechnologies at the QUT-owned and operated Mackay Renewable Biocommodities Pilot Plant. This pilot scale research facility has been used to bridge the gap between laboratory research and commercial investment.

The Wastes to Profits project aims to improve business sustainability and capture a potential market opportunity in excess of $100 million per year for the livestock sector by converting wastes into valuable products. The four year project commenced in 2018 and brings together stakeholders from across Australia’s animal industries and technology, research and development providers to deliver advanced technologies to convert wastes from livestock production and municipal water treatment into fertilisers, feeds, chemicals, and energy products for use in agriculture. The research underpins work to create new business models for improved management of wastes, unlocking new revenue streams for Australia’s livestock industries. The Wastes to Profits project is supported by Meat and Livestock Australia and partners through funding from the Australian Government Department of Agriculture as part of its Rural R&D for Profit program.

The Biorefineries for Profit project seeks to develop technologies needed to convert Australian agricultural and forestry by-products into new value-added animal feeds, chemicals, and advanced fuels. Phase 1 of the project commenced in February 2016 and involved collaboration with a number of partners around Australia. The project successfully demonstrated laboratory-scale conversion of sugarcane bagasse and cotton gin trash into valuable animal feed ingredients, feed probiotics and fine chemicals. Phase 2 of the project is currently underway and will progress research towards commercialisation of these products, benefiting the agricultural industry, on-farm producers and regional communities. The Biorefineries for Profit project is supported by Sugar

Research Australia and partners through funding from the Australian Government Department of Agriculture as part of its Rural R&D for Profit program.

The Biogas from Sugarcane project aims to develop technologies for the extended integration of bioenergy into the sugarcane production and milling process, reducing costs and enhancing the energy efficiency in one of Australia’s largest agricultural production systems. This will be achieved through the utilisation of sugarcane harvest residues (trash) and surplus fibre from the milling process (bagasse) to produce biogas, then upgrading the biogas and associated digestate into transportation fuels and other energy products for use back in sugarcane production and processing. This project is a unique utilisation of two biomass conversion technologies to significantly improve the efficiency of biomass conversion for the production of high quality drop-in gas and liquid transport fuels. In doing so, the project will increase the number of jobs in regional communities while reducing input costs for the sector as well as its environmental burden.

QUT continues to develop and demonstrate technologies to enable the commercialisation and growth of agro-industry in Australia for economic development and job creation. QUT also recognises that engagement with industry, government and the wider community will enable projects to realise a real-world impact and contribute to delivering social, economic and environmental benefit. Through its engagement strategy, QUT has promoted participation of its biotechnology researchers in a wide range of forums to guide and support government policy and to promote engagement with industry, including sugar industry regional research seminars. QUT will endeavour to support Australia’s economic development through its continued interests in industrial biotechnology for the advancement of the agricultural industry technology capability and providing long-term viable economic solutions for producers. This work is now at the stage where Government involvement through targeted industry attraction investments will unlock significant value for rural and regional communities, through job creation, market diversification and income stabilisation.

5. Entrepreneurial methods of regional development

Underpinned by a mindset and a range of personal skills, attributes and behavioural and motivational capacities, a culture of entrepreneurship creates opportunities for individuals to develop and grow ventures, to lead change and to add value within any context, from for-profit business organisations to social impact ventures, education, health, public sector and community organisations. Entrepreneurship will contribute to regional outcomes by way of:

1. Entrepreneurship-related learning, teaching and research for regional jobs across all fields,

2. Entrepreneurship-related direct engagement with regional areas particularly engaging widely with regional players to deliver targeted activities (such as the regional projects QUT is conducting in partnership with the Massachusetts Institute of Technology (MIT) outlined below in Example 2) as well as high schools and other organisations, to inspire entrepreneurial action and build capability that could lead to new industries, new jobs and employment opportunities in the regions.

The forthcoming QUT strategic plan, Blueprint 6, identifies Creativity and Entrepreneurship as a core priority of the university, committing the institution to supporting students and staff to explore their creativity, build entrepreneurial mindsets, develop capabilities and identify entrepreneurial opportunities for individual careers and social and economic development. QUT will continue to lead in providing a vibrant and supportive entrepreneurial ecosystem for Queensland and Australia to help launch careers, businesses and new fields of endeavour.

For the past three years QUT has hosted the MIT Innovation and Entrepreneurship Bootcamp in partnership with MIT Bootcamps and Advance Queensland. The Bootcamp offers budding innovators, entrepreneurs and change-makers from across the nation and around the world an
intensive program to inspire their ideas and accelerate their projects. The Bootcamp’s focus changes year on year to meet Queensland’s needs: initially focusing on general Entrepreneurship, later iterations have explored ‘technology-enabled innovation for mining agriculture and the environment’ and ‘Innovation Everywhere’. Bootcamp participants meet with local Queensland entrepreneurs and innovators, experience the innovation facilities in Brisbane that have been established to support innovation and entrepreneurship (namely the State Government’s innovation hub, The Precinct and Brisbane City Council’s the Capital), as well as interact with MIT faculty and MIT Bootcamp alumni. Participants learned the skills critical to leading innovation in Queensland, including regional areas.

The MIT Regional Entrepreneurship Acceleration Program (MIT REAP) is an internationally recognised two-year practical program that provides opportunities for regions around the world to engage with MIT in an evidence-based, practical approach to strengthening innovation-driven entrepreneurial ecosystems. Team Queensland enrolled as a part of MIT REAP Cohort 5 in June 2017 and graduated in June 2019, with the team continuing to implement its identified initiatives. The team is represented by the Queensland Government, QUT, the University of Queensland, RedEye Apps (a startup), Blue Sky Ventures, Rio Tinto and the state Office of the Chief Entrepreneur.

Queensland is home to the nation’s most decentralised population, which makes it very important to ensure there are strong connections between entrepreneurs and other stakeholders around Queensland, as well as more broadly across Australia and internationally. Team Queensland is focused on accelerating Innovation Driven Entrepreneurs (IDEs) in Queensland’s key mining, agribusiness, and environment sectors to promote sustainable growth and overcome barriers to innovation and knowledge transfer. The team is focusing on developing and expanding local capacity to plug innovators and entrepreneurs directly into the ecosystem and support them to turn great ideas into commercial realities, to scale up and market globally. The team is currently implementing its must-win battle, which is to initiate sub-REAPs in regional Queensland to offer a new framework that can accelerate regional IDEs to deliver local jobs.

The concluding report outlines the array of initiatives to be delivered as well the process for the sub-REAPs that are being piloted in participating regions: Gladstone, Mackay and Toowoomba. The aim is to pilot a process to educate and connect the key ecosystem stakeholders in these regions to identify a purpose that leverages their region’s comparative advantages. Sub-REAP teams will build intra-regional connections and state-based collaborations. The sub-REAPs embed the importance of transformation and change that is:

1. Led collectively and has all key players at the table (entrepreneurs, government, corporate, risk capital and universities) and
2. jointly owned and accountable for strategic interventions aligned to sub-regional comparative advantages in the context of the state’s strengths.

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6. Renewable energy transitions as substantial opportunities for the development of sustainable regional jobs

Universities have an important role to play in facilitating regional development. QUT is committed to working with regional communities, industry partners and government to generate sustainable, positive change.

6.1 Potential for short term and sustainable job creation and value of product

The cost, source and supply of energy is a headline issue in Australia, as is the related matter of climate change and other environmental impacts. Scientists have amassed unequivocal evidence that global transitioning of energy systems from fossil fuels (coal, gas, oil) to renewable energies as rapidly as possible is essential to limit global warming and thus protect human health and wellbeing, national security, economies and ways of life.18 Two key unequivocal messages based on substantial scientific evidence and modelling from the Climate Council’s Energy Communication Guide 2018 are: ‘renewable energy and energy storage is clean, affordable and reliable’ and ‘renewables and storage are powerful enough to generate electricity to supply the National Energy Market non-stop or 24/7’.19 With energy transition an absolute imperative, new clean energy sources are now among the most backable of all emerging technologies. Renewable energy developments clearly top the list of win-win opportunities for creating regional jobs that bring positive environmental, health, social, emotional and economic wellbeing consequences.

It is clear that in real terms current policy will not enable Australia to deliver on our international emissions reduction commitments under the United Nations’ Paris Agreement.20 In response to this trajectory, the Australian Energy Market Operator (AEMO) modelled a ‘Fast Transition’ scenario in late 2018. This scenario aimed to produce 42,895 megawatts of new renewable energy capacity in Australia by 2029/2030 – shifting reliance on renewables to 53% and reducing fossil fuels’ reliance to 47%—to reach a zero carbon grid no later than 2050. The Australia Institute utilised data from four existing estimates of renewable energy employment under AEMO’s ‘Fast Scenario’, and examined additional estimates that take into consideration maximised potential for domestic manufacturing, assembly, battery storage and distributed energy opportunities.21 This research identified that between 18,535 and 58,554 jobs per year would be created up to 2029/30 under the ‘Fast Scenario’. Furthermore, the research estimated that between 7,368 and 12,536 jobs would be required for ongoing operations and maintenance thereafter. These labour volumes would presumably increase in concert with greater numbers of large scale installations occasioned by population growth and industrial development.

In mid-August 2019, the AEMO released an even more powerful ‘Step Change’ shift to renewable energies.22 The ‘Step Change’ scenario is not only feasible, but also provides reasonable certainty in helping Australia to meet and exceed its commitment to emissions reduction, with Australia achieving its ‘fair share’ in line with the Paris Agreement's hopes to limit warming to 1.5°C.

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Although no job volume modelling has been done in relation to the ‘Step Change’ scenario, the elevated ambition within this model suggests that higher employment numbers would be required to meet these objectives. While these transitions will require investment in the short term, costs would be dwarfed when compared to the savings made by avoiding the very substantial health, social and economic losses that would result from failing to prevent catastrophic global warming. Recovery of investment at household and large installation level would be rapid, as the cost of energy generated by the new renewable infrastructures becomes increasingly cheaper than the price of energy generated by gas and coal.

6.2 Opportunities for community level gain at rural and regional areas

We consider the development of renewable energy industries to represent a very significant opportunity for regional employment and sustainable economic growth. Given the space-intensive nature of such industries, coupled with an increasing need to diversify regional economies, these emerging industries offer a central means to create new businesses in regional communities, and thus new, and importantly, stable job opportunities. Local innovation, skills, expertise and capabilities are built through renewable energy initiatives in the regions. There are also several examples in Victoria and New South Wales, such as Goorambat Solar Farm and Lismore Community Solar Farm, that demonstrate how the development of such industries regionally can be community-led and -owned. These substantial economic and community benefits of renewable energy initiatives in the regions have the potential to offset or invert current challenges experienced by many regional and rural communities, including population decline, a lack of viable options for older residents wishing to remain in place, and the essential need to provide younger residents with pathways to either stay rurally, or relocate to regional areas.

It is worth noting, however, that a sizeable portion of the present opportunity afforded by moving into regional renewable energy production is time-limited, as both global first-mover advantage and the domestic establishment of secondary industrial development near cheap and reliable energy sources will reduce the (still positive) dividend expected from these investments in the future.

6.3 Multiple benefits of renewable energy developments to environment, health and wellbeing

The transition from coal and gas mining operations to wind and solar installations also carries substantial local health gains for communities currently living with the emissions from thermal power stations. Renewable energies generate substantially less air pollution and harbour less risk of water quality disturbances. Solar and wind energy installations, whether on rooftops or across fields, do not consume or generate waste and disperse particulate matter and other potentially toxic chemicals into the air or water as can occur in coal, gas and oil developments. Problems with power lines may be addressed by advances in storage and transport. Local installations do not require the long-distance pipelines, compressor stations and flaring that

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accompany gas developments, nor, once installed, the heavy trucking or rail transport necessary for coal and gas. While not completely free of environmental impacts, the difference in health and environmental risks and impacts between solar and wind versus coal and gas power generation dwarf the highly vaunted differences between coal and gas generation.

6.4 Future potential for Australian exports when renewable energy storage and transport options become fully on line

To date, most attention to renewable energies has focused on meeting domestic energy demands. However, new technologies in storage and transport that will revolutionise future global energy systems are being rapidly developed. With Australia’s expansive solar and wind potential, we have the opportunity to lead in this area and secure serious employment opportunities, most of the future action will be in the regions, in clean energy production, supply (with affiliated local industrial development) and export. This prospect presents a bright future for regional Australia if we are willing to acknowledge the imperatives dictated by both the science and global markets, and embrace the future. But this opportunity will be missed if we do not start positioning ourselves now.