



Hunter Energy Transition Alliance
Blueprint Report
July 2016



Foreword



Since 1837, AGL has been providing energy solutions for Australians. In that time we have seen new advances in technology that have transformed how we provide energy for our community. Recent advances are accelerating the rate of transformation as our business moves to a low carbon generation mix while developing a digital experience for our customers that is unsurpassed.

As our generation mix and the broader economy de-carbonise, the technical, financial and energy system challenges are immense and will drive fundamental changes in the national policy and regulatory settings, business models and services delivered by our sector. Equally important though, are the challenges our workforce will face, and the impacts on our local communities.

The Hunter Valley's prosperity has historically arisen due to the abundant coal deposits which have created a global resources powerhouse and underpinned secure electricity generation in New South Wales for much of the twentieth century.

The transition of the energy sector to lower-carbon forms of power generation is likely to have concentrated impacts on the communities where coal power stations and related mining activity are based.

Consistent with our Greenhouse Gas Policy, AGL has announced closure dates for the Liddell and Bayswater power stations of 2022 and 2035 respectively. These closures will potentially cause significant economic impacts on local communities.

It is AGL's view that with the right collaborative structures in place, the Hunter Region can successfully transition its economy from being reliant on resources to one based on innovation and the production of advanced goods and services.

The Hunter region has the opportunity to play a key role in the emerging energy technologies and services sector for the benefit of New South Wales and Australia more broadly. This is why we have established the Hunter Energy Transition Alliance bringing together peak regional stakeholders to prepare for and enable the best pre-conditions for future growth, diversification and prosperity.

AGL is committed to seeing our communities and customers thrive in the new energy future.

The Hunter Energy Transition Alliance is our contribution to the economic leadership required in any successful economic transition. We are confident that with strong collaboration from stakeholders in our workforce, in government and across industry, the Hunter will thrive as Australia adopts the energy systems of tomorrow.

Doug Jackson
Executive General Manager – Group Operations
AGL Energy Limited

Foreword



This report represents an important milestone for the Hunter. Not only for its potential to support the diversification goals of this region but also as a model for the transformation of resource intensive regions around Australia.

Here, along with the shared commitment of industry, government and the research community we have the opportunity to deliver tangible pathways for growth into the region.

This is not a new concept, there are many international models where the development of a sound innovation platform acts as a driver for economic growth and as a drawcard for innovative companies looking to relocate or diversify. Fostering an innovation ecosystem adds capacity for existing industries and becomes an enabler for the new.

The Hunter Energy Transition Alliance recognises the region will continue to be a magnet for industry with its significant suite of investment ready qualities. The Hunter Energy Transition Alliance aims to build on the existing strengths of the Hunter as a driver for economic activity and inject new emerging technologies and research infrastructure into the mix.

Hosted by the University of Newcastle, the NSW Energy and Resources Knowledge Hub supports the objectives of the Hunter Energy Transition Alliance, linking industry partners and leading researchers in key areas of energy, resources, land, water and intensive agribusiness. Industry engaged research and training has a major role to play in regional economic transition and there is much to leverage when research intensive universities are embedded in regional areas.

The NSW Energy and Resources Knowledge Hub was established as a NSW Government initiative to capture opportunities for growth, collaboration and innovation. As a major project under this program, we welcome the commitment and partnership of AGL and the regional stakeholders that make up the Alliance, in the shared goal to grow and highlight the unique duality of the Hunter region as both a resource and innovation rich site for economic activity.

Alan Broadfoot
Director, NSW Energy and Resources Knowledge Hub
Director, Newcastle Institute for Energy and Resources, University of Newcastle

Executive Summary

Australia's electricity sector is undergoing a period of transformation with the growth of renewable energy sources, emission reduction policies and consumers gaining more control of their energy usage. This transformation is likely to present both impact and opportunity for regions like the Hunter Valley NSW.

As part of AGL's commitment to decarbonise its generation fleet, Liddell Power Station will close by 2022 and Bayswater Power Station by 2035 – these power stations directly employ approximately 650 people and hundreds more contractors and specialists in the Hunter Valley.

AGL has identified the potential for industry, the community and government to work together to harness opportunities presented by the transition of Australia's electricity system, seeking to contribute to new economic opportunities and prosperity for the Hunter Valley, for example in new energy technologies, agriculture and manufacturing.

It was recognised by Alliance forum participants that this transition will take place alongside other industry changes impacting the region. Rapid change in land-use has created particular stresses on the provision of infrastructure and services because of the heightened need to 'bring forward' substantial infrastructure to service the growth against the background of a static rural rating base. In addition, the growth of mining has impacted and will further impact upon the diversity of the regional economy. A dependence on coal mining exposes the local economy to fluctuations in the international price of thermal coal, as has become increasingly evident over the past financial year.

The Hunter Energy Transition Alliance was established as a partnership between AGL and the NSW Energy and Resources Knowledge Hub to take advantage of innovation growth in the energy sector and deliver on the ground activity to foster diversification in the Hunter. While this project is focused on the Hunter, the aspiration of the Alliance is to deliver a model of regional development that places innovation as a key element for regional economies across the nation.

In early discussions with AGL, there was significant interest for what innovation driven initiatives can do for regional areas. Participants of the Alliance reflected on the transformation of Sheffield in the UK as a model of regional economic change. Based on the taskforce approach adopted in Sheffield, the Alliance recommends the establishment of a collaborative agreement between AGL, the Hunter Energy Transition Alliance, the University of Newcastle and the NSW and Commonwealth Government.

A strong consortia of regional stakeholders was engaged to drive the process and inform the Alliance on ways forward. This report captures the process, stakeholder input and recommendations of the Hunter Energy Transition Alliance. It is the beginning of a long-term project that aims to contribute to the growth of the Hunter into an economically diverse, innovation rich region.

The Alliance acknowledges the long-term work already underway by the NSW and Local Government bodies in developing diversification initiatives and stakeholder projects. The Alliance does not intend to replicate these initiatives. Rather, its aim is to establish on the ground projects that will leverage the assets of AGL to attract innovation rich investment into the region. It is a significant action agenda within the broader regional development initiatives underway in the Hunter. The Alliance was established in late 2015 and held its first forum of government, industry and community representatives in January 2016. A second forum was held in July 2016 to focus on some priority areas for action. Participants are detailed in the appendix to this document.

The January forum provided the opportunity to establish a dialogue with key regional participants and to outline the aspiration and potential of the Alliance initiative. It gave participants the opportunity to canvas a broad perspective of issues and regional challenges and provided a forum to capture genuine consensus and ideas for change. The initiative was welcomed by Hunter stakeholders.

At the January meeting, Alliance participants acknowledged two linked streams for consideration:

- > The immediate impact of workplace transition (employment and retraining)
- > The longer-term opportunity for industry investment and economic potential for the region with the re-use of the AGL infrastructure/sites.

AGL is committed to addressing the first stream and working within the organisation to deliver pathway programs for workplace transition. It was then considered a valuable exercise for the Alliance as a consortia of regional stakeholders to focus on the longer term opportunities to leverage AGL assets and partnerships to help attract investment and economic diversification into the region. Participants acknowledged the investment strengths of the Hunter as:

- > Close proximity to international markets through port and freight infrastructure
- > A diverse range of soil types suitable for a broad range of industries
- > Excellent water resources and rainfall reliability
- > Close proximity to a large and reliable energy source
- > A skilled workforce and access to excellent research support and infrastructure
- > An existing and diverse number of enterprises with a proven track record of success.

Following this preliminary forum, the Alliance secretariat worked with AGL on the prioritisation of tangible initiatives to put forward at a forum held on 21 July 2016. This forum aimed to ensure the goals and objectives of all stakeholders were aligned to the priorities put forward for action by the Alliance.

Energy security was an area of policy concern raised by participants and this was discussed at some length. Throughout the discussion at

this forum, it was clear that the objectives and focus areas of the Alliance were shared by all stakeholders. Innovation, land-use and the potential to leverage infrastructure and resources emerged as focus areas.

At this Forum, AGL reinforced its commitment, noting that apart from the broader objectives of economic transition, there may be more direct contributions their business can make to this community through opportunities associated with their water entitlement, access to diverse buffer lands and the potential to attract energy intensive industries located close to energy and water resources.

The July forum focused in on four key areas for discussion and action:

- > AGL's water allocation
- > Innovative land-use for the AGL buffer land
- > New energy innovation (including industry engaged research activity)
- > Agribusiness innovation and diversification.

These focus areas are detailed within this report alongside recommendations for action including the establishment of technical working groups for each focus area, a site inspection of the AGL buffer lands for prospective industries and an expression of interest for two parcels of AGL buffer land.

This report also outlines the aligned and parallel activity underway by the University of Newcastle's Institute for Energy and Resources to establish a Hunter Innovation Precinct in partnership with Muswellbrook Shire Council. The University of Newcastle is committed to delivering industry engaged research and educational support that will lead to regional prosperity and sustainable growth. The University acknowledges it has the opportunity to play a significant role in partnership with government, community and industry to shape the future of this region.

ACTIONS AND RECOMMENDATIONS

- > Focus on water, land, energy and agribusiness
- > AGL site visit for stakeholders and interested industry proponents: Use of buffer lands
- > Distribution of expression of interest for two parcels of land on AGL's buffer
- > High level collaborative, innovation focused agreement between AGL, the Hunter Energy Transition Alliance, the University of Newcastle and the NSW and Commonwealth Governments.

Background and Context

Development of the Alliance Blueprint and Engagement

AGL ENERGY OPERATIONS AND TRANSITION IMPERATIVE

AGL is one of Australia's leading integrated energy companies and draws on over 175 years of experience, serving its customers throughout eastern Australia with meeting their energy requirements. AGL has a diverse power generation portfolio including base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources including hydro, wind, solar, landfill gas and biomass. AGL also invests in and operates natural gas production tenements and natural gas storage facilities.

As Australia's largest energy generator, AGL has a key role to play in gradually reducing emissions while continuing to provide secure and affordable electricity for around 3.7 million customers.

The Commonwealth Government has committed to work towards a global agreement that limits global warming to less than 2 degrees Celsius above pre-industrial levels. AGL supports the Commonwealth's commitment and has taken the lead on this issue by releasing a revised Greenhouse Gas Policy.

AGL's policy acknowledges the move into a carbon constrained future, both nationally and internationally, and therefore it provides a pathway for the gradual decarbonisation of its generation portfolio by 2050.

This measured process of decarbonisation states that AGL will:

- > Continue to provide the market with safe, reliable, affordable and sustainable energy options
- > Not build, finance or acquire new conventional coal-fired power stations in Australia (i.e. without carbon capture and storage)
- > Not extend the operating life of any of its existing coal-fired power stations
- > Close, by 2050, all existing coal-fired power stations in its portfolio
- > Improve the greenhouse gas efficiency of its operations, and those over which it has influence
- > Continue to invest in new renewable and near-zero emission technologies
- > Make available innovative and cost-effective solutions for its customers, such as distributed renewable generation, battery storage, and demand management solutions
- > Incorporate a forecast of future carbon pricing in to all generation capital expenditure decisions
- > Continue to be an advocate for effective long-term government policy to reduce Australia's emissions in a manner that is consistent with the long term interests of consumers and investors.

Australia currently relies significantly on coal and gas to power its homes and industries, with 88 percent of electricity produced from fossil fuels. AGL's existing portfolio of generation assets are therefore central to its ability to meet customer demand, and to managing the transition to a carbon constrained or low carbon future.

PRINCIPLES OF ENGAGEMENT TOWARD A DECARBONISED FUTURE

As part of AGL's decarbonisation commitment, Liddell Power Station will close in 2022 followed by Bayswater Power Station in 2035. AGL recognises these assets are significant contributors to economic activity and employment in the Hunter region. It is committed to ensuring its operations and activities are conducted in ways that demonstrate and contribute sustainable benefits to the communities in which it operates through social, environmental, ethical and economic considerations.

As these two assets close, AGL endeavour to continue its engagement as part of Hunter Energy Transition Alliance to minimise negative impact on the region, build trust, deliver value, influence sustainable outcomes and support the development of new opportunities of growth for the Hunter community.

AGL and the Alliance strive to exceed the standard principles of stakeholder engagement.

PARTNERSHIP

AGL ENERGY AND NSW ENERGY & RESOURCES KNOWLEDGE HUB

The Hunter region has developed as a centre for innovation in the energy technology sector due to the importance both power generation and coal have within the region. AGL is conscious it must collaborate with government, industry, and research and educational institutions to result in an aligned and informed strategy as the region diversifies and transitions to new markets.

The NSW Energy and Resources Knowledge Hub is a networked platform for the energy and resources sector to capture opportunities for growth, development, collaboration and innovation. In conjunction with the NSW Government and the University of Newcastle, the Knowledge Hub is focused on strong links between research and business.

AGL recognises there are likely to be far greater opportunities for the Hunter region if industry collaborates with research and development, educational and training institutions and their partners.

The Sheffield Model is an example of the benefits that can be created for regions through collaboration. The Sheffield Advance Manufacturing Park was built on the site of former coal mines in Sheffield, England. Around 100 innovative companies including Boeing, Rolls-Royce and Hitachi have come together in conjunction with the University of Sheffield and with the support of the European Regional Diversification Fund. This innovation hub now provides jobs, apprenticeships and economic stimulus for a region that was traditionally dependent on thermal generation. This model is an aspirational benchmark for the Hunter Energy Transition Alliance.

If the Hunter Energy Transition Alliance has the support of all stakeholders including government, research and education, it is more likely that businesses, industry associations, environmental and community groups will invest in the process and deliver tangible outcomes.

HUNTER ENERGY TRANSITION ALLIANCE STRATEGY AND OBJECTIVES

While the short term priorities for AGL and the NSW Energy and Research Knowledge Hub have been to identify key businesses, industry association groups, organised labour organisations and key government stakeholders, the formation of the Alliance has ignited several initiatives within the local region. For example, the relocation of industry funded research projects led by the Newcastle Institute for Energy and Resources and the NSW Energy and Resources Knowledge Hub to a new innovation precinct in Muswellbrook. These initiatives are outlined in further detail in the action agenda section of this document.

The initial project objectives and outcomes as outlined within the NSW Energy and Resources Knowledge Hub's Project Proposal included:

- > Formation of an Energy Transition Alliance for the Hunter Valley to work as part of the NSW Energy and Resources Knowledge Hub
- > The facilitation of an industry/community consultation session where the Alliance can consult with Hunter representatives to explore options for long-term and sustainable investment in the region
- > The development of a report that outlines options for industry investment in the Hunter Valley region, addressing the priority of transitioning jobs post coal power generation and harnessing the opportunities from innovation in the energy industry and enable benefits (through investment and job creation) to the Hunter region.

These objectives have been delivered.

CONSULTATION AND COORDINATION

The Alliance workshops and numerous meetings held with key stakeholders including industry and community groups, local and state government have identified key areas of priority that will be outlined in detail in the section below.

While the Alliance is focused on immediate priority areas within its control and direction, a key consideration is to reduce duplication of what is ongoing within other fora across the Hunter region. Where there is alignment of other regional activities, it is the preference of the Alliance that technical stakeholders would participate in these studies and programs of work contributing to key regional plans.

The NSW Government is examining future opportunities for industry in the Upper Hunter in the context of a changing industry environment. The Upper Hunter Scenarios Project has sought to collaborate with industry experts and leaders together to establish an industry context for future development with particular reference to urban planning and zoning; water security and sharing; and agribusiness development at the conclusion of coal mining and power industries restructuring.

AGL believes it is important that government policy incentivise investment in lower-emitting technology while at the same time ensuring that older, less efficient coal-fired power stations are removed from Australia's energy mix in an orderly manner. Decarbonisation and modernisation of Australia's electricity system are important goals requiring effective policy.

Action Agenda

WATER – A VALUABLE RESOURCE FOR THE HUNTER

With an approximate 25% share of the licenced water resource for the Hunter, AGL recognises the need for research to plan future options for potential surplus water allocations. AGL water is primarily used for power generation. Water is managed by AGL at Liddell and Bayswater with a fully integrated system of storage dams that include Lake Liddell, reticulation, water treatment plant and water conservation infrastructure. Water management infrastructure provides the flexibility suitable to support multiple future industries with various water quality requirements. Water security is strengthened by AGL's Barnard River Scheme, an inter-basin water transfer system at the head of the Hunter Catchment, which is used to transfer water from the Barnard River in the upper Manning River catchment over the Mount Royal Range into the Hunter River. AGL undertakes a comprehensive monitoring program across its water management system. There is a large dataset on water use and water quality, climate and broader catchment. This is a highly valuable resource for operational planning and for developing strategies and technologies to increase future water use efficiency and value-add industries.

Alliance forum participants noted the following for consideration:

- > Water management research should take into consideration work underway with the Upper Hunter Water Security Project
- > Potential opportunities to enhance existing industries including mining, agriculture manufacturing and new energy generation
- > Potential opportunities for contributing to urban/rural community water supply
- > High security water for attracting new industry investment
- > Research to enhance water use efficiency including water recycling and waste water treatment
- > Connectivity of water should be an important consideration across all areas of priority identified by the Alliance.



Action Agenda

NEW ENERGY INNOVATION

Energy technologies are a focus area for AGL, and reinforced by the implementation of a new energy business within the organisation to respond to new markets in areas such as metering, solar, storage and electric vehicles. AGL has partnered with GE in a significant microgrid project with pilot projects across Australia. One of these pilots could be established in the region which will add quantum to the momentum and appetite for new energy projects locally. It was identified by the Alliance that innovative businesses should be invited to invest in the Hunter and potentially on AGL buffer land.

Large scale utility battery storage was flagged as a potential area to target. The development of an energy technologies, equipment and services sector for NSW is an objective of the NSW Government which is reflected in the establishment of the NSW Energy and Resources Knowledge Hub. The significant and immediate opportunities presented by AGL's energy infrastructure in the Hunter make this an obvious area for focus. There is also a highly skilled Mining Equipment Technology Services (METS) sector in NSW that is innovative with the capacity to diversify into new energy markets.

Alliance forum participants noted the following for consideration:

- > There are already new energy projects underway in the region with jobs being created
- > Immediate potential and interest in waste to energy
- > Alignment with energy innovation underway at the Newcastle Institute for Energy and Resources
- > Capacity to share knowledge across the industry through the NSW Energy and Resources Knowledge Hub
- > Significant transport, land access and energy infrastructure in the Hunter
- > Skilled workforce
- > Market appetite for new energy technologies
- > Significant opportunity in the Hunter related to bio-energy
- > Energy connection is a large barrier to renewables investment. This is a significant point of difference in the Hunter where the infrastructure and network connection is solid. Transgrid has published where there is capacity and investors are flocking to those areas
- > NSW Minister for Energy and Resources has released Network Opportunity Maps, developed by the Institute for Sustainable Futures at the University of Technology, Sydney to show the capacity of the network. The Alliance should incorporate some of that data in discussions with industry
- > Further research and development of components to run more efficient wind turbines, solar PV panels, inverters
- > Utility-scale energy storage utilising existing transmission infrastructure.



Action Agenda

LAND USE OPPORTUNITIES - AGL BUFFER LANDS

AGL has 10,000 hectares of buffer lands. This is a valuable resource that can make a significant contribution to the innovation and diversification objectives of the region. Intensive agriculture and new energy was suggested as key use for this land. AGL is currently working through regulatory and land-use factors for use of this land. While this process is underway, AGL has identified two parcels of land for use in the short-term. An expression of interest process will be initiated inviting innovative industries to join what will be a rich cluster of smart enterprises.

Alliance forum participants noted the following for consideration:

- > Need for heightened planning considerations for land-use regulation and zoning (more consideration for industries targeted to match geography, soil, water and energy offerings) rather than a blanket approach to agricultural zoning
- > Look at the planning considerations of successfully co-located industries (i.e. viticulture and equine in the Hunter)
- > Local government could contribute and work with planning to introduce sub-categories with different rate incentives for different land uses
- > There is a need to consider land use ability and land use capability – there can be multiple land uses on one patch of ground and this has been overlooked in policy – if an operation has a grazing license then they can graze and nothing else
- > There needs to be a new and vibrant way of government working with industry and the research community to look closely at this mixed use opportunity
- > There is great opportunity in bio-energy with increasing requests to the NSW Division of Resources and Energy for use of buffer lands for feedstock.



Action Agenda

OPPORTUNITIES FOR AGRIBUSINESS AND INNOVATION

The process of consultation conducted by the Alliance has identified agribusiness as a key growth area for the region. In order to provide an immediate impact into the regions' diversification, the Alliance has focused on agricultural models of industrial innovation such as the poultry industry. This will provide the initial platform towards a future broadening to other industry groups.

The Alliance is interested in promoting and encouraging industries onto AGL buffer lands who meet an innovation criteria based on carbon neutral, or positive practices, water and energy efficiency, and waste management. This criterion will be refined by the technical working groups recommended in the next stage of Alliance activity.

It is important to note that the areas highlighted for priority by the Alliance (water, land, energy) are all linked. Agriculture will increasingly be coupled with smart energy integration to unlock the efficiencies and productivity required to meet food security challenges. As demand increases for agricultural products, so do the challenges associated with energy, productivity, land-use and the cost of production.

There is also a strong diversification appetite within the NSW METS sector into high efficiency, smart

technology development for agricultural production. Mining is a major employer in the NSW economy with the METS sector employing over 40,000 people in NSW. Newcastle and the Hunter Region have a strong historical connection to the sector. NSW based METS businesses have the opportunity to diversify their products and services (via technology development) toward high-efficiency, highly productive agriculture and this sector has the technical capability to diversify into the agricultural sector particularly in the area of bulk materials handling, energy technologies, processing and water management.

Some of the ideas captured by forum participants include:

- > There are clear advantages for agriculture in the Hunter particularly through access to buffer lands, water and energy
- > Agribusiness could be a significant provider of new jobs to the region
- > The increase of agricultural output to leverage increased demand from export markets
- > EOI process for use of AGL buffer land welcomed as a priority for on the ground action
- > This Alliance has the opportunity to create impact with practical solutions.



Next Steps

FORMATION OF A COLLABORATIVE FORMAL STRUCTURE FOR THE HUNTER ENERGY TRANSITION ALLIANCE AS A STEERING COMMITTEE WITH SEVERAL TECHNICAL WORKING GROUPS.

Alliance forum participants noted the following for consideration:

- > Funding was raised as a concern for participants keen to capture the momentum of Alliance activity – there is a lot of planning underway with no resources to match
- > Alliance steering committee to workshop funding options
- > Take the Alliance initiative to a Commonwealth level as a model of regional innovation led transition
- > Muswellbrook Shire Council has committed \$10 million for innovation based initiatives if matched by State or Commonwealth governments
- > NSW Government interested in participating in technical working groups
- > There is enormous capability the Alliance can bring to the working groups
- > Needs to be a mechanism for existing regional industries to participate in the Alliance – a working group based around capacity building (adapting to new markets) for existing industry was suggested.

AGL SITE TOUR

As part of the next stage of Alliance activity, AGL will invite interested participants to an interactive hands-on site tour through Liddell and Bayswater. This will provide the opportunity to see the technical aspects of the hydro, water allocations and energy assets. This will also include a site tour of the AGL buffer lands, looking at the quality of the land, its significant infrastructure and proximity to transport. A date will be announced and further detail provided in the coming weeks.

HUNTER REGION INNOVATION PRECINCT

On 8 August 2016, the University of Newcastle and Muswellbrook Shire Council will announce the establishment of the Hunter Region Innovation Precinct. This announcement follows a significant period of engagement between the University and Council. This engagement and subsequent investment by the University is a direct outcome of the Hunter Energy Transition Alliance. The NSW Government has also contributed funding towards an innovation hub to boost SME engagement with the research sector as part of this hub.

Over the past two years, the core themes within the Newcastle Institute of Energy and Resources at the University of Newcastle have been influenced by a consistent push from industry and government towards an expansion of research across energy and resources, land and water. There are several factors driving the agricultural research expansion with lead researchers in resources engineering, energy technologies and environmental remediation diversifying their research program into land use management, soil productivity, water management, climate adaptation, energy efficiency for the agribusiness sector, precision or high efficiency agriculture and social sustainability. Externally, it is becoming obvious that multinational agribusiness companies are also intersecting with products and services associated with energy, land and water.

The 'resources' within the mandate of the Newcastle Institute of Energy and Resources has expanded to include those valuable and critical resources - water and soil. This is supplemented with a focus on smart energy integration to unlock the efficiencies and productivity required to meet food security challenges. As demand increases for agricultural products, so do the challenges associated with energy, productivity, land-use and the cost of production. One of the key research areas within Newcastle Institute of Energy and Resources is the International Centre for Balanced Land Use (ICBLU), a joint initiative between the NSW Government (NSW Department of Primary Industries and Division of Resources and Energy) and the University of Newcastle.

This centre has a mandate to increase engagement with key regional areas through the development of industry engaged pilot demonstration to build capacity and establish 'regional clusters' of concentrated research based land use activity. The potential scope of this engagement is broad enough to encompass expertise in integrated land-use planning, soil productivity, water, precision agriculture, automation, energy efficiency and utilisation, land remediation and rehabilitation. While the Hunter is the focal point and logical node for this embedded model of regional engagement, this is a model that can serve as an exemplar of regional economic diversification and research excellence. It will also generate nodes and research activity elsewhere in NSW and internationally.

Muswellbrook Shire and Singleton Councils have developed strategies and programs to diversify economic activity in the region. Muswellbrook Shire Council have recently released their operational plan 2016/17 that includes a commitment towards a specific fund for jobs growth in areas of priority including renewable energy, education and agricultural innovation. At a practical level this involves partnering with researchers and industry participants to attract demonstration scale new technologies to Muswellbrook, building on the skilled workforce and traditional industry markets, yet extending to new training and jobs opportunities. Over the past few years, Muswellbrook Shire Council has embarked on a capital works program to boost education infrastructure in the city. Following a successful 'Resources for Regions' bid, Muswellbrook Shire Council recently completed a new Tertiary Education Centre. The University of Newcastle will occupy a significant area of this space for the following projects in near future:

- > Research focusing on the 'Tailings to Topsoil - Direct Tailings Emplacement Technology' project in partnership with Muswellbrook Shire Council, the University of South Australia's Agricultural Machinery Research and Design Centre, Jord International and University of Newcastle's Global Centre for Environmental Remediation (GCER). This project is based on the direct emplacement of tailings to develop productive agricultural soil.
- > Increased opportunities for the location of research staff and students of environmental remediation in sites of market need. Closer to the field and industry partners and with a focus on the rehabilitation of mining disturbed land.
- > The attraction of pilot demonstration projects aligned with research students/staff and industry participants to create a cluster of intensive research activity to drive momentum and attract like businesses and innovative companies.
- > The attraction of water resources studies and water treatment technologies.

All of these projects provide solutions to raising regional productivity, economic and skills diversification and regional prosperity. The practical benefits of locating applied research into a regional area may translate into opportunities to assess policy, community change and educational strategy. This provides real-world opportunity for inter-disciplinary research that bridges multiple industries, land-use and stakeholders.

ESTABLISH A FORMAL AGREEMENT BETWEEN STAKEHOLDER GROUPS

Success for the Alliance will demand collaborative effort. The Alliance recommends a joint agreement between AGL, the University of Newcastle's Institute for Energy and Resources, the Hunter Energy Transition Alliance, the NSW Government and the Commonwealth. If managed and resourced accordingly, this is an initiative that could represent a benchmark model of regional industrial transition.

As it moves forward, the Alliance will work together to engage with the NSW and Commonwealth Governments to raise awareness of its innovation led diversification efforts in the region. There is already the aspiration, framework and stakeholders engaged in the process however moving forward this will require increased focus from all levels of Government.

ACKNOWLEDGMENTS

The Hunter Energy Transition Alliance, AGL Energy Limited and the NSW Energy and Resources Knowledge Hub would like to thank all participants of the Alliance foras (outlined in the appendix). The Alliance acknowledges support for the first stage of this initiative from the NSW Government's Knowledge Hub program.

Appendix

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