

AGRICULTURAL INNOVATION

University of Newcastle Submission to the House of Representatives Standing Committee on Agriculture and Industry



The University of Newcastle (UON) welcomes the opportunity to respond to the House of Representatives Standing Committee on Agriculture and Industry – *Agricultural Innovation* – and the role of technology in increasing agricultural productivity in Australia.

Addressing the Terms of Reference, UON makes the following comment:

1. Improvements in the efficiency of agricultural practices due to new technology, and the scope for further improvements
2. Emerging technology relevant to the agricultural sector, in areas including but not limited to telecommunications, remote monitoring and drones, plant genomics, and agricultural chemicals

The University of Newcastle's (UON) Newcastle Institute for Energy and Resources (NIER) has developed priority areas of research in response to industry demand and analysis of external markets and environments. This research platform has traditionally included:

- Resources Productivity and Efficiency;
- Smart Energy Integration;
- Advanced Materials for Energy Technologies;
- Energy Technologies and Utilisation; and
- Balanced Land Use and Social Sustainability.

Over the past two years, these core themes have been influenced by a consistent push from industry and government partners towards an increased expansion of research into high efficiency agriculture. There are several factors driving the agricultural research expansion at UON with our leading 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.

Increased industry and government focus on land use management, soil productivity and water security

UON recently appointed a Global Innovation Chair in the International Centre for Balanced Land Use. This Centre focuses on interdisciplinary research to create new opportunities for the co-existence of high efficiency agriculture, energy and mineral resources industries. The outcomes address rural and regional development, community engagement and environmental sustainability. The Centre is an initiative between the NSW Government (NSW Trade and Investment's Department of Primary Industries and Division of Resources and Energy) and UON.

The program aims to develop:

- Strategies to optimise the co-existence of industries in rural and regional landscapes,
- Technology to assess and mitigate the cumulative impacts of multiple industrial developments on air, land, soil and water resources;

- Enhanced models for community participation in decisions about land use, coexistence and the sustainability of critical regional industries;
- Technologies and systems required to rehabilitate land post mining to highly productive agricultural use;
- Technology development to improve water use efficiency in mining and agriculture
- Unlocking the agricultural potential in high-value urban and regional land through remediation and rehabilitation; and
- Innovative remediation methods for contaminated soil and groundwater.

NSW Government economic development framework

In 2014, the NSW Government identified an emerging opportunity for an energy technologies and services sector based as a specialised ‘hub’ in NSW with links across the nation and internationally. The establishment of the NSW Energy Innovation Knowledge Hub (hosted by NIER) is a strategic approach to attract investment and foster increased economic activity in the state. The growing demand for new energy technologies and efficiencies provides NSW with an opportunity for the development of innovative businesses in energy services and agriculture to help manage the rising costs and decreasing productivity witnessed over the past decade.

Hunter Energy Transition Alliance

Australia’s electricity sector is undergoing a period of transformation with the growth of renewable energy sources, emissions reduction policies and consumers gaining more control of their energy usage. This transformation is likely to present both impact and opportunity for communities like the Hunter Valley in NSW. AGL Energy Ltd is committed to facilitating the establishment of an Alliance of industry and community partners to help identify future jobs and opportunities for new energy investment, and skills development for the region. Agricultural Innovation has been identified as a focus area for the Alliance who is developing an industry investment report to inform strategy as the region diversifies and transitions to new markets.

Addressing Growing Demand and Productivity: Energy challenges and opportunities for Australian Agribusiness

There is a global challenge to meet an expanding demand for agricultural products from a finite, and diminishing land resource. The challenge is to produce more food from less resources to feed the increasing world population. In order to meet this challenge and also remain competitive and to fully embrace the opportunities emerging in the global market, the Australian agribusiness sector is actively seeking innovations that optimise energy efficiency and the energy intensity of food production. This is a core theme with the UON’s Priority Research Centre for Energy Technologies and Utilisation. Challenges for the sector include:

- Effective management of resources (soil, water, energy) for sustainable food production;
- The need to develop a skilled workforce capable of tackling energy related challenges;
- The reliance on energy intensive technologies such as thermal processing; and
- Rising energy costs representing at least 20% and in some cases 50% of the total production costs of agricultural products in Australia.

The diversification appetite of a strong NSW Mining Equipment Technology and Services Sector (METS) 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. There is a growing momentum across NSW to diversify regional economies and focus on coexistence and opportunities for growth in innovative agribusinesses. NSW based METS businesses have the opportunity to diversify their products and services (via technology development) toward high-efficiency, highly productive agriculture.

Businesses operating within the METS sector have the technical capability to diversify into the agricultural sector particularly in the area of bulk materials handling, energy technologies, processing and water management. NIER, UON and our partners can also deliver key enabling capabilities to both inform and support sector growth in emerging technologies and services. For example, ICT capability is a critical element in the future development of both the METS and agricultural sector with opportunities to manage and exploit large datasets and to advance the smart manufacturing and high-tech technologies for control systems, communications and automation. The University has extensive capability in the Priority Research Centre for Complex Dynamic Systems and Control with a multidisciplinary team of electrical engineers, mathematicians and mechatronics experts, alongside the Priority Research Centre for Computer-Assisted Research Mathematics and its Applications.

3. Barriers to the adoption of emerging technology

SME engagement in the innovation cycle

UON welcomes the Federal Government's focus on SME engagement in the innovation cycle. The research agenda of NIER responds to priorities set by our industry partners and the industry representation on our governance board. In our experience, large-scale businesses are better equipped to support research and technology development initiatives both within the organisation and with collaborative partners. Over the past five years there has been a consistent focus on assisting SMEs with the innovation process. This focus might be best served with better understanding of the reality of SME capacity for large-scale research and development activity. There needs to be some weight attributed to strengthening supply chains and a refocus on the larger SMEs and Primes in this process (a model successfully adopted by the defence and mining sectors). This model could be transferred to the agricultural sector to accelerate SME involvement in the innovation cycle to boost agribusiness in Australia.

One of the critical issues facing R&D collaborative models is the funding gap between bench scale and theoretical research and full-scale demonstration. What tends to be overlooked in this process is the \$5-10 million generally required for pilot scale demonstration. Pilot scale demonstration is a critical step between bench-scale and full-scale demonstration and can mitigate costly errors and risks in the funding of full-scale demonstration projects. It is often overlooked, projects fail and the motivation for industry involvement in research and development fades. This is an overlooked factor in discussions around the lack of research-to-business collaboration in Australia.

Regulatory challenges

An accelerated and productive agriculture sector that embraces technology development will require policy integration to enable the co-existence of competing land uses. There are immediate opportunities to streamline the regulatory and policy environment for the mineral and agricultural industries through the integration of 'big data' research to build the rigour and utility of social and economic impact assessment. The NSW Government is working with UoN on pilot-scale community

research that aims to provide new protocols for decision makers. In addition, there is an equally important need for policy to address energy supply and technological access for rural and regional Australia. Acknowledging the challenge presented by remote and rural electricity supply, there should be an increased focus on the research development and implementation of distributed generation with off-grid and fringe-of-grid systems to help build capacity and economic growth in remote areas.