



Australia's National  
Science Agency

# Inquiry into the challenges and opportunities for the WA Economy

## Economics and Industry Standing Committee

Inquiry Submission

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# Introduction

CSIRO welcomes the opportunity to provide input to the Economics and Industry Standing Committee inquiry into the challenges and opportunities for the WA economy.

CSIRO has a headcount of 462 staff (excluding contractors) in WA, amounting to approximately \$65.3 million in wages during the last financial year. CSIRO also contributes to a further investment of \$27.58 million (2020-21) to the WA economy through active projects with industry, government, and universities.

CSIRO provides scientific knowledge and tools in support of WA's economy and industrial activities, including:

- the improvement of agricultural practices to boost the value, competitiveness, and sustainability of WA exports, including future protein research and biosecurity risks
- innovative science impacts in the fields of energy and mineral resources, with a focus on translative technology that is applicable to industry
- unique infrastructure and capability through the Pawsey Supercomputer, radio astronomy telescopes and the Square Kilometre Array (SKA)
- strategic input and research, development, and technology demonstration support for hydrogen industry development

## CSIRO response to Terms of Reference (ToR)

Below is a summary of key areas in which science can inform decisions related to the Terms of Reference for this inquiry.

### **a) the current structure of the WA economy**

The WA economy is characterised by its well-endowed primary resource activities that are highly intensive in production and jobs, notably in:

- mineral/energy exploration and mining
- agricultural products

WA is already a global leader in these exports and has world leading capabilities in resource R&D, as reflected in our local hydrogen, critical metals and agriculture and food industries.

The success of the agricultural sector requires the maintenance of underpinning natural resources as well as the development of new science and practices that enable producers to mitigate and adapt to climate conditions.

The WA agricultural sector exports the vast majority of what it produces, with 80% traded on international markets and a significant remainder traded to Australia's eastern states. Major

commodities include grains, meat, and fruits. The sector's growth is reliant on capturing premiums from trade and requires R&D to:

- develop new standards to grow and secure access to high value international (and domestic) markets
- build brand through tools that validate the credentials of WA-produced food
- reduce the cost of meeting the various levels of regulatory compliance associated with trade
- develop new industries that add value to WA-produced raw products through manufacturing.

In addition, the Western Australian Renewable Hydrogen Strategy and Roadmap has stimulated and supported the local industry's development of multiple hydrogen projects in the state, positioning WA as a leader in the sector. WA leads the nation's lithium exports for the battery industry through its lithium discovery and extraction and has world leading capabilities in R&D through industry and research collaborations.

Therefore, these industries need further R&D and support to ensure continued success and the maintenance of jobs and economic growth.

### **b) key factors driving current demand for WA exports**

CSIRO has identified significant opportunities for innovation in WA exports and has exploited these to work with industry to deliver innovative solutions that realise efficiencies and improve quality. Key factors that are driving the current demand for WA exports, include:

- developing and demonstrating technologies which reduce barriers (including cost) across hydrogen export value chains
- supply security of energy-related minerals from a stable sovereign government
- reliable supply chain of high-quality agricultural products in the ASEAN market

### **c) key factors that will affect demand for WA exports into the future**

WA's research sector and industry groups are well positioned to play an ever more important role in the state's economy, and in the coming years we can predict that demand will align to the security of a green and ethical supply of exports. This is represented through the following key examples, including:

- international decarbonisation drivers that will likely stimulate the development of international hydrogen supply chains. As such, Research development and innovation is needed to support the scaleup of a hydrogen export industry based on hydrogen carriers such as liquid hydrogen and ammonia
- regulatory changes in international markets such as the EU and ASEAN are poised to dictate carbon footprint limits. However, it is imperative that WA can secure downstream production, which will rely on cheap energy from renewables and attracting partners with requisite IP to re-

shore production to Australia. Many past reports<sup>1</sup> have clearly pointed to the opportunity around the development of the lithium-ion battery industry for WA, including the potential for battery industry hubs

- the efficiencies of global supply chains will determine the success of agriculture and food exports. How WA responds to these changes will depend on the state's ability to access high-value markets and meet export compliances

#### **d) actions being undertaken by relevant stakeholders to plan for identified trends in demand for WA exports**

Feedback from CSIRO's relevant stakeholders indicates that planning is underway to address the identified trends in demand for WA exports.

Through its Hydrogen Industry Mission, CSIRO is supporting the development of Australia's hydrogen industry by providing trusted science and technology advice to government, industry, and the community. Following are examples of innovative hydrogen technology solutions and R&D partnerships (domestic and international):

- the provision of techno-economic analysis relating to priority opportunities for hydrogen industry development in the state, as evidenced by CSIRO's support in the development of the state's first renewable hydrogen strategy in 2018/19, and ongoing involvement in the WA Renewable Hydrogen Council. Opportunities exist for science to inform region-specific studies and trusted community engagement relating to major hydrogen infrastructure developments, including energy resource assessments (renewable, fossil/CCUS) and environmental impacts (including water resources). In the area of technology development and deployment, CSIRO is supporting WA's emerging hydrogen technology sector through CSIRO's WA based research infrastructure and R&D collaborations with many local industry and university partners.
- opportunities are also under development for CSIRO to lead and/or catalyse hydrogen technology demonstration projects in WA, through both feasibility study and deployment phases which de-risk commercial investment decisions. CSIRO is also supporting the local industry by developing knowledge sharing resources such as the 'Hyresource' online portal, which was developed in collaboration with Future Fuels CRC, NERA, and Australian Hydrogen Council. It contains information and data relating to all active hydrogen projects in Australia, including more than 10 projects at various stages of development in WA.
- CSIRO has developed a physical stock and flows framework model that can be used to create outyear metal demand scenarios for solar, wind and electric vehicles. This tool can be used by

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<sup>1</sup> Austrade (2018), Lithium-ion battery value chain. Canberra.

Best, A. and Vernon, C. (2020) State of Play, Australia's Battery Industries as of March 2020. CSIRO, Australia.

Bruce S, Delaval B, Moisi A, Ford J, West J, Loh J, Hayward J (2021) Critical Energy Minerals Roadmap. CSIRO, Australia.

the WA government to understand how technology can impact primary demand in the outyears, enabling market analysis in a sophisticated, timely manner which identifies the timing of global metal surplus/deficits and can inform new project developments.

For the agriculture industry, CSIRO is partnering across the R&D sector to develop and deliver three missions which collectively seek to support WA's contribution to the national target of a \$100b agriculture sector in farm-gate value. While these are national missions, they nonetheless can be a vehicle achieving impact in WA, while leveraging other regions and the national agenda. These are:

- The *Trusted Agriculture and food Exports Mission*, which will leverage opportunities in global supply chains to increase the value of Australian agriculture and food exports by \$10 billion by 2030. The mission will improve access to high-value markets, verify the authenticity of Australian products through new methods of demonstrating food origin, and improve supply chain efficiency through automated export compliance.
- The *Future Protein Mission*, which will help to produce an additional \$10 billion of new products by 2030 to meet the changing needs of consumers, and provide high quality, nutritious protein to feed a global population that is projected to grow to almost 10 billion by 2050. The mission will develop new plant-based products, protect, and grow existing livestock and aquaculture industries and create novel protein production systems to transform no or low-value waste streams into high value food products.
- The *Drought Resilience Mission*, which with droughts in Australia projected to increase in frequency and severity, will reduce the impacts of droughts by 30 per cent by 2030. The Mission is vital to protect agricultural profitability, strengthen the economic resilience and water security of regional communities, and improve environmental outcomes.

### **e) key factors affecting inbound investment in major sectors of the WA economy**


CSIRO recognises that there are key factors which may affect inbound investment to the WA economy. These include:

- cheap, abundant renewable energy for industrial use is essential in the low carbon economy and there is significant scope for the WA government to drive that outcome on the grid
- the shift of mining activities towards advanced manufactured products (like battery chemicals) will require the securing of finance for new mines.
- the need to engage overseas Original Equipment Manufacturers (OEMs) to invest in Australia, resulting in increased advanced manufacturing
- changing legacy processes and produce greener battery products, requires significant, sustained investment at an industry level to scale up (demonstrate at sub-commercial scale) the efficacy of new processing technology. Only this will de-risk the technology to a point that alternatives can be moulded into the capex design of new mines and chemical plants
- in seeking new technologies to help grow the agriculture and food sector, the sector needs commercial ventures to scale and seek impact. This requires growth in the agriculture and food sector around digital tools (AI/ML), sensors and automation, and new business services

# Summary

Capitalising on opportunities to expand WA's export industries can benefit from the world class research delivered by Australia's innovation system. As Australia's national science agency, CSIRO has the necessary multi- and trans-disciplinary capabilities and collaborative relationships to deliver solutions at-scale to support the WA economy's sustainable growth. This support could encompass evidence-based solutions to offer innovations for expansion as well as the social science research and data necessary to establish the social licence critical to supporting it.

CSIRO would welcome the opportunity to provide the Committee with any further information relating to this submission if this would assist the inquiry.



**As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.**

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