



10 August 2023

Mrs Lisa O'Malley MLA  
Chair, Public Accounts Committee  
Legislative Assembly  
Parliament House  
4 Harvest Terrace  
WEST PERTH WA 6005  
Via email: [lapac@parliament.wa.gov.au](mailto:lapac@parliament.wa.gov.au)

Dear Chair

**RE: INQUIRY INTO HOW THE WESTERN AUSTRALIAN GOVERNMENT'S PROGRESS TOWARDS ACHIEVING ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) OUTCOMES IS ASSISTING TO SECURE INTERNATIONAL INVESTMENT**

CSIRO welcomes the opportunity to provide input to the above inquiry. As Australia's national science agency, CSIRO aims to solve the greatest challenges through innovative science and technology. CSIRO has a strong relationship with Western Australia and a significant footprint across several metropolitan sites with over 650 staff. Our key sites in Perth focus on research into mineral resources and energy, agriculture, space and astronomy, water and the environment. CSIRO provides scientific knowledge and tools in support of WA's sustainable economic development, 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 mineral resources and energy, with a focus on translative technology that is applicable to industry, including examples such as piloting new processing routes for critical minerals to value added products;
- strategic input and research, development, and technology demonstration support for hydrogen industry development;
- management of Inyarrimanha Ilgari Bundara, the CSIRO Murchison Radio-astronomy Observatory, home to CSIRO's ASKAP radio telescope and the future SKA-Low telescope, where the Federal Government, WA Government, CSIRO and the Wajarri Yamaji Aboriginal Corporation came together to create an Indigenous Land Use Agreement for the observatory's operations on Wajarri Country. This ensures educational, social and economic benefits flow to the Traditional Owners and native title holders of the site, the Wajarri Yamaji.

In our role as trusted advisor to communities, industries and governments, CSIRO provides technological pathways and solutions to achieve sustainable resource development that align with ESG considerations. As such, this submission provides general comment on the role of science and technology in helping to achieve ESG outcomes, including examples of relevant CSIRO activities, without commenting specifically on the inquiry's Terms of Reference or policy matters.

## ACHIEVING SUSTAINABLE DEVELOPMENT AND MEETING ESG OUTCOMES THROUGH SCIENCE AND TECHNOLOGY

Global demand for renewable and low emission technologies continues to grow, as does demand for the critical mineral resources required to manufacture these technologies and societal expectations of sustainable resource development. Developments, both locally and internationally, will need to be considered with a holistic view of the value that can be created, not just economically, but also in delivering benefits to the environment, communities, and culture. This ‘whole of value chain’ perspective extends post-mining with the potential for industry to create enduring value for the regions in which they work and the communities with which they work.

The United Nation Sustainable Development Goals (SDGs)<sup>1</sup> seek to ‘build a greener, fairer and better world’ with mining companies and sustainable mineral resource development set to play important roles in meeting the challenges of delivering on the goals. Investors, and indeed broader communities, are placing increasing demands beyond local compliance commitments to secure social and community support for developments and existing operations with a focus on the global push for emissions reduction to achieve net zero.

The transformation of the minerals sector that comes with the drive for net zero emissions and the increasing focus on ESG performance requires innovative new science and technology, as well as a deeper focus on community and cultural engagement. This provides for operating models and decision trees within industry that will increasingly seek to capture the measures of ‘value’ that can come from such innovations being employed.

CSIRO’s *Our Future World*<sup>2</sup> report released in July 2022 describes global megatrends which underpin the possible challenges and opportunities ahead. With an outlook to 2042, the report explores the geopolitical, economic, social, technological forces unfolding around the world, predicting their likely impact on Australia’s people, business and governments. The second megatrend *leaner, cleaner and greener* suggests there will be an increased focus on potential solutions to Australia’s resource constraints through technologies including those to enable a net-zero energy transition and highlights that leading global investors plan to only finance companies with net-zero carbon emissions by 2050.<sup>3</sup>

### Sustainable Products

CSIRO’s *Critical Minerals roadmap*<sup>4</sup> outlines the potential to supply sustainably mined products as a key comparative advantage for WA and Australia. Sustainable production is broad and can include everything from waste, emissions, water and labour.<sup>5</sup> However, there is typically a higher cost of production in countries with governance structures in place to support sustainable products and this is often passed through as a premium to the customer.

The willingness of energy technology Original Equipment Manufacturers (OEMs) and their suppliers to pay that premium is uncertain. This is particularly the case at present given the more immediate need to be cost competitive with incumbent fossil fuel-based technologies. Further, the dispersed global nature of many of these energy technology value chains makes it more challenging to certify sustainable products and the imposition of provenance frameworks in itself creates an additional layer of cost. With some countries requiring visibility and transparency on the ESG credentials of materials being utilised in energy technologies, having Australia meet high standards of sustainable minerals, materials and components

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<sup>1</sup> <https://www.globalgoals.org/goals/>

<sup>2</sup> <https://www.csiro.au/en/research/technology-space/data/Our-Future-World>

<sup>3</sup> Our Future World - CSIRO, reference Jolly J (2020) Investor group makes net-zero carbon pledge to tackle climate crisis. Sydney: The Guardian Newspaper (11 December 2020)

<sup>4</sup> <https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/CSIRO-futures/Energy-and-Resources/Critical-energy-minerals-roadmap>

<sup>5</sup> Ibid

production, especially for the critical energy minerals, is an important opportunity in order to access those markets.

Access to capital is another considerable obstacle, with financial institutions enforcing tighter lending conditions relating to sustainability. While important, this makes it harder for mining companies to secure capital if they are unable to pass the added cost of compliance onto customers. Adding to this challenge is the emergence of border adjustment taxes that are assessed according to embodied emissions within export products. Such initiatives are currently being driven by the EU but will require alignment with the World Trade Organisation General Agreement on Tariffs and Trade as well as other relevant free trade agreements.<sup>6</sup> A diverse range of technologies will be needed to minimise the cost of sustainable products.

### **Integration of renewable energy**

Integration of renewable energy into mining and processing operations will be critical to minimising embodied emissions. Notably, Australia's prime renewable energy resources are often co-located with regional mining operations. Ongoing reductions in the capital cost of solar photovoltaics (PV) and wind has also meant that such forms of renewable energy generation are already providing economical energy solutions where there is an absence of grid connected transmission and a heavy reliance on diesel and natural gas. This is particularly applicable to electricity intensive mining processes such as grinding mills, tailings filtration, water pumping, desalination, electrorefining and electrowinning.<sup>7</sup>

Established solutions also exist for energy storage to help smooth the variability of renewable energy for continuous processes. This includes batteries and off-river pumped hydro, which is particularly applicable to mining operations as it involves developing two water reservoirs and leveraging the difference in potential energy between them. The challenge is greater for mining and processing operations dependent on high temperatures, with mature renewable and cost competitive solutions not as readily available.<sup>8</sup>

### **SCIENCE SUPPORTING SOLUTIONS**

A working and effective ESG framework aims to provide a foundation for companies when it comes to the deployment of new technology and assets but does not guarantee achieving social licence to operate.<sup>9</sup> The principles of place-based early engagement, transparency, good operational practice<sup>10</sup>, and a clear value proposition for broader community need to be embedded in an effective ESG approach, along with understanding the benefits and shared value for impacted environments.<sup>11</sup>

While CSIRO does not currently undertake research on ESG frameworks specifically, we are developing research opportunities in that area. We also have a broad range of multi-disciplinary capabilities and collaborative relationships that are delivering solutions to support industry in achieving environmental and social outcomes. Some examples of CSIRO research are described below.

### **Net Zero Emission Steel**

CSIRO is working to support the readiness of WA and Australian iron ores to produce net-zero emission steel<sup>12</sup>, a value chain that is currently a significant contributor to emissions. Our related projects include<sup>13</sup>:

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<sup>6</sup> Ibid

<sup>7</sup> Ibid

<sup>8</sup> Ibid

<sup>9</sup> Walton, A., & McCrea, R. (2020). Understanding social licence to operate for onshore gas development: How the underlying drivers fit together. *Applied Energy* 279 <https://doi.org/10.1016/j.apenergy.2020.115750>

<sup>10</sup> Mercer-Mapstone, L., Rifkin, W., Louis, W., & Moffat, K. (2017). Meaningful dialogue outcomes contribute to laying a foundation for social licence to operate. *Resources Policy*, 53, 347-355.

<https://www.sciencedirect.com/science/article/pii/S0301420717302453>

<sup>11</sup> SLO Better Practice Guidelines: <https://www.theenergycharter.com.au/wp-content/uploads/2023/05/The-Energy-Charter-Better-Practice-Social-Licence-2023-GUIDELINE.pdf>

<sup>12</sup> <https://www.csiro.au/en/work-with-us/industries/mining-resources/Resourceful-magazine/Issue-26/Net-zero-steel>

<sup>13</sup> <https://www.csiro.au/en/work-with-us/industries/mining-resources/Resourceful-magazine/Issue-26/Net-zero-steel>

- **Direct support for Australian iron ore producers** - CSIRO supports the Australian iron ore industry with laboratories and pilot-scale test facilities to improve product characterisation, processing, and physical/metallurgical assessment. One example is sintering tests<sup>14</sup> which help miners to improve the iron-ore content of their material and advise on how the iron ore can best be processed.
- **Self-sustaining pyrolysis** - One of the short term challenges for green steel is finding a replacement for coal in the blast furnace which can still sustain the reducing process. Working with industry partners, CSIRO has developed a self-sustaining slow pyrolysis process<sup>15</sup> to produce charcoal that can be tailored to steel and other metal production. This process uses heat from pyrolysis reactions in biomass feedstocks within the furnace, lowering production costs and generating valuable by-products such as bio-oil and bio-gas. The current pilot-scale facility can produce up to 1000 tonnes of charcoal per year and can lower blast furnace emissions by 2-3%.
- **HILT CRC** - CSIRO is a founding partner in the Heavy-Industry Low Carbon Transition Cooperative Research Centre (HILT CRC<sup>16</sup>). This includes HILT CRC's Process Technologies program<sup>17</sup>, bringing expertise in modelling solar thermal and hybrid biomass technologies for power generation. The WA Government and the Minerals Research Institute of Western Australia are key partners.

### CSIRO Missions portfolio

CSIRO's energy research portfolio aims to build Australia's energy security while lowering emissions to support Australia's energy transition. This includes CSIRO's Missions Program which has strengthened investment in research to support the energy transition via the following Missions:

- **Hydrogen Industry Mission** to underpin the development of domestic and export value chains for hydrogen in Australia as a key enabler of the net zero energy transition.
- **Towards Net Zero Mission** to support some of our most hard to abate industries through its focus developing transition pathways to embed low-emission technology into Australian industry and agriculture, supporting regional communities in a low emissions future. A particular focus is to bridge the gap between roadmaps and prototyping and early scaling of new technologies.
- **Renewable Energy Powerhouse Mission** to create Australian capability, technologies, and home-grown supply chains for affordable storage of renewable energy and other power for deployment in grids and microgrids, to secure reliable energy as the nation's power mix is decarbonised.

### Future Science Platforms

CSIRO is also investing in future science programs, including:

- **Revolutionary Energy Storage Systems** to explore how new grid management systems will incorporate more renewable energy;
- **Carbon Lock** to explore how to integrate carbon storage and carbon streams in new ways;
- **Hydrogen Energy Systems** to create new science, capabilities, and technologies across the hydrogen value chain;
- **Responsible Innovation** to investigate the interface of science and society to ensure that emerging technologies can proceed responsibly and deliver positive impacts; and
- **Valuing Sustainability** to co-develop and test measures of sustainability to guide investment and innovation.

<sup>14</sup> <https://research.csiro.au/resourcesandsustainability/understanding-properties-low-grade-ore/>

<sup>15</sup> <https://www.csiro.au/en/work-with-us/industries/mining-resources/processing/green-steelmaking>

<sup>16</sup> <https://www.hiltcrc.com.au/>

<sup>17</sup> <https://www.hiltcrc.com.au/#Programs>

### **National Critical Minerals Research and Development Hub**

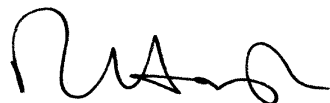
CSIRO is the host Organisation for the National Critical Minerals Research and Development Hub that is being established with the Australian Government's Department of Industry, Science and Resources. This research hub brings together CSIRO, Geoscience Australia and ANSTO capabilities to support the development of the critical minerals sector, including in ESG performance and sustainable production, and international collaboration opportunities.

### **INTERNATIONAL INVESTMENT**

Main Sequence is a venture capital firm founded by CSIRO to attract private sector investment in spinouts, startups and SMEs with connection to Australia's publicly funded research sector. Main Sequence's observation is that increasingly, investment in the commercialisation of research (including Australian superannuation and international investment) requires ESG transparency. In line with this requirement, its membership of the UN Principles for Responsible Investment (UNPRI) network and its own ESG policy, Main Sequence is investing in opportunities aligned with ESG and SDGs. An example of such an investment is WA-based renewable biomaterial company ULUU.<sup>18</sup>

CSIRO would welcome an opportunity to discuss this submission with the Committee if this would assist the inquiry. For any further information please contact Amy Ruddock, WA State Engagement Manager, CSIRO

Yours sincerely



**Dr Rob Hough**

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<sup>18</sup> <https://www.uluu.com.au/>