



Lithium and Battery Metals AusIMM Policy Paper

September 2021



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Ministerial Foreword

As the world's biggest lithium producer and host to large reserves of other battery metals including nickel and cobalt, as well as rare earths, Western Australia has the unique opportunity to become a central player in the global battery value chain.

This report highlights the strength of the sector and the abundance of opportunities for expansion and investment in projects and operations in Western Australia. The rapid growth of electric vehicles and battery-based energy storage systems is globally driving the unprecedented demand for lithium-ion batteries. Electric vehicle and battery manufacturers are actively securing their supply chains including sources of minerals, materials, and components to secure their operations and meet the increased global demand.

Under the McGowan Government's Future Battery and Critical Minerals strategy, we are leading Australia's drive to be a Tier 1 exporter of future battery minerals, materials, technologies, and expertise. This strategy is committed to establishing a world-class, value-adding battery minerals and rare earths industries in Western Australia by facilitating access to infrastructure and funding for technology SMEs. Western Australia has all the battery minerals required to produce batteries and energy technologies.

With a stable and robust economy, low sovereign risk, and status as world-leaders in research and development, we facilitate the business landscape, attracting investment to expand current operations and establish new projects.

As the Minister for Mines and Petroleum, I'm supportive of the Australasian Institute of Mining and Metallurgy (AusIMM) in highlighting the fundamental role of resources professionals in enabling our sector to move further down the battery metals value chain. Lithium and battery metals are a significant and exciting prospect for the economy and downstream processing industry. It'll also create jobs and provide skills development opportunities for Western Australian.

AusIMM's policy paper highlights critical factors for unlocking this potential, including technical innovation, social responsibility, skills development and workforce sustainability. I thank the AusIMM for contributing their expertise to this important discussion, and commend the paper to stakeholders all across the global lithium and battery metal supply chain.



Hon Bill Johnston MLA
Minister for Mines and Petroleum

Bill Johnston



AusIMM: Leading the way for people in resources

The Australasian Institute of Mining and Metallurgy (AusIMM) is the peak body and trusted voice for people working in the resources sector. We shape careers, showcase leadership, create communities and uphold industry standards. Representing a global community from 110 countries, we are committed to supporting people working in all aspects of the mining industry.

AusIMM was founded in 1893 and operates under a Royal Charter. We have a global community of members, branches and societies, along with influential partnerships with industry, government, education and the community.

We offer outstanding professional development opportunities including world class mining conferences, leadership events, online learning and industry news to help build and accelerate careers. We host local and global networking events to connect professionals with common goals and interests and help build their profile.

As a welcoming and inclusive organisation, AusIMM is committed to representing all people in the mining industry and improving environmental, social, and economic outcomes in the sector, now and for generations to come.

Introduction: our voice on battery metals

The battery metals supplied by the resources sector are essential commodities for modern life. They have a vital role in driving global development, are essential ingredients for emerging energy, defence, communications, and transport technologies, and are vital for regional security and supply chain resilience.

The resources sector in our region can build on a substantial minerals endowment and world-class research, training, engineering and technical capabilities to move up the value chain into the advanced manufacturing of battery precursor chemicals and finished battery products. Australia is the world's largest producer of lithium concentrates, and mine and process other battery metals including nickel, cobalt, aluminium, vanadium, graphite, manganese and rare earths.¹

Growth in global demand for these commodities is well canvassed across a range of literature. The global market for battery and energy commodities will expand by as much as 25% per annum over the period through to 2028.² Currently Australia realises only 0.53% of the value of the lithium in the lithium-ion battery value chain by exporting metal concentrates.³ In a rapidly developing, politically complex global market, the opportunity to capture a significant proportion of this growth is not only substantial, but time sensitive.

AusIMM recognises an imperative to ensure the expertise of resources professionals is harnessed to maximise our industry's ability to grow market share and deliver sustained social and economic benefits for our community.

This paper outlines key considerations for industry and government decision makers as we chart a sustainable future for our sector.

¹ Best, A and Vernon, C, 2020, 'State of Play: Australia's Battery Industries as at March 2020', CSIRO, Australia.

² Casson, B, Lewis, C and Martin, K, 2021, 'Outlook for Selected Critical Minerals: Australia 2021', Office of the Chief Economist, Australia; Department of Industry, Science, Energy and Resources, 2020, 'Responsible, Reliable, Ready for the Future: Australia's Global Resources Statement', Australian Government, Australia; Department of Industry, Science, Energy and Resources, 2021, 'Resources Technology and Critical Minerals Processing National Manufacturing Priority Road Map', Australian Government, Australia.

³ The Lithium-Ion Battery Value Chain – New Economy Opportunities for Australia, AusTrade, December 2018, Figure 31.



Recommendations

AusIMM highlight in this paper several factors that we believe are fundamental to allow the sector to access greater value across the battery metals supply chain. Our recommendations cover technical standards and best practice, social and environmental responsibility, skills development, workforce sustainability, innovation, technology and the need for well calibrated government policy to drive investment and create a supportive operating environment for industry.

For clarity, we adopt the term ‘battery metals’ to capture the full range of battery metals including lithium, nickel, cobalt, lithium, vanadium and graphite.

We share key recommendation below, providing further detail in the sections that follow.

Critical factor	AusIMM recommends
Technical standards and best practice	Domestic standards development across key battery commodities
	International standards leadership to strengthen Australia’s competitive position
	Collaboration across industry, government and academia to advance Australian leadership on battery metal standards
Social and environmental performance	Professional knowledge, understanding and competency in line with the AusIMM Social Responsibility Framework
	Regulatory modernisation to account for environmental, social and governance factors across the battery metals life cycle
	Industry-wide coordination to align environmental, social and governance programs

Skills development and workforce capability

Research to address key technical challenges, leverage potential competitive advantages and enhance domestic capacity

Forecasting to ascertain future workforce needs and identify challenges

Education, skills and training to diversify entry pathways and enable continuous learning

Programs to attract and retain battery metals professionals at all stages of their career

Equality of opportunity for prospective professionals from diverse backgrounds, disciplines and industries

Tailored professional development for professionals entering the battery metals industry from other sectors

Partnership and investment across the sector to deliver skills development and workforce programs

Business and geostrategic considerations

Increased access to global markets including India, Taiwan, South Korea, Japan and China

Investment attraction across the battery value chain through flagship global conferences, events and other fora

Policy to increase local demand for industrial and domestic energy, transport and other end-use applications

Consistent investment support across geographical regions

Enhanced workforce mobility through an effective mutual recognition framework and responsive skilled migration program

Battery technology and prime metals

This section provides an overview of key battery technologies, commodities and operations across the Australian sector, as an illustration of both the current state and the potential for growth across the value chain.



Lithium-ion batteries

Lithium-ion battery is a common name for a large variety of battery types, not only in the shape and packaging of cells, but also in the chemistries contained within the battery. All Li-ion batteries utilise the lithium ion for current transfer. Most commercial Li-ion batteries use graphite for the anode with silicon and titanate used in some battery types. There are many different formulations of cathode material, each with different attributes. The table below summarises the major commercial Li-ion battery types and typical applications.

Battery type	Cathode material	Abbreviation	Short form	Applications	Characteristics
Lithium Cobalt Oxide	LiCoO ₂ (60% Co)	LCO	Li-Cobalt	Cell phones, laptops, cameras	High specific energy, moderate power density, moderate safety and life span. High cost due to high cobalt content
Lithium Manganese Oxide	LiMn ₂ O ₄	LMO	Li Manganese or spinel	Power tools, hybrid and electric cars, laptop computers	Fast charging and high current discharge, good safety and moderate life span. Capacity 2/3 that of Li-cobalt battery type but 50% more than nickel-based chemistries
Nickel Manganese	(70% Ni, 25% Mn)	NMX	NMX	Electric Cars	Svolt proprietary cobalt-free NMO variant focused on the electric car market
Lithium iron phosphate	LiFePO ₄	LFP/LMFP	Li-phosphate/ Li-manganese ferro-phosphate	Electric cars and bikes, power tools, laptop computers	High safety, high temperature stability, high current rating, long life span, Lower material cost, lower voltage. LNFP boosts specific energy relative to LFP.
Lithium Nickel Manganese Cobalt Oxide	LiNiMnCoO ₂ (60% Ni, 10-20% Co)	NMC	NMC	Electric cars, power tools	Higher specific energy or power, low self-heating rate, lower cobalt content. Current research to further lower cobalt without destabilising nickel.
Lithium Nickel Cobalt Aluminium Oxide	LiNiCoAlO ₂ (9% Co)	NCA	NCA	Tesla (Panasonic) electric vehicles and power grid-storage	High specific power and specific energy, long life span, high cost, lower safety
Lithium Nickel Titanate**	Li ₄ Ti ₅ O ₁₂ (9% Co)	LTO	Li-titanate	Electric cars and busses, small-grid power storage, grid power stabilisation	Svolt proprietary cobalt-free NMO variant focused on the electric car market

Notes: * Anode Material

Sources:

<http://investingnews.com/daily/resource-investing/battery-metals-investing/6-types-of-lithium-ion-batteries>

<http://marsen.com.au/lithium-explained/lithium-chemistry-explained/>

<https://www.greencarcongress.com/2021/02/20210213-svolt.html>

https://lithium-au.com/wp-content/uploads/2020/02/08072021-LIT-subsiary-VSPC-dispatches-cathode-material-to-custom.pdf?utm_source=Investors&utm_campaign=77dd1c7186-EMAIL_CAMPAIGN_2019_08_30_03_58_COPY_02&utm_medium=email&utm_term=0_25617522fe-77dd1c7186-346062561

From the previous table, the major battery metals of importance for transport and energy storage are lithium, nickel, cobalt, vanadium and graphite. Other bulk-mined elements include aluminium, manganese and titanium.

Most of the commercial Li-ion battery types require cobalt for the cathode formulation. Approximately 70% of current world supply is from the Democratic Republic of Congo (DRC).⁴ Supply-chain uncertainty, and concern that some DRC supply does not conform to the Equator Principles⁵ is an issue for many electrical vehicle and tech-manufacturers. Non-DRC cobalt supply is primarily a co-product of nickel refining, located in various countries, including Australia.

Due to the constraints on cobalt supply, cobalt-free LFP and LMFP battery types are being developed as the prime battery technology for EV application.^{6 7 8}

Vanadium flow battery

There are numerous alternate battery technologies being developed for energy storage, particularly those associated with solar and wind energy projects. The vanadium flow battery is an Australian developed technology nearing commercial application.

The vanadium flow battery utilises the voltage difference of the oxidation states of vanadium ions in a liquid medium. A 2MW/8MWh vanadium flow battery is currently being constructed as part of the Yadlamalka Solar/battery renewable energy project in South Australia.⁹ Being a liquid based system, this battery type does not experience the cycle-charge degradation characteristic of Li-ion battery technology. While still at demonstration stage, this technology is likely to be adopted as a major energy storage option for both small and large-scale renewable energy projects.

⁴ NS Energy – Profiling the six largest cobalt reserves in the world by country, 07 Jun 2021, <https://www.nsenenergybusiness.com/features/largest-cobalt-reserves-country/>

⁵ The Equator Principles – Environmental and social risk management for projects (equator-principles.com) <https://equator-principles.com/>

⁶ 210416 – Does LFP signal the demise of nickel/cobalt lithium-ion Batteries? – Lithium Australia – VSPC Ltd technology release news [VSPC - Lithium Australia \(lithium-au.com\)](https://www.lithium-au.com/news-releases/vspc-lithium-au-com)

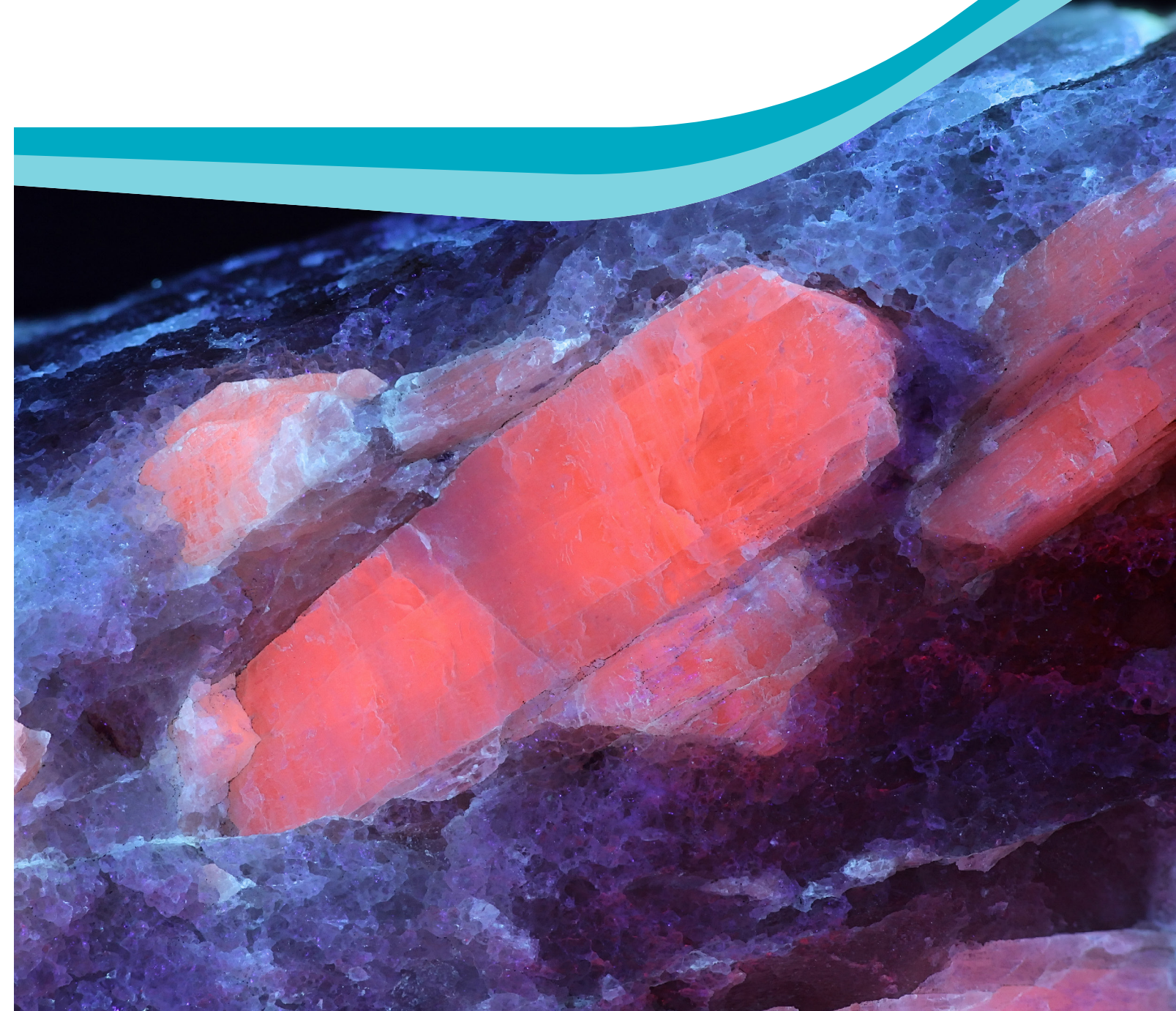
⁷ Two versions of SVOLT NMX cobalt-free cells now available for order <https://www.greencarcongress.com/2021/02/20210213-svolt.html>

⁸ https://lithium-au.com/wp-content/uploads/2020/02/08072021-LIT-subsiary-VSPC-dispatches-cathode-material-to-custom.pdf?utm_source=Investors&utm_campaign=77dd1c7186-EMAIL_CAMPAIGN_2019_08_30_03_58_COPY_02&utm_medium=email&utm_term=0_25617522fe-77dd1c7186-346062561

⁹ Large-scale vanadium redox flow battery takes shape in Australia, PV Magazine <https://www.pv-magazine.com/2021/05/10/large-scale-vanadium-redox-flow-battery-takes-shape-in-australia/>

Australian battery metal resources and processing

This section covers major Australian deposits of battery metals and current processing. AusIMM presents this information not as an endorsement or promotion of specific projects, but as an articulation of regional battery metal capacity and prospectivity.



Nickel

Nickel is recovered from both sulphide and laterite sources

- Sulphide sources (flotation + smelting + hydromet flowsheet)
 - Nickel West – Kambalda, Leinster, Mt Keith
 - IGO Limited – Nova
 - Western Areas – Forrestania and Odysseus development
 - Mincor – Kambalda operations
 - Poseidon – Black Swan, Silver Swan, Golden Swan (suspended/potential)
 - Panoramic Resources – Savanna/Savanna North (re-starting)
 - St George – Mt Alexander (prospect)
 - Chalice – Julimar (prospect)
- Laterite – sources (Hydromet process routes)
 - Glencore - Murrin-Murrin – production 2020 – 36.4kt Ni, 2.9kt Co
 - FQM – Ravensthorpe – production ~ 25kt/a Ni, as nickel hydroxide
 - Australian Mines – Sconi project, Qld – Ore Reserve 89Mt@0.58%Ni, 0.07%Co, - studies ongoing
 - Cleantech – Sunrise Project, NSW – Ore Reserve 101Mt@0.59%Ni, 0.13%Co - studies ongoing
 - Ardea – Goongarrie project, WA – Ore Reserve 109Mt@0.79%Ni, 0.1%Co, - studies ongoing
 - Bulong & Cawse HPAL Projects - suspended/abandoned
- Refining
 - BHP Nickel West – Kalgoorlie Nickel Smelter
 - BHP Nickel West – Kwinana Sherritt-Gordon Nickel Refinery

Cobalt

Cobalt is primarily recovered as a co-product from both sulphide concentrate and laterite ore processing. Studies to assess the potential for development of a pyrite/cobalt sulphide project near Broken Hill are progressing.

- Nickel-West produce a cobalt rich precipitate at the Kwinana refinery - a pre-cursor for Li-ion battery cathodes
- Murrin-Murrin produces a cobalt metal briquette product
- Ravensthorpe produces a mixed Nickel/cobalt hydroxide product
- The proposed Ardea – Goongarrie flowsheet allows for production of a cobalt sulphate product
- Cobalt Blue project – Broken Hill, Reserve 123Mt @ 660ppm Co associated with pyrite is at an advanced study stage
- Bulong and Cawse Projects – suspended/abandoned.

Lithium

Australia has eight ASX listed companies with Lithium deposits and produces approximately 47% of world Lithium concentrate (21.3kt of contained Li). Other major producers are Chile (14.1kt contained Li, 31%), Argentina (5.5 kt, contained Li, 12%) and China (3 kt, contained Li, 7%).

- Flotation Concentrate
 - Talisoan - Greenbushes 1.3Mt/a – 2.4Mt/a Spodumene concentrate
 - Mineral Resources - Mt Marion 206, 000 t/a Spodumene concentrate
 - Mineral Resources – Albemarle - 750,000 t/a Spodumene concentrate
 - Pilbara Minerals – Pilgangoora – Pilgan concentrator - 330,000t/a spodumene concentrate
 - Pilbara Minerals – Pilgangoora - Pilgangoora concentrator (formerly Altura Minerals) - 220, 000t/a spodumene concentrate
- Lithium Hydroxide Refineries
 - Tianqi/IGO – Kwinana 24 000 t/a Lithium hydroxide, expanding to 48,000t/a LiCO₃ – (construction/commissioning progressing)
 - Albemarle/IGO – Bunbury 100,000 t/a LiOH (proposed/pending)
 - Covalent Resources (SQM/Westfarmers) – Kwinana 45,000t/a LiOH (proposed/pending)

Graphite

Graphite is used as the anode material for most types of Li-ion batteries. The principal export sources of mined graphite in order of tonnage are China, Mexico, Canada, Brazil, and Madagascar.

There are no current graphite producers in Australia. The Uley district on the Eyre peninsula of South Australia and Munglinup region west of Esperance in WA both host significant graphite mineralisation, some of which has been commercially mined in the past.

- Graphite Processing International Graphite is currently constructing a process facility in Collie WA to upgrade imported graphite to battery and industrial product specifications

Vanadium

South Africa is the major producer of vanadium. Australian produced vanadium chemical products at the Windimurra project in the 1990s. This project is currently on care-and-maintenance.

- Significant Australian vanadium mineral resources:
 - Australian Vanadium Limited – Gabanintha Project, WA – PFS complete, resource: 208.2Mt at 0.74% vanadium pentoxide (V₂O₅) plus minor Cu, Ni, Co credits
 - Atlantic Pty Ltd - Windimurra Vanadium project, WA – BFS for reestablishment of operations at Windimurra is complete, resource 209.7 million tonnes at 0.50% V₂O₅
 - Interim Resources – Richmond project – Qld – 3.3Bt @ 0.4% V₂O₅, 295g/t Mo
 - King River Resources – Speewah project, WA, 4712Mt @ 0.3% V₂O₅, 3.3%TiO₂,14.5% Fe
 - Neometals – Barrambie Project, WA. 53.6Mt @ 9.19% TiO₂, 0.44% V₂O₅ and 64.9Mt @ 16.9% TiO₂, 0.82% V₂O₅

Battery recycling

A recent paper by CSIRO¹⁰ highlights the importance of recovering battery metals from degraded Li-ion and Ni-Cd batteries. Important considerations include:

- Disposal of degraded rechargeable batteries to landfill results in potential lost value of \$AU 603m to \$AU 3.1B
- Recovery of Ni, Co and Li from lithium batteries will be essential to the battery metal supply-chain to maintain the rate of worldwide transition to a low carbon future
- Disposal of spent batteries to landfill has significant environmental and health risks as nickel and cobalt salts are toxic, as is the lithium hexafluorophosphate electrolyte. Residual charge in spent batteries can also initiate fires in landfill facilities.

CSIRO and other research groups are developing technologies for recovery of metals from spent batteries. International cooperation and standards are required for identifying battery cell chemistry and ensuring end-of-life dismantling of battery packs is considered as part of consumer product design.

Several metal recycling companies collect and sort spent batteries for processing overseas. Lithium Australia NL has established a processing facility in Melbourne for hydrometallurgical recovery of battery metals, and a demonstration scale plant for production of lithium ferro phosphate cathode powder.¹¹ Neometals Ltd has also developed battery recycling processes and constructed a pilot plant in Canada.¹²

¹⁰ Zhao, Y, Ruether, T, Bhatt, A and Staines, J, 2021, 'Australian Landscape for lithium-ion battery recycling and reuse in 2020' prepared by CSIRO for the Future Battery Industries Co-operative Research Centre, available at: <https://fbicrc.com.au/wp-content/uploads/2021/03/CSIRO-Report-Australian-landscape-for-lithium-ion-battery-recycling-and-reuse-in-2020.pdf>

¹¹ Envirostream Australia, 2021, 'Company Brochure', available at: <https://envirostream.com.au/wp-content/uploads/2021/06/Envirostream-Brochure-1.pdf>; Lithium Australia, 2021, 'ASX Announcement: 6 July 2021', available at: <https://lithium-au.com/announcements/>.

¹² Neometals, 2022, 'Lithium Refinery', available at: <https://www.neometals.com.au/our-projects/core-projects/lithium-refinery/>.

Critical factors: enabling battery metals expansion

In the section that follows, AusIMM outline our views on the critical enablers required to support the Australian resources sector to move up the battery metal value chain.

Critical factors for battery metals expansion



- **Technical standards and best practice** clear codes, guidelines and standards strengthen Australasia's competitive position by ensuring the sector is delivering premium quality products to the global market



- **Social and environmental performance** The role of resources professionals in delivering socially and environmentally responsible products for the global battery metals market



- **Skills development and workforce capability** leverage existing expertise, create new skill sets and generate new opportunities for professional, technical and operations personnel by expansion of the battery and clean energy industry



- **Innovation and technological development** The role of professional and technical experts in developing new technologies for battery pre cursor chemical and finished battery products



- **Business and geostrategic factors** Addressing key challenges for attracting investment and making capital available for Australian lithium and battery metal operators



- **Government policy** Increase local demand for Australian battery metals and value-added products through clear national energy targets and support for domestic uptake of Battery Electric Vehicles, domestic batteries and other 'end-use' applications



Technical standards and best practice

AusIMM exists to advance the highest standards of technical, professional and ethical practice within the resources sector. We recognise that this leadership is fundamental to realise the full potential of Australia's mineral endowment for the benefit of all sectors of the Australian community.

AusIMM supports domestic standards development

AusIMM believes clear norms are essential to secure the economic and social benefits available through an expanded lithium-ion and battery metals supply chain.

To advance industry development, AusIMM works with our partners through Standards Australia in the development of technical standards to guide mining, concentration extraction, separation and conversion activities within the region. In this work we pursue shared leadership with:

- **Research and academic organisations** including CSIRO,¹³ ANSTO,¹⁴ the University of Queensland and Curtin University
- **Federal, state and territory governments** including Geosciences Australia, the Commonwealth Department of Industry, Science, Energy and Resources and the Queensland Department of Resources
- **Our kindred peak bodies** including AMEC,¹⁵ AiG¹⁶ and the MCA,¹⁷ IChemA, Engineers Australia (EA)

AusIMM commits to continuing to work with industry partners to establish clear norms to guide the expansion of the Australian battery metal value chain. AusIMM ensuring the currency and relevance of technical guidelines.

¹³ Commonwealth Scientific and Industrial Research Organisation.

¹⁴ Australian Nuclear Science and Technology Organisation.

¹⁵ Association of Mining and Exploration Companies.

¹⁶ Australian Industry Group.

¹⁷ Minerals Council of Australia.

AusIMM calls for Australian leadership in international standardisation forums

AusIMM calls for Australian leadership in international standardisation processes concerning battery metal mining, concentration, extraction and separation. We emphasise that Australian participation in developing international standards on lithium and lithium alloys, for example, is vital to ensuring alignment between our region and large-scale lithium producers such as Chile and China.

International standards alignment will promote production, fair trade and sustainable development globally and advance Australian leadership, including in relation to:



- **Health and safety** Allowing the Australian sector to share leading practices, with one of the lowest global incident rates, and address health and safety risks unique to battery metals production and processing.



- **Community and society** Australian representation in international standards development will drive global consensus building, ensuring production standards amongst major lithium producers including Australia, Chile, Argentina and China are aligned and calibrated to maximise community benefit.



- **Sustainability** Reflecting the role of battery metals in enabling technology development and production, including for renewable energy storage and grid stabilisation, Australian leadership in global standards development will drive the uptake of Australian products, technologies and practices. Standards should also be developed to support battery recycling, with a major limiting factor being the present difficulty in identifying the battery chemistry of much of what is produced across the global supply chain.



- **Competition and economic benefit** As a major world producer, the Australian sector can realise significant commercial benefits in guiding international standardisation from its inception, as this allows industry to develop suitable processes to maximise domestic production viability and export competitiveness.

AusIMM commits to working with industry, government and research partners to advance international standards development and alignment regarding battery metals.

AusIMM commits to pursuing Australian representation in international standards development fora, such as those of the International Standards Organisation.

AusIMM ensuring the currency and relevance of technical guidelines

The demand for Australasian mining expertise reflects the status of the region's technical standards, professional expertise and experience on the world stage. This expertise is a core driver for our sector's global leadership, and one which extends to battery metals.

AusIMM, for example, is the co-parent of the JORC¹⁸ and VALMIN Codes,¹⁹ which have been recognised around the world and incorporated into the listing rules of both the Australian and New Zealand stock exchanges. AusIMM also takes a leading role in guiding the development of technical reporting standards globally, working through JORC and with our kindred bodies as part of the Committee for Minerals Reserves International Reporting Standards (CRIRSCO).

The currency, relevance and integrity of these codes is important in providing assurance and confidence regarding geological knowledge. Providing such assurance is fundamental in guiding technical and investment decision making, aids policy formulation and ensures resources are managed in a way that delivers enduring benefits for the global community. Codes and standards of this nature must keep pace with industry, regulator and public expectations, and AusIMM believes this is particularly true for the fast-developing lithium and battery metals sector.

AusIMM calls for the continued provision of principles-based technical guidance to support the decisions being taken by government, investors and operators in the battery metals sector.

18 The common denomination of Australasian Code for Reporting of Exploration Results Mineral Resources and Ore Reserves, governed by AusIMM, the Australian Institute of Geoscientists and Minerals Council of Australia.

19 The common denomination for the Australasian Code for the Public Reporting of Technical Assessments and Valuation of Mineral Assets, also co-parented with the Australasian Institute of Geoscientists.



Environment, social and governance

The imperative for ethical, sustainable professional practice

Environmental, social and governance (ESG) factors are fundamentally important to the sustainability and financial viability of mining globally, including within the Australasian region²⁰. The impacts of ESG performance on community sentiment, and trust in the credibility of mining operations, are reflected in the spread of investment geographically. ESG performance has a profound impact on sources, availability, time frames and costs for project financing.²¹

The opportunity to develop battery metal resources, and use them as the basis for downstream industry development, will be severely constrained unless projects and associated legacies balance economic, social and community imperatives.²² It is particularly relevant to note the role of battery metals in the global energy transition, and the substantial ethical and governance issues attached to many current major producers.²³ The Australian sector has an important leadership role to play, in delivering premium, ethically sourced products for the global market.

ESG performance must be assured across all stages of the project lifecycle; from exploration through to production, processing and refinement, mine closure, site rehabilitation and spent battery recycling. Our members deliver trusted, evidence-based advice to stakeholders across this lifecycle. This includes the leadership our members provide through their work in advising operators on community engagement, environmental performance and waste management and, for example, through their roles on regulatory bodies overseeing mined land rehabilitation.

To drive expansion of the Australian battery metal sector, AusIMM sees that professionals must be equipped to meet the highest standards of ESG performance across all aspects of their work. Such leadership will ensure the sector delivers maximum community benefit, and allow the Australian industry to position itself as a trusted and ethical partner for prospective consumers around the globe and across the lithium and battery metal supply chain.

20 AusIMM Social Responsibility Statement, available at: <https://www.ausimm.com/about-us/governance/social-responsibility-framework-and-statement/>.

21 AusIMM, 2019, 'Social Licence Policy Development Forum Summary Report', available at: https://www.ausimm.com/globalassets/advocacy/slto_forum_report_final.pdf; PwC, 2020, 'Aussie Mine 2020: Resources the Recovery'; Mackenzie, S, Everingham, J and Bourke, P, 2020, 'The Social Dimension of Mineral Exploration', SEG Discovery No 121. April 2020, pp. 16-28;

22 Lebre, E., Stringer, M., Svobodova, K., Owen, J., Kemp, D., Cote, C., Arratia-Solar, A., Valenta, R., 2020, 'The Social and Environmental Complexities of Extracting Energy Transition Metals', Nature Communications, available at: <https://www.nature.com/articles/s41467-020-18661-9.pdf>.

23 International Energy Agency 2021, 'The Role of Critical Minerals in Clean Energy Transitions', available at: <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>.

AusIMM Social Responsibility Framework

AusIMM is taking the lead in ensuring resources professionals are equipped to meet the highest standards of ESG performance. One key mechanism through which we are providing this leadership is the AusIMM Social Responsibility Framework, comprised of the:



- **AusIMM Royal Charter and By-Laws**

- **AusIMM Code of Ethics**

- **AusIMM Social Responsibility Statement**

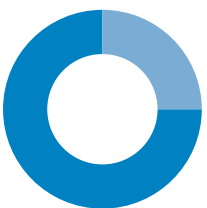


- Area of Practice descriptions for **AusIMM's Chartered Professional Program**, including for Environmental and Social Performance professionals.

AusIMM is also expanding its program of ESG related professional development offerings to ensure resources professionals are equipped to meet these standards, including through Professional Certificates in Social Responsibility and Tailings Management.

AusIMM's Royal Charter references community considerations and the Code of Ethics states 'The purpose of the Institute is to advance the sciences applying to the minerals industry for the benefit of the community'. Members must be aware of, and consider ESG factors, including specific legal requirements and well-established global sustainability principles, standards and guidance material.

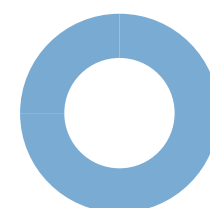
The AusIMM Social Responsibility Statement outlines three levels of professional due diligence in relation to ESG factors:



- **Level 1 – Awareness** Awareness of all members of AusIMM's Code of Ethics and the existence of global ESG related principles, standards and guidance, and the likely consequences of work activities on communities and broader society. This can involve participating in relevant cultural induction and awareness training, demonstrating consistent good behaviour appropriate to local context and workplace codes of conduct; and undertaking professional work with personal accountability for good health, safety, environmental and social outcomes.



- **Level 2 – Understanding** Understanding by members in leadership roles of how they can contribute to minimising harm and maximising value to affected communities and broader society by reference to global ESG related principles, standards and guidance, managed effectively through workplace systems, procedures, and behaviours. This includes the identification of environmental and social uncertainties, threats and opportunities through risk assessment, and designing and executing work to gain broad-based support for resource development and operations.



- **Level 3 – Competence** Competence by members who have accountability in ESG areas of Practice, demonstrated through professional qualification, experience and a working knowledge of jurisdictional requirements, workplace systems and procedures, relevant global principles, standards and guidance, and potential JORC modifying factors. Greater detail is set out in the AusIMM Environmental and Social Performance Chartered Professional guidelines.

AusIMM believes that the supply chain due diligence requirements articulated in the Social Responsibility Statement are a critical tool to identify, assess and mitigate risks while increasing traceability and transparency for Australian battery metal products.

AusIMM calls on all professionals working in resources to understand their role in ensuring the resources industry develops in a socially and environmentally sustainable fashion, as outlined in the Social Responsibility Framework.

AusIMM calls on governments to ensure project approvals frameworks and regulatory oversight across the mining life cycle is delivered in a way that prioritises beneficial environmental, social and community outcomes. We note significant reforms in several jurisdictions to modernise approvals frameworks, implement robust financial assurance frameworks to cover mining legacies, and establish independent regulatory bodies to oversee land access, mine rehabilitation and other key matters affecting ESG performance in the sector.

AusIMM calls for ESG policy co-ordination across industry, government and academia

The AusIMM Social Responsibility Framework deliberately incorporates existing international ESG frameworks, including those set out by the Organisation for Economic Co-operation and Development OECD, United Nations, International Finance Corporation, International Council of Mining and Metals and our kindred bodies across the global resources sector.

Notwithstanding the significant value realised through these various frameworks, AusIMM cautions against the proliferation of initiatives that increase the risk of duplication, inconsistency, and complicate the task of incorporating standards into legal and regulatory frameworks.

AusIMM calls for coordination across the sector to ensure alignment of industry, state, professional, legal and regulatory framework for ESG across the lithium and battery metal supply chain.

AusIMM calls on regulators to work with industry to ensure ESG factors are appropriately reflected in the legislative frameworks for battery metals project approvals.



Innovation and technological development

The global resources sector is undergoing rapid transformation with new technologies and shifts towards automated and remote operations allowing the Australian sector to capitalise on the significant growth projected for battery metals.

Australia has been at the forefront of major research breakthroughs in mining and processing technology, including, for example, the development of grinding and flotation technologies that are now deployed across the global resources sector. The challenge historically for Australia has been to commercialise this research competence.

This is an area in which significant progress has been made. For example, Federal and State Governments have funded work to support applied research and technological advancement through Co-Operative Research Centres, Australian Research Council programs (including Centres of Excellence, Training Centres and Research Hubs), government agencies (including CSIRO and both the State and Federal geological surveys), and industry-development hubs (such as Lithium Valley in Kwinana, Western Australia).

These initiatives have led to several breakthroughs in applied research of relevance to the battery metal sector, particularly in fields such as chemical refining, precursor chemical development, cell manufacture, battery assembly, deployment and recycling.

A number of these projects are canvassed in the report prepared by CSIRO for the Future Battery Industries CRC, entitled 'State of Play, Australia's Battery Industries as at March 2020'.²⁴ AusIMM commend this report as a 'point in time' overview of key research programs across the region.

²⁴ Best, A. and Vernon, C., 2020, 'State of Play: Australia's Battery Industries as at March 2020', CSIRO, Australia; Azevedo, M., Campagnol, N., Hagenbruch, T., Hoffman, K., Lala, A., Ramsbottom, O., 2018, 'McKinsey & Company: Lithium and cobalt – a tale of two commodities' available at: <https://www.mckinsey.com/~/media/mckinsey/industries/metals%20and%20mining/our%20insights/lithium%20and%20cobalt%20a%20tale%20of%20two%20commodities/lithium-and-cobalt-a-tale-of-two-commodities.ashx>.

AusIMM calls for further research to address the following key matters :



- **Hardrock spodumene concentrate production** Spodumene is the major economically significant lithium mineral mined in Australia. It is associated with pegmatite mineralisation and mined by hard-rock methods. Hardrock spodumene offers significant competitive advantages compared with salina projects as production can be suspended and restarted rapidly in response to market variability. Salina projects (extraction from brines and salt lakes) may also have significant environmental, social and post-mining land use impacts. Australian research should focus on maximising the cost efficiency of spodumene concentrate production, and ensuring key ESG related matters are addressed. Further research is also warranted to improve the economics of recovering lithium from micaceous lithium minerals including lepidolite.



- **Pre-cursor chemical manufacturing** A focus on battery precursor chemical manufacture (including NiSO₄, CoSO₄, MnSO₄ and LiOH) will move Australia further down the value chain, provide a basis for expanded battery manufacturing, and allow the sector to integrate more fully into the global battery supply chain by strengthening relationships with strategically aligned technology producers and end-users.



- **Battery technology development** AusIMM recommends a focus on new and emerging battery technologies, to keep pace with changing end-user preferences as new technologies and battery chemistries emerge.
- **Battery recycling** Research to support onshore battery materials recycling will help ensure environmentally hazardous lithium ion and nickel cadmium materials are responsibly managed. Efficient recycling could also provide material for use across the domestic manufacturing sector. We additionally note that governments can play a role in encouraging battery recycling through regulatory settings and recycling legislation.



Skills development and workforce sustainability

The imperative for professional expertise

Professionals working across the Australasian resources sector are recognised around the world as leaders in their field. This leadership is reflected not only in the global standing and strong market position of the industry, but also in the sustained global demand for our region's professional services, standards and practices.

In relation to battery metals, we have made significant scientific and research contributions, for example, in spodumene concentration, lithium hydroxide processing, pre cursor chemical manufacturing and the transformation of mineral ores and concentrates into high-value sulphates.²⁵ The Australian sector has, however, historically struggled to translate and realise the full commercial application of our research and development achievements.

The pace and scale of technological advancement in the sector has never been greater, and the battery metals value chain is perhaps one of the most acute sites of this advancement. Expanding the region's capacity across the battery minerals chain will require further technical research, as discussed above, but will also increase demand for competent and highly skilled professionals in fields such as chemical, geological and metallurgical engineering and materials science.²⁶

The demand for an expanded range of professional skill sets to support the nascent battery metals sector therefore creates a significant opportunity for the region to generate new expertise and employment opportunities for professionals working in the industry.

AusIMM sees several key imperatives for securing a strong talent pipeline to enable expansion of the Australian battery metals sector, which we outline overleaf.

²⁵ Austrade, 2018, 'The Lithium-Ion Battery Value Chain', available at: <https://www.austrade.gov.au/ArticleDocuments/5572/Lithium-Ion%20Battery%20Value%20Chain%20report.pdf.aspx>.

²⁶ Best, A. and Vernon, C., 2020, 'State of Play: Australia's Battery Industries as at March 2020', CSIRO, Australia; Azevedo, M., Campagnol, N., Hagenbruch, T., Hoffman, K., Lala, A., Ramsbottom, O, 2018, 'McKinsey & Company: Lithium and cobalt – a tale of two commodities' available at: <https://www.mckinsey.com/~media/mckinsey/industries/metals%20and%20mining/our%20insights>

AusIMM calls for action on key focus areas for a sustainable talent pipeline

AusIMM recognises several key areas in which action is required to ensure a sustainable and agile future resources workforce:



- **Forecasting** to ascertain the future needs of the industry, map expected growth in the resources workforce and identify potential gaps and skills shortages



- **Education** skills and training, with an expansion of education pathways to diversify progression and entry options across all battery metal mining, processing, manufacturing and battery recycling fields



- **Attraction and retention** to improve the perception of the resources sector and increase awareness of the breadth of established and emerging career opportunities, as well as the role of mining and processing in providing future economic and social prosperity



- **Equality of opportunity** which requires the sector to adopt a broad understanding of the diversity that exists within the community, recognise the value of accessing diversity of thought and background within the workforce, and working to increase the inclusiveness of the workforce and industry; and



- **Collaboration** with co-ordination across industry, government and the education to ensure a cohesive and responsive approach across each of these areas.

These were themes that emerged during the inaugural Resources Education Collaboration Summit, (RECS) co-hosted by AusIMM with the Victorian Government in 2019.²⁷ AusIMM are working to address each of these areas through several initiatives, including through establishment of the Working Group on the Resources Industry Future Workforce (discussed below).

AusIMM will also be hosting a second Resources Education Collaboration Summit with industry, government and education partners in 2021.

AusIMM calls for collaboration amongst all stakeholders in the sector to address these priorities, including industry, governments, universities, and training and education providers. We emphasise that collaboration across all industry tiers, the METS sector and allied sectors such as manufacturing, agriculture and defence will maximise access to skills required across the lithium and battery metal value chain.

²⁷ AusIMM, 2019, 'Summary Report: Resources Education Collaboration Summit', available at: https://www.ausimm.com/globalassets/advocacy/2020-recs-summary-report_v2.pdf.

Forecasting: working group on the resources industry future workforce

A key initiative led by AusIMM is the establishment of a Working Group on the Resources Industry Future Workforce, focussed on gathering data from universities and industry to forecast supply and demand and map gaps. The Working Group comprises representatives from industry and academia, with an initial body of work focused on:

- Devising and supporting a proactive approach to industry and universities to source accurate data on the supply and demand of graduates for the minerals industry
- Guiding engagement with industry and university stakeholders
- Providing insights and review into the desired types of data for collation from universities and industry
- Developing definitions for the minerals related roles on which data will be sought
- Establishing a clear methodology to guide data analysis
- Sharing advice and feedback on initial data analysis, including its presentation to key stakeholders

AusIMM looks forward to sharing outcomes from this initial body of work at the second RECS, and working with stakeholders to identify strategy to meet identified demand.

AusIMM calls for further engagement with industry, government, university and education stakeholders as this body of work progresses.

Education, skills and training

While Australia presently has world-leading capability in mining and commodity production, moving further down the battery values chain will require new specialist skill sets in precursor chemicals production, recycling and value-added manufacturing. AusIMM see a particular need to develop skills at the chemical manufacture stage, as the next logical 'step' down the value chain for the Australian battery metals sector.²⁸

Significant progress has been made to develop skills at the postgraduate degree level, including through bodies such as the Future Battery Industries Cooperative Research Centre based out of Curtin University. The Federal Government's Industrial Transformation Training Centres, which operate with significant financial contributions from state and territory counterparts, have also supported postdoctoral and postgraduate research programs in critical minerals and METS.²⁹





AusIMM takes the view that training and education is required to prepare these researchers to work in the resources sector, and likewise support the continuous professional development of resources professionals who are not higher research or doctorate qualified. This demands collaboration between industry specialists and university researchers to deliver tailored professional development for the resources sector, which is one of AusIMM's core capacities as the peak association for professionals working in the sector.

AusIMM calls on industry, government, academic partners and kindred professional institutes to join us in co-developing and delivering tailored professional development and support for professionals with the emerging skillsets required for an expanding battery metals sector.

Attraction and retention: further insights on youth attitudes towards the resources sector

Research conducted by AusIMM in collaboration with our industry partners offers insights into the factors that attract young people to the industry, and what drives them away. These insights are particularly salient when considering future workforce needs for an expanded battery metals sector, which will call on people from a range of technical, professional and industry backgrounds. Encouraging future professionals to pursue careers in resources will be key.

Key findings from AusIMM research touch on the following themes:

-  **Certainty** Few high school, university and vocational education aged students are fixed on a career in a particular industry, with career certainty trending up with education
-  **Awareness** Knowledge of the resources sector generally varies across jurisdictions, but knowledge of mining careers is extremely low, with 94% of students indicating they know either 'nothing at all' or only 'a little bit' about careers in mining
-  **Association** Spontaneous associations with mining are generally negative to neutral, with young Australians recognising both the current and future economic contributions made by Australian mining, but having little awareness of the sector's role within broader society (including, for example, in relation to battery metals)
-  **Interest** Low consideration of mining is generally driven by a lack of knowledge, rather than conscientious objection based on ethical or environmental concerns
-  **Influence** Key spheres of influence in the career decisions of young Australians are television and online news, school classes, friends and family (particularly parents), and are positively influenced by an increased understanding of the breadth of career opportunities in the sector, the opportunity to work overseas and across regional and metropolitan locations, and the strong wages offered in the industry

AusIMM has conducted and championed this research to instruct future government and industry initiatives intended to strengthen and secure the critical talent pipeline for the resources industry, and in turn support the ongoing role of the industry within the community.

AusIMM calls for industry and government partners to join with us in targeted programs to increase youth awareness, understanding and interest in the resources sector, and the various career opportunities it offers.

²⁸ Best, A. and Vernon, C., 2020, 'State of Play: Australia's Battery Industries as at March 2020', CSIRO, Australia;

²⁹ Ibid.

Equality of opportunity: securing the workforce through a diverse and inclusive industry

As expansion of the Australian battery metals sector creates demand for new professional skill sets, it is vital that industry continues to attract a diverse cohort of professionals into the sector. Battery metals industrial expansion demands a workforce possessed with the full breadth of knowledge, skills and experiences required to support the burgeoning industry's economic, technical, environmental and social custodianship.

As the peak professional body for all people in resources, AusIMM's focus is on supporting and empowering resources professionals, and through driving change to champion an inclusive sector, maximising the diversity of our professional cohort and supporting equality in accessing opportunities in emerging fields such as battery metals.

We draw the government and industries' attention to four key areas that require a particular focus:

- **Professional and role diversity** across the resources sector
- **Aboriginal and Torres Strait Islander people** working in resources
- **Gender and sexually diverse professionals** in resources, including women in mining
- **Age diversity** of people working and pursuing careers in resources

At AusIMM, we to address these focus areas through several levers:



• **Advocacy** We raise awareness about diverse attributes, skills and qualities of our professional community and advocate for equality of opportunity in our sector.



• **Education** We equip all professionals with the tools, guidance and professional development opportunities they need to thrive and drive meaningful change for themselves and all other people working in resources, including through initiatives such as our National Mentoring Program



• **Insight** With a global member base and networks spanning industry, government and academia, we undertake research and analysis to identify priorities for action, inform our initiatives, and expand knowledge within the sector and community. Findings from our flagships Women in Mining survey, for example, are set out below.



• **Standards** We expect and promote the highest standards of professional conduct and ethical practice across all parts of our industry, as explored in this submission, including by encouraging members to exercise personal leadership and uphold principles of equity and inclusion.

Expansion of the battery metals sector provides an opportunity to address these challenges, drive workforce participation and create further employment opportunities for Australian professionals working across a range of technical and professional fields.

AusIMM draws the sector's attention key findings from our 2020 Women in Mining Survey. AusIMM takes the view that these focus areas are as salient for women in mining and as they for all other professionals pursuing careers in resources, with results showing that:



• **Perception challenges persist** Women continue to report that their own workplaces are significantly more inclusive than their perception of the broader resources sector.

67%

• **Amenities are improving:** In the latest survey, 67.0% of female respondents rating amenities as good or very good, an increase of 7.5% on previous years.



• **Travel support is improving:** Reflecting the sector's agility in response to the COVID-19 pandemic, 73.0% of female respondents rated employer support for travel as good or very good, an increase of 10.0% on previous years.



• **Educational pathways must be broadened:** Survey results show, for example, that Aboriginal and Torres Strait Islander women in resources are five times more likely to have high school graduate as their highest form of qualification, compared to the survey average.

79%

• **Diverse leadership is needed:** Leadership is rated by 79.0% of women in resources as being a top priority for diversity and inclusion in the sector, and is identified as a key professional development priority by 55.0% of respondents.



• **Workforce flexibility is a priority:** The on-site experience is improving for many women in resources, but workforce flexibility and inter-role conflict continue to be key challenges.

AusIMM recognises and welcomes the shared commitment of many of our partners across industry, who have invested significant capital and human resources in programs to drive inclusivity and workforce diversity. We likewise commend the Federal Government for identifying workforce diversity and inclusion as a key priority under the National Resources Workforce Strategy.

A focus on supporting junior and mid-tier companies to attract and engage a diverse workforce will be particularly critical as the battery metal sector expands. Individual operators across the value chain may not have the workforce footprint or capital to establish programs of a similar nature to their top-tier peers.

AusIMM plays a vital role in bridging this gap, uniting employers and professionals from across the sector through the provision of inclusive professional development opportunities, networks and events, and through the research and information sharing initiatives outlined above.

AusIMM calls for continued investment and engagement in workforce programs that provide support for operators across all tiers of the resources sector, including within the METS sector, to maximise equality of opportunity through diverse a workforce and inclusive working environment.

AusIMM calls for continued investment in training and development pathways to ensure the supply of the skilled personnel that will be required to support battery metals expansion. Skilled workers will be required for technical, maintenance and operational manning, as they will in a range of fast-developing professional fields. Pathways must be available across the tertiary, trade and technical education systems, and must be combined with clear continuing professional development pathways to increase access to a workforce that is diverse in respect of both skills and background.

Business and geostrategic considerations

Australia benefits from a well-established position as one of the most attractive jurisdictions for mining investment worldwide. This global position is based on the region's significant minerals endowment, world leading technical and professional practices, broadly supportive policy settings, political stability and low corruption.³⁰

³⁰ Yunis, J and Aliakbari, E, 2021, 'Frasier Institute Annual Survey of Mining Companies, 2020', available at: <https://www.frasierinstitute.org/sites/default/files/annual-survey-of-mining-companies-2020.pdf>.

Key challenges

The sector's high degree of investment attractiveness is a significant benefit for operators seeking to secure finance for lithium and battery metal projects in the region. AusIMM appreciates from our partners across the sector that there are, however, several investment challenges peculiar to the battery metals sector, including:³¹

- **Low supply and price volatility** Key battery commodities such as lithium, nickel and cobalt have historically been in relatively low supply worldwide. While this points to the clear opportunity to expand the Australasian value-added battery metals sector, the emergence of new supply often leads to significant price spikes. This volatility complicates the operating environment for industry and investors, creating a hurdle for project financing
- **Price opacity** Supply, demand and pricing of key battery commodities across the global marketplace is not transparent, making it difficult for prospective investors to assess the viability and value of prospective Australasian projects³²
- **High tech is high risk** As a somewhat nascent sector, technologies to enhance extraction, beneficiation and processing of battery metals are still emerging and being commercialised. This is both a benefit and major challenge for Australasian projects. While the Australasian sector possesses, and is well placed to apply emerging expertise, most projects are technically novel, which increases the risk profile for institutional investors
- **Investment across the supply chain** The limited diversity of project financing vehicles available to Australasian project proponents, particularly the prevalence of internationally financed offtake agreements, restricts domestic miners' capacity to make lithium and battery commodities available for downstream value-added domestic industry
- **Foreign investment restrictions** The imperative to protect national interests has spurred a regulatory response that restricts the availability of (some) foreign capital to Australasian project proponents

With battery metals recognised as a strategic priority and substantial economic opportunity in Australasia, AusIMM takes the view that these investment restrictive factors warrant a targeted response from government. Australian governments at the state and federal levels can provide funding to replace these investments and maximise the availability of capital for lithium and battery metal projects (across the value chain).

³¹ Best, A. and Vernon, C., 2020, 'State of Play: Australia's Battery Industries as at March 2020', CSIRO, Australia; Azevedo, M., Campagnol, N., Hagenbruch, T., Hoffman, K., Lala, A., Ramsbottom, O, 2018, 'McKinsey & Company: Lithium and cobalt – a tale of two commodities' available at: <https://www.mckinsey.com/~media/mckinsey/industries/metals%20and%20mining/our%20insights/lithium%20and%20cobalt%20a%20tale%20of%20two%20commodities/lithium-and-cobalt-a-tale-of-two-commodities.ashx>.

³² Maxwell, P, 2015 'Transparent And opaque pricing: The interesting case of lithium', Resources Policy, available at: <https://isiarticles.com/bundles/Article/pre/pdf/43430.pdf>; see also Commonwealth of Australia, 2018, 'The Lithium-Ion Battery Value Chain: New Economy Opportunities for Australia', Austrade, Canberra, available at: <https://www.austrade.gov.au/ArticleDocuments/5572/Lithium-Ion%20Battery%20Value%20Chain%20report.pdf.aspx>.

Responses across Australian government

Australian governments at the state, federal and territory levels have provided substantial support to attract capital investment and improve the business and investment conditions for Australasian lithium and battery metal projects, including through:



- **Infrastructure** Substantial investments in transport, freight and critical energy infrastructure, including through the National Australia Infrastructure Fund



- **Exploration** Delivery of exploration incentive programs and collaborative exploration initiatives, particularly those with a focus on junior explorers (many of whom are active in the battery metals sector)



- **Intelligence** Programs to re-analyse existing cores and mine samples, and understand the secondary prospectivity of existing sites are underway across several jurisdictions



- **Data transparency** Open data initiatives being led by Geoscience Australia and the various state Geological Surveys, which are a critical supplement to exploration incentive programs



- **Approvals** Programs to modernise and streamline regulatory approvals processes are also underway at the state and federal levels, which AusIMM support on the basis that they balance efforts to reduce duplication and inefficiency with the preservation of critical protections to ensure sustainable economic, social and environmental outcomes

AusIMM supports programs of this nature being led by governments across the region. In the section that follows, however, we identify several further actions that will further advance substantial efforts and investments made by Australasian governments to date.

Focus areas for future action

To further strengthen the business and investment conditions for battery metals expansion in the region, AusIMM recommends governments collaborate with the sector on programs to drive:

- **Access** Governments should continue to pursue trade agreements with key emerging markets for battery metals, including in India, Taiwan, South Korea, Japan and China. Such agreements are important to diversify the market for Australian battery metal outputs, particularly given the complex geopolitical environment, opaque market and national security imperative that exists for consumers across the global supply chain
- **Attraction** Governments have invested significantly in geological programs to expand understanding of Australia's battery metals endowment. This investment should be matched by government support for flagship conferences, events and international forums to promote investment opportunities and stimulate the domestic battery ecosystem. Such events are also vital to connect experts and industry leaders, researchers and professionals to advance best practice across the battery value chain, helping to build Australia's profile as a clean, reliable and ethical producer
- **Demand:** Measures to increase domestic demand for battery metals and products will strengthen the business case for domestic operators, and provide an important supplement to overseas markets. AusIMM recommends governments investigate opportunities to strengthen domestic demand through local procurement (particularly for government fleets and buildings), grid-scale energy storage, and programs to strengthen Australia's brand and credentials as a clean, reliable and ethical player in the global battery supply chain.
- **Consistency:** AusIMM puts the view that government programs should, where feasible, have equal application across geographical regions, to avoid unintended consequences and externalities. Where governments pursue place based policy and investment initiatives, the rationale must be clear, and reflect the concentration of industrial demand and potential (as relevant to battery metals). AusIMM notes that some government investment programs may have a perverse impact on the Australian battery metals sector, with significant funding available for projects in Northern Australia and a relative absence of comparable programs in key battery regions such as south west Western Australia and South Australia.
- **Mobility:** AusIMM commends the commitment of several Australasian governments pursuing a consistent framework for professional registration and regulation, as reflected in significant efforts to drive Automatic Mutual Recognition reforms in Australia. AusIMM cautions, however, that such efforts must be coordinated, as several state based reforms continue to see a proliferation of narrowly scoped professional registration regimes. It is vital that such developments take place in a coordinated way, lest they complicate the task of delivering consistency and mobility across jurisdictional boundaries.

AusIMM recommends Australian governments focus on these additional levers to create a supportive business environment for the nascent battery metals sector. AusIMM invites further engagement with governments in relation to these matters, particularly in the context of key policy planning initiatives such as the Global Resources Strategy and Queensland Resources Industry Development Plan.

