Mineral Development Taskforce | FINAL REPORT

December 2022

NORTHERN TERRITORY GOVERNMENT | THE TERRITORY

Introduction

The mining sector currently contributes close to a quarter of the Territory's gross state product and is a key contributor to the Northern Territory Government's vision of a **$40 billion economy by 2030**.

The mining sector currently employs around 3,500 people directly, and the total value of mineral production in the Northern Territory was $4.86b for 2021–22. Securing new producing mines and increased Territory-based minerals processing and value-add will be critical to economic growth, industry diversification, labour force expansion and productivity.

The Mineral Development Taskforce (the taskforce) has been tasked with identifying barriers to investment in the Territory and developing options to drive external investment to realise the Territory's enormous mineral development potential to support increased economic and social benefits across the region for all Territorians.

Foreword

Dear Minister for Mining and Industry

The Mineral Development Taskforce is pleased to present to you our final report.

Resources is the Territory's biggest contributor to the economy.

Worth close to $4.9b, the mining industry is also one of the largest job creators with around 3,500 people directly employed by the sector. The indirect flow-on benefits to the Territory economy, including our regional areas, are significant and vital to support ongoing growth and prosperity.

The Territory will continue to be in demand for its availability of world-class mineral resources, particularly for a future that recognises the global expectation of decarbonisation and the growing focus on emerging technologies.

In fact, many of the resources found here are critical to the world's transition to net zero emissions and provide the essential raw materials that are needed to address climate change and technological advancements of the future.

There has never been a greater demand for critical minerals such as lithium, rare earth elements, cobalt, manganese, phosphate and copper.

While the increasing need for more minerals and metals is good news for the Territory's economic prosperity, the development of this sector must be sustainable and responsible, and social licence is critical. The priority has to extend beyond exporting raw materials to focus attention on maximising local value-add opportunities.

The Northern Territory Government set an ambitious but achievable goal to build a $40b economy by 2030 to create more jobs in sustainable industries and end the boom and bust cycles of the past.

The Territory is in a prime position to achieve this goal, but to do so, requires focus and determination to become the most competitive and attractive destination for investment, not just in exploration and mining projects but also in new downstream value-add industries.

It has been my honour to chair the Mineral Development taskforce alongside 6 independent members from industry and government, who collectively contribute more than 100 years experience in resource development policy and practice in both public and private sectors. I also acknowledge the significant contribution from Sid Marris from the Minerals Council of Australia and Clare Pope from PricewaterhouseCoopers.

This taskforce has brought a depth of invaluable knowledge and experience to the table, and I would like to take this opportunity to record my appreciation for taskforce members' significant and tireless efforts and advice.

Our final report to government outlines a series of recommendations and possible specific actions which are individually and collectively targeted at driving a step increase in external investment in mining and downstream value-add projects to help secure the vision of a $40b economy and beyond.

We need to grasp the opportunity to participate in the new era of modern mining for the benefit of all Territorians.

Sincerely

Shaun Drabsch
Mineral Development Taskforce – Chair
Chief Executive Officer
Department of Industry, Tourism and Trade

Chair

Shaun Drabsch
Chief Executive Officer
Department of Industry,
Tourism and Trade

John Braham
Independent Director
Castile Resources Ltd

Tania Constable PSM
Chief Executive Officer
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Dr David Carland
Company Director and co-founder
BurnVior Corporate Finance

Bryan Quinn
Growth Executive OZMinerals and
(Former BHP President)

Tom Seymour
Chief Executive Officer
PricewaterhouseCoopers

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Deputy Director General, Resources and
Project Facilitation, Department of Jobs,
Tourism, Science and Innovation

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Manganese freight ship loading at Groote Eylandt

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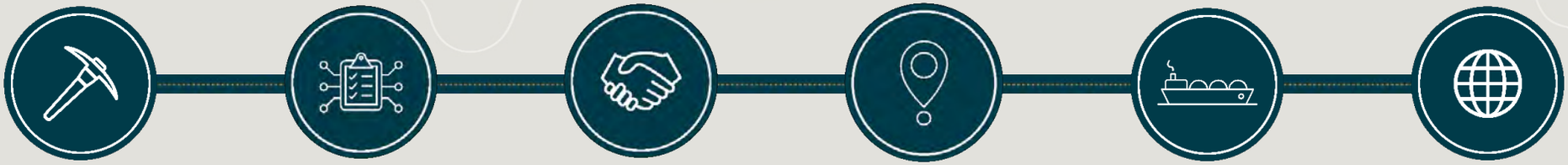
The Territory's mineral potential remains relatively untapped, presenting significant opportunities.

The Territory is an established mining jurisdiction with world-class mineral deposits, including critical minerals, and is strategically located close to the high-growth Asia-Pacific region.

The Territory is underexplored, with substantial areas available for either new exploration or for farm-ins and joint venture exploration agreements with existing tenure holders.

Inherent strengths

The Territory has inherent strengths that can be leveraged



World-class mineral deposits, including critical minerals[1]

High quality pre-competitive geoscience data on mineral opportunities available at no cost[2]

Small jurisdiction – responsive and ready access to key decision makers

Proximity to markets in Southeast Asia[3]

Deep water harbour and intermodal logistics[4]

Globally significant gas resources and a high level of solar irradiance provide the potential to deliver secure and cost competitive power generation[5]

Mining industry growth and diversification is key to realising a $40b economy by 2030.

A step increase in new investment capital is vital to sustained industry growth and diversification.

Private investment will take the path of least resistance, and, to be globally competitive, the Territory must reduce and eliminate barriers.

The Territory has to be attractive and competitive for new investment in mining and downstream value-add projects. It must be the investment destination of choice and unequivocally embrace industry growth and expansion.

Government effort has to extend beyond expediting private investment in new mining projects to securing a Northern Territory industry ecosystem that inspires economically sustainable opportunities in downstream value-add processes. This transition of mining away from being a primary industry will deliver positive externalities beyond purely economic ones and is the mining industry's critical and necessary contribution to achieving a $40b economy.

The transition away from primary mining requires structural reform to secure appropriate conditions for private investment and institutionalise an economy that supports sustainable private economic activity.

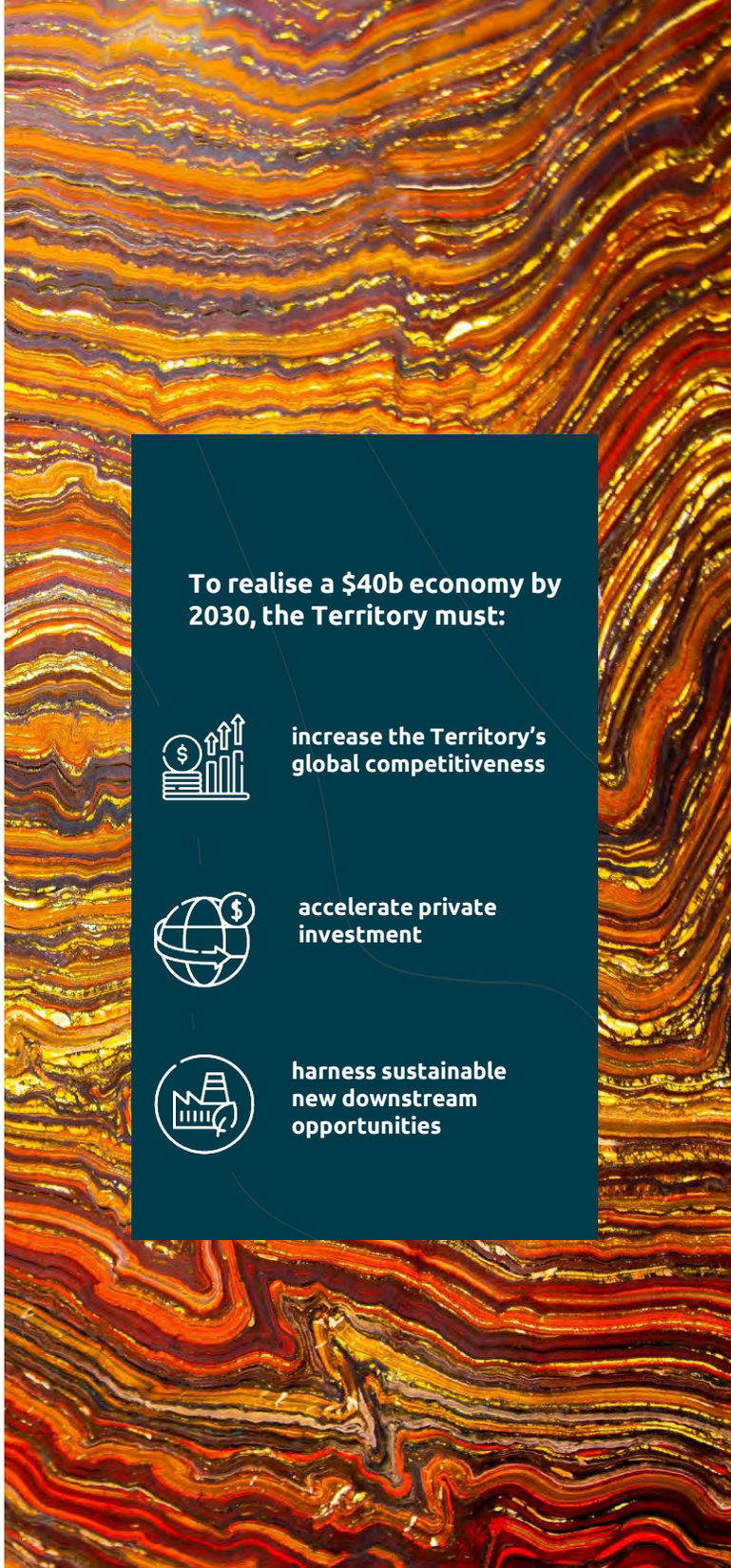
Social licence is critical for industry growth and expansion. Securing mining industry credibility, legitimacy and acceptance requires collaborative effort to build community confidence in sustainable sector operations.

The taskforce's recommendations, while addressing more immediate barriers to private investment, ultimately aim to shift the mining sector away from a being a primary to becoming a secondary industry over the medium to long term. Government commitment and investment will be critical to making this transition a reality.

The report is in 3 sections. Section 1 analyses the enabling environment for mining projects from the perspective of project proponents. It considers what the private sector has identified to be key project risks and potential government actions that could open up greater opportunities for mining activity.

Section 2 considers options to accelerate project investment decisions through the lens of an investor, Royalties is one consideration, as is a more targeted role for governments in project financing and funding.

Section 3 analyses downstream value-add opportunities. It notes that while production costs in the Territory are generally at the higher end of the scale, there are broader strategic, economic, social, supply chain security and national interest considerations that could justify a case for government intervention to facilitate downstream value-add opportunities.



To realise a $40b economy by 2030, the Territory must:

- increase the Territory's global competitiveness
- accelerate private investment
- harness sustainable new downstream opportunities

Key Findings

The taskforce has identified a range of opportunities to increase and enhance the competitiveness of the Territory as an investment destination and position the Territory to achieve its $40b by 2030 economic target. A summary of the key taskforce findings and conclusions are outlined below.

1. **Speedy development of new mines is critical to achieving targeted economic outcomes** – targeted initiatives need to be introduced to encourage increased exploration and mining activity.
2. **Industry views access to land as a significant risk** – securing coordinated, streamlined, transparent and efficient land access processes that respect landowners and recognise co-existing uses is critical.
3. **Regulatory processes have a significant impact on project economics** – risk-proportionate regulations focussed on outcomes rather than inputs can deliver improved project dynamics and have to be targeted.
4. **The Territory needs to recognise the new remote workforce paradigm and capitalise on what it can control** – focus on building local skills, and, through multi-industry collaboration, ensure a focus on workforce retention.
5. **There is an infrastructure gap in the Territory** which must be able to be addressed in a timely manner to de-risk exploration, mining and downstream value-add investment opportunities.
6. **The success of the mining industry relies on its ability to align with community expectations** – trust in the regulator and social licence must be secured.
7. **The Territory's royalties regime is uncompetitive** and a deterrent to investment. It must be revamped.
8. **Governments have a significant role in supporting projects to reach final investment decision** – better designed and targeted project capital support programs are necessary.
9. **The Territory is well endowed with minerals that are the building blocks for a clean and technology enabled future** – capitalising on economically sustainable downstream mineral value-add opportunities is critical to securing a $40b economy by 2030.

Following detailed analysis of the high-level key findings and conclusions outlined above, the taskforce identified a series of targeted recommendations and possible specific actions. While consolidated directly below to provide a holistic perspective, the recommendations and possible specific actions are contained in the body of the report following analysis of each key matter canvassed by the taskforce.

Consolidated recommendations and possible specific actions

Consolidated recommendations and possible specific actions

Mineral titles

Recommendations	Possible specific actions
1.a.1 **Secure a pipeline of new mines mapped to deliver $40b by 2030**	• Publish a mining industry development and investment attraction strategy, developed in collaboration with industry. • Activate existing mineral leases and secure new investment by introducing incentives to encourage activity on ELs and mineral leases, and minimise opportunities for land banking. • Incorporate reportable minimum expenditure conditions on new or extended mineral leases. • Institute a more aggressive mining project facilitation stance to drive investment opportunities.
1.a.2 **Consolidate small mineral leases to increase investor interest**	• Target consolidation of small adjoining mineral leases, recognising existing titleholder interests. • Engage in active marketing strategies to increase investor awareness of brownfield opportunities.
1.a.3 **Increase transparency in mineral title processes**	• Engage with applicants earlier on in the mineral title process to ensure a clear understanding of processes and associated costs. • Ensure clear and concise fact sheets, guides and template documents are readily accessible. • Invest in digitisation for all mining title and authorisation applications, with readily accessible information on progress through assessment processes and supported by a contemporary and secure mineral titles IT system.
1.a.4 **Enhance the Northern Territory's legislative architecture to better target mining industry investment and development**	• Review and amend the legislative architecture for the Territory's mining industry to make it simpler and more transparent, and to increase focus on sustainable mining industry development. • Enhance the Department of Industry, Tourism and Trade's industry intelligence capability to improve monitoring of exploration activity and inform promotion of upstream investment opportunities. • Implement a detailed framework for assessments and renewals of ELs applications, including to secure rigour in assessment of proponent capacity and capability, with associated annual reporting of performance against licence commitments. • Introduce new mineral lease categories that take a risk-based approach to better recognise and encourage smaller explorers, miners and prospectors. • Introduce additional enforcement practices to encourage meaningful activity and progress towards development of the resource.

Access to land

Recommendations	Possible specific actions
1.b.1 **Increase process clarity and transparency for access to land**	• Publish information on all requirements covering access to land to facilitate early applicant engagement. • Collaborate with land councils, industry and regulators to publish guidance on how proponents should engage, including with native title parties and pastoralists. • Collaborate with land councils to develop and publish guidance notes on land access negotiation scope. • Progress development and rollout of simple graphics (storyboard communications) to support broader understanding of mining industry and activities. • Collaborate with land councils to digitise storyboard communications and create multi-media information, utilising common indigenous languages, to increase information accessibility.
1.b.2 **Reduce risks and streamline processes for access to land**	• For highly prospective mineral provinces, collaborate with land councils, AAPA and heritage council to secure publicly available baseline information to geospatially overlay geoscientific data, recognising confidentiality requirements. • Coordinate sharing of data and secure agreement on a consistent and efficient process for sacred site authorisations and certificates. • Invest in modernisation of AAPA business systems to increase sacred sites clearance efficiency. • Strengthen co-existing land use policies and practices to minimise mining industry vulnerability to specific interest group frustration of project and investment opportunities.
1.b.3 **Secure broader economic outcomes for Traditional Owners of land**	• Encourage land owner negotiations to focus on innovative approaches and strategic opportunities that secure enduring economic outcomes for Traditional Owners and Aboriginal communities beyond mine life. • Embed project proponent commitment to local content, including to long-term residual benefits for Traditional Owners and Aboriginal businesses. • Foster joint ventures/partnerships with Traditional Owners and land trusts in delivery of mining projects.

Regulatory reforms

Recommendations	Possible specific actions
1.c.1 **Build trust in mining industry regulators**	• Urgently develop and implement strategic communications and messaging on the role of the regulator in securing responsible and sustainable mining activity –mining activity will result in environmental disturbance, and environment regulation must proportionately manage, not prevent, disturbance. • Produce and publish annual reports on regulatory compliance activities and regulated sites. • Take timely and proportionate action on regulatory breaches and make actions public. • Embed stakeholder and community engagement functions as a core responsibility of all staff.
1.c.2 **Prioritise and implement risk-based and proportionate mining industry regulation focussed on outcomes**	• Commit to implement less prescriptive and more risk based outcomes focussed mining regulations. • Ministers issue statements of expectations reflecting broader industry policy drivers and strategic objectives, which establish the authorising environment for mining industry regulators and how performance will be measured, and which is tabled in the Legislative Assembly for transparency and accountability. • Introduce environmental regulatory reforms which are risk-based to balance the potential seriousness of an adverse outcome and the likelihood of it occurring, and which remove administrative overlap and provide certainty to business and industry.
1.c.3 **Streamline mining industry regulatory processes to secure a red carpet approach to project development and facilitation**	• Take a lead agency approach to regulatory approvals with processes led by sectoral agency. • Implement and publish administrative agreements that define the roles and responsibilities of regulators so that legislative and procedural responsibilities are discharged in an efficient, fair, transparent and consistent manner. • All regulatory agencies to ensure regulatory approvals timeframes are transparent, with annual reporting of performance against timeframes. • Invest in modern digital architecture to deliver a central Territory Government portal covering all mining-related regulatory processes and providing transparency on the status of applications and seamless regulatory engagement. • Publish user-friendly guidance material and template documents that comprehensively identify and capture all across-government mining regulatory requirements. • Implement open data policies and protocols that enable release of collected data to reduce duplication of effort and investment, and facilitate efficiencies in regulatory approvals processes and compliance. • Progress Territory Government approved-recommendations from TERC-commissioned regulatory mapping under the Regulating for Growth action that are targeted at improving mining industry regulatory processes. • Adequately resource regulatory functions, potentially through reprioritisation, to secure engineering, regulatory and technical expertise.

Skills and workforce

Recommendations	Possible specific actions
1.d.1 **Identify and implement strategies to plug skills and workforce gaps for exploration, mining and downstream manufacturing projects that recognise evolving industry needs and expectations**	• Deliver a baseline skills analysis gap for exploration, mining and downstream mineral manufacturing projects over short-medium and long-term, recognising the increasing role of technology, automation, artificial intelligence and robotics. • Informed by the baseline skills gap analysis, prepare, in collaboration with multiple industry sectors and the Australian Government, strategies that address specific skills and workforce issues more broadly but recognising the specific requirements of the mining industry.
1.d.2 **Focus on building local skills and growing our own for the mining industry, recognising the growing workforce paradigm of remote jobs**	• Government to collaborate with industry and university and VET sectors to develop and champion pathways for transition from school to jobs for specialist mining sector skills and capability development. • Work with industry to establish apprenticeship programs, targeted at Territorians, to mentor, develop and train a workforce for the future with specific emphasis on Traditional Owners of the land on which their projects are located.

Enabling Infrastructure

Recommendations	Possible specific actions
1.e.1 **Secure timely delivery of supply chain and other physical infrastructure necessary to underpin and attract new investment in exploration, mining and downstream value-add projects, recognising lead times and supply chain constraints**	• Finalise planning and design, and construct multi-use regional logistics hubs in Tennant Creek, Alice Springs and Katherine to ensure infrastructure is in place to de-risk mining project and downstream mineral processing opportunities. • Engage with project-to-port logistics chain stakeholders, including Aurizon and Darwin Port, to secure necessary infrastructure capacity to accommodate project requirements and avert bottlenecks. • Implement strategies that improve supply chain economics and reduce supply chain costs through multi-use efficiency, synergies and technology. • Work with industry to ensure the Territory's mining and downstream mineral manufacturing industry is future-proofed in low emissions supply chains and with the common use infrastructure necessary to support circular economy aspirations in place.
1.e.2 **Ensure infrastructure planning and delivery recognise and address the evolving nature of the mining industry**	• Government infrastructure planning to prioritise common-use infrastructure and identify, de-risk and allocate project-ready land in appropriate locations proximate to logistics, telecommunications and essential services infrastructure for mining projects and downstream minerals processing opportunities.

Social licence

Recommendations	Possible specific actions
1.f.1 **Balance negative public commentary on mining industry development**	• Develop and implement targeted strategic media and communications that include proactive campaigns to inform public commentary. • Take pre-emptive action to deal with issues – real or perceived and get off the back foot and onto the front foot to dispel myths and promote facts-based industry discourse. • Create a platform to share positive stories.
1.f.2 **Build mining industry credibility, legitimacy and acceptance in collaboration with industry**	• Campaign to promote industry alignment with a sustainable future, focussed on proven ESG credentials. • Promote industry benefits and make it real – creates jobs for your mother, uncle, daughter, brother and friend; increases opportunities and builds regional communities; leads to improved infrastructure in remote and regional Australia. • Partner with industry to demonstrate commitment to and embed practices that optimise resource extraction, minimise waste generation and deliver closed lifecycle use of resources. • Investigate and partner with industry to implement block chain and distributed ledger technologies to enable provenance tracing through chain of custody.
1.f.3 **Harness expertise, commitment and experience to be a mine rehabilitation centre of excellence**	• Establish the Northern Territory as a centre of excellence for mining remediation, rehabilitation and closure, including through investigating the establishment of a Mining Remediation and Rehabilitation Cooperative Research Centre, in partnership with the Charles Darwin University, Traditional Owners and industry. • Territory Government to collaborate with the private sector to develop models to identify and embed innovation opportunities in the rehabilitation and remediation of end-of-life mines and legacy mine sites based on science and evolving community expectations.

Royalties

Recommendations	Possible specific actions

2.a.1
Fundamentally reform the Territory royalty scheme – replace with an ad valorem scheme which is simple, competitive, delivers appropriate returns for non-renewable resources and delivers investment certainty[1]
	• Introduce by 2024 a replacement ad valorem royalty scheme with legislated certainty in terms of application and supported by modelling to provide information on the broader economic impacts of this change.
	• Work with industry and land councils to manage the broader implications of the new scheme and potential for grandfathering of the current scheme to soften short-term royalty change impacts.
	  ◦ The replacement ad valorem scheme should incorporate modern and contemporary design features, and further detailed design work is necessary to confirm its operation and application, particularly the following areas:
	  ▪ valuation arrangements for mineral commodities
	  ▪ administrative arrangements

2.a.2 **Improve existing capability and capacity in government to administer the Territory's mineral royalty scheme**	• Adequately resource the efficient and effective administration of the Territory's mineral royalty scheme. • Introduce early engagement strategies and publish guidance material to support new and emerging royalty payers in their understanding of the application and operation of the Territory's mineral royalty scheme.

Capital markets

Recommendations	Possible Specific Actions
2.b.1 **Focus financing effort in early-stage mining exploration and feasibility assessment to secure a sound business case for FID and project delivery**	• The Territory Government to request that the Australian Government reconsiders NAIF design so as to secure support based on identified gaps in project financing opportunities, particularly for the early-stage mining project feasibility and regulatory approvals phases. • Review the scope and reach of the Local Jobs Fund to likewise target the gap in current financing opportunities. • Work with industry to support junior explorers and small miners to progress to pre-feasibility and bankable feasibility studies.

Downstream value-add opportunities

Recommendations	Possible specific actions
3.1 **Prioritise advancing mining from a primary to secondary industry through securing sustained investment in downstream mineral processing and value-add**	• As a priority and to capitalise on Beetaloo timeframes, immediately identify and progress action to de-risk and secure local production of sand and related material to meet petroleum industry requirements. • Promulgate and implement government policies, strategies and frameworks that encourage mining projects to expand beyond the current primary mining pattern to downstream mineral processing and value-add. • Commission expert advice to develop a strategic plan to secure establishment of a Northern Territory downstream mineral processing and value-add industry, focussed on emerging industry trends, leveraging national and global opportunities and based on what is ambitiously achievable in the Northern Territory context. • Commit Territory Government funding and effort to policies, strategies and projects that will establish a downstream minerals processing and value-add industry.
3.2 **Identify, establish and nurture economic and business links with investment and export markets**	• Develop and articulate the Territory's value proposition for the mining industry and downstream minerals processing and value-add. • In collaboration with industry, create market development strategies for investment capital and exports that recognise and capitalise on the Territory's value proposition and are informed by evidence based analysis of priority/target markets to form the blue-print for industry and business engagement activities. • Develop a critical minerals prospectus to showcase Northern Territory minerals potential and opportunities.
3.3 **Secure the availability of reliable and cost-competitive energy**	• Ensure electricity infrastructure and system planning and design recognise and cater for the energy required to underpin and attract new industry growth, with a focus on renewable energy. • Collaborate with industry to develop and implement strategies to encourage and support mine plant designs and engineering flowsheets to maximise the use of renewable energy.

Downstream value-add opportunities

Recommendations	Possible specific actions
3.4 **Government takes further action to support sustainable water use for mining and downstream value-add activities**	• Develop and publish clear government policies on water availability for economic use, and processes and timeframes for resolving competing uses. • Collaborate with industry to secure industry commitment to sustainable practices that recognise efficient water use and maximise reuse and recycling, and publish performance against commitments.
3.5 **Investigate and, if viable, facilitate the establishment of a locally production of reagents**	• Undertake a detailed feasibility assessment of a Territory based reagent (sulphuric acid) manufacturer. • If feasible, develop a business case, including an assessment of the necessity for, degree of necessity and optimal approach to government market intervention and support. • Depending on business case, facilitate the establishment of local production.
3.6 **Accelerate the development of telecommunications infrastructure and digital connectivity across regional and remote Northern Territory**	• Engage the Australian Government to develop and implement a digital connectivity solution for regional and remote areas of the Northern Territory. • Engage with the Australian Government to develop and implement a plan to ensure a minimum standard of reliable 4G broadband to all regional and remote areas of the Northern Territory. • Collaborate with telecommunication network service providers to increase network redundancy, strengthen network fault tolerance and establish high telecommunications availability levels across the Territory.

Downstream value-add opportunities

Recommendations	Possible specific actions
3.7 **Encourage and support circular economy principles and architecture being embedded in mining and downstream minerals manufacturing business process design and architecture**	• Collaborate with industry to secure commitment to embed circular economy practices and applications in mining and downstream processing business process design and architecture. • Investigate and establish government strategies to reduce barriers for industry in the transition to resource recovery, recycling and reuse outcomes.
3.8 **Ensure government policies and regulations support and enhance traceability in the extraction, processing and transport of minerals**	• Continue to monitor Australian and global mining, product and supply/value chain traceability developments and trends to ensure government is positioned to proactively lead or respond to industry and market opportunities and requirements. • Proactively engage with industry and markets to investigate the potential for traceability to be leveraged as a value proposition for the Northern Territory minerals industry.

Section 1
Increasing the Territory's global competitiveness

Overview

To secure the global competitiveness of the Territory as an investment destination, section 1 analyses the enabling environment for mining project proponents.

Section 1 acknowledges that mining activities are developed in stages, common across all projects depending on resource discovery and commercialisation opportunities, and that there are specific challenges faced by project proponents in each stage.

Section 1 highlights the public policy and structural changes the Territory can make to improve a proponent's experience from early stage exploration to production and subsequent rehabilitation and remediation. It recognises that certainty and timeliness are critical success factors and that there are opportunities to modify current government settings to de-risk projects and improve investment attractiveness.

There are areas where the Territory is already punching above its weight. The Northern Territory Geological Survey (NTGS), for example, is recognised internationally as best in class[6]. A rolling program of activities to secure and publish pre-competitive geological information continues to yield vital information on regional mineral resource potential and prospectively, with large areas picked up by private sector parties for more detailed exploration. The geological survey facilitates collaborative programs in partnership with explorers and research institutions, is a key exploration enabler and is the bedrock for exponential growth in Northern Territory mining industry development, expansion and diversification. NTGS continues to advance activities that expand and secure accessibility to the wealth of available pre-competitive information for online users.

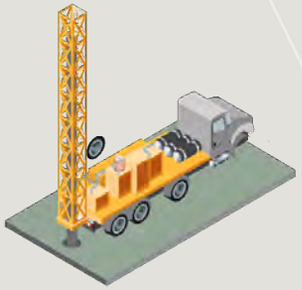
Section 1 focusses on other critical enablers for the mining industry and covers mining tenure, access to land, regulatory frameworks, skills and workforce, and physical infrastructure. With the growing focus on sustainability and environmental, social and corporate governance (ESG) principles, Section 1 also considers social licence issues faced by the industry and recommends initiatives to encourage greater levels of informed commentary around resource development and environmental stewardship.

Section 1 provides a portfolio of recommendations the taskforce believes will collectively result in greatly improved outcomes for the global competitiveness of the Territory's project-enabling environment.

Mine lifecycle

1. Exploration

The **exploration** phase involves identification of a target region, reconnaissance exploration and target appraisal.



2. Discovery phase

The **discovery** phase happens when something of value is found and involves assessment drilling, resource modelling and project planning.

3. Mine design

The **mine design** and **development** phase covers scoping and feasibility studies, front-end engineering and design, planning, environmental and other regulatory approvals and capital raising. The target is a final investment decision.

4. Mine construction

The **mine construction** phase involves the construction of necessary mine infrastructure including civil works for water dams, tailings dams, stockpiles, waste rock dumps as well as haul roads, surface water controls, drainage, milling and processing plants, and offices.

5. Production and Processing

The **production and processing** phase involves extraction, milling, processing and sale of the resource.

6. Rehabilitation

The **mine closure and rehabilitation** phase should commence at the start of the project and involves progressive site remediation, with the ultimate objective being to restore the site for future land uses.

(a) Mineral titles

There are 2 key types of mineral titles for Territory mining activities – exploration licences and mineral leases.

Exploration Licences (EL) provide an exclusive right to explore for minerals and to apply for a mineral lease for all or part of the title area.

Approximately 22% of the Territory is covered by ELs, with a further 22% under application.

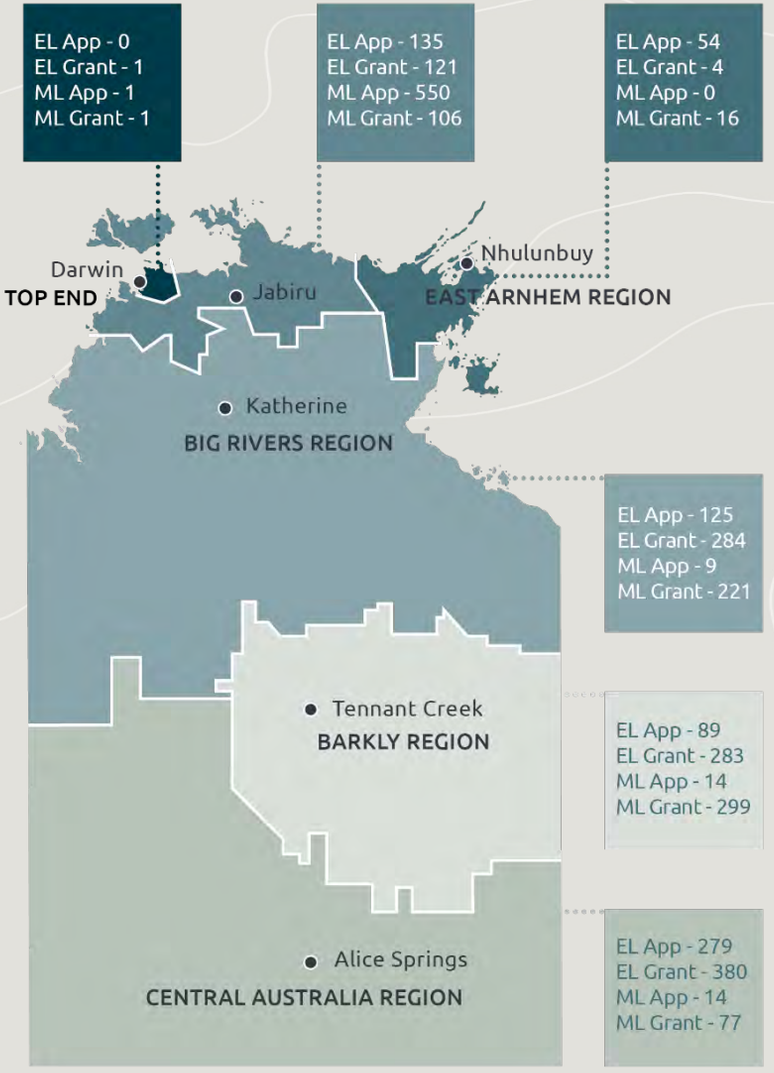
Mineral Leases (ML) provide an exclusive right to mine for minerals and to conduct activities ancillary to mining e.g. operate a treatment plant.

Approximately 0.12% of the Northern Territory is covered by MLs, with 0.03% under application.

Exploration licences: 1,073

Mineral leases: 720

Figures as at 23 October 2022.



Exploration licences

At 23 October 2022, there were 1,073 granted exploration licences covering approximately 22% of the Northern Territory.

All granted ELs have legislated requirements that must be met, including actively conducting authorised activities.

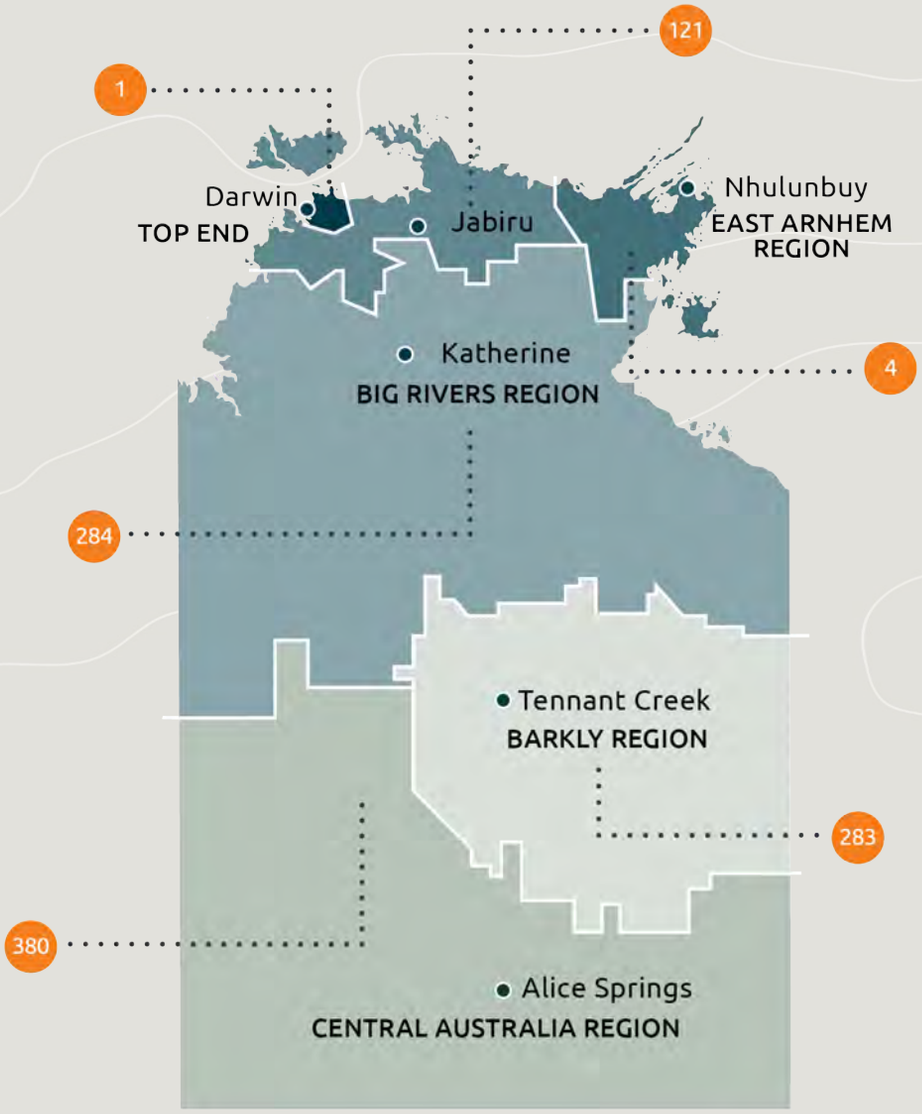
An EL holder nominates an annual expenditure covenant.

Activities are reported to the Northern Territory Government annually.

EL areas are measured in blocks of varying sizes, and loss of block penalties apply if expenditure covenants are not met for 2 consecutive years. However, penalties may be waived in full or in part.

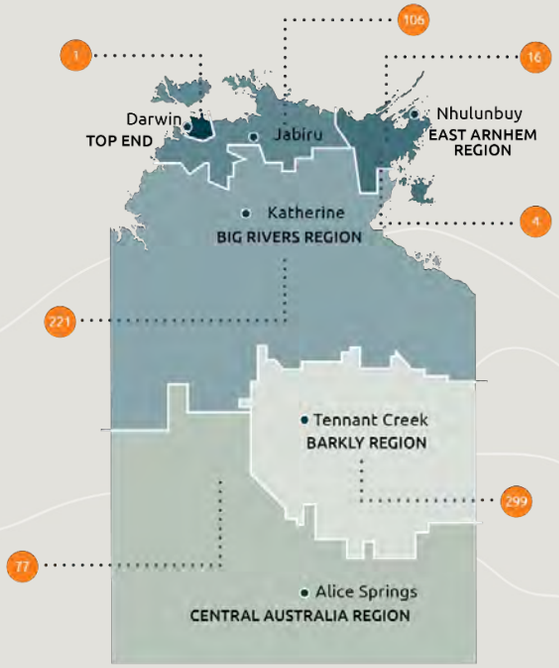
Initiatives targeted at increasing the rigour of assessment of proponent capacity and capability to deliver committed exploration activity and the subsequent enforcement of these commitments is critical.

There is an opportunity to encourage more expenditure and exploration activity on granted and in new ELs.

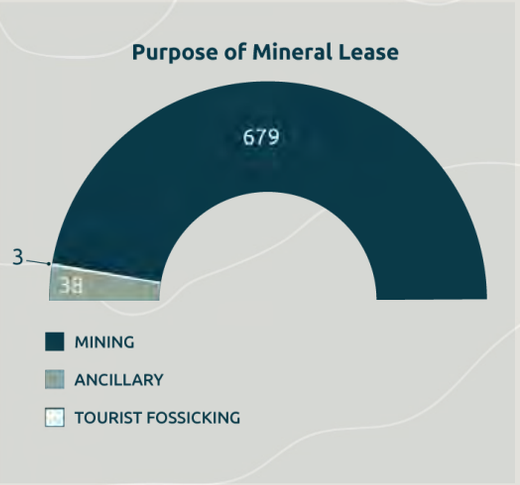


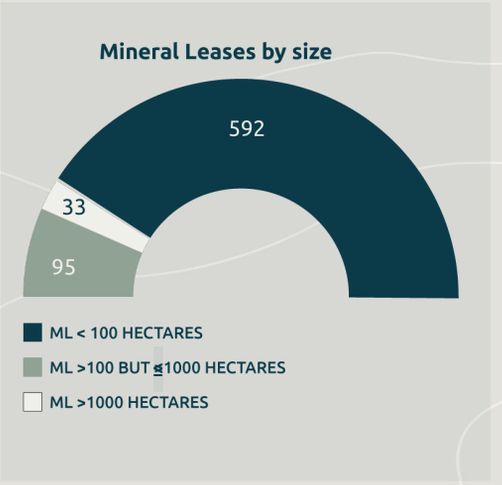
Current ELs in the Territory. Figures as at 23 October 2022.

Mineral leases



Current mineral leases in the Territory.



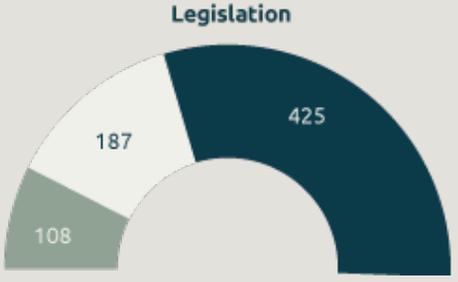


There are 720 MLs covering 0.12% of the Northern Territory. Of these, there are 8 operating mines across 68 MLs.

The holder of an ML must comply with the conditions of the lease. However, unlike ELs, there is no expenditure commitment requirement.

An ML can be cancelled for non-compliance with conditions. These generally relate to matters such as non-payment of rents and fees.

Complexities and lengthy timeframes associated with the re-application and grant of a new ML on either Aboriginal land or native title affected land act as a deterrent to lease cancellation.



Of the 720 mineral leases, **700** pre-date the **Mineral Titles Act.**

Mineral titles

The lack of expenditure and mine development on mineral leases is an impediment to economic expansion and diversification.

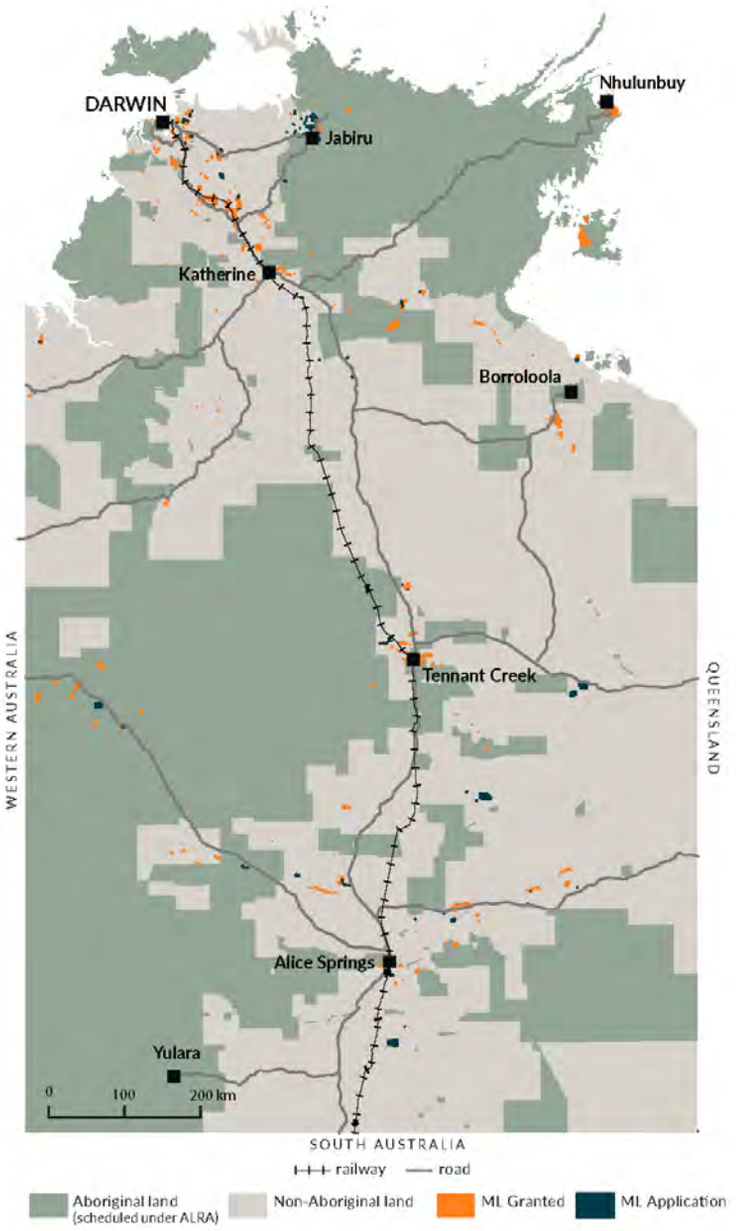
Only **20 new** MLs for mining have been granted since 2011.

The size of the majority of current MLs is also small, potentially making them unattractive for large investors.

Of the current 720 MLs

- 33 cover an area greater than 1000 ha
- 95 cover an area of greater than 100 ha but less than 1000 ha
- 592 cover an area of less than 100 ha, 469 of which are less than 40 ha

There is an opportunity to introduce initiatives to target and generate increased investment activity on granted mineral leases.



Current operations in the Territory.

Despite the number of granted MLs and ELs, there are only 8 operating mines currently in the Northern Territory[7].

Core Lithium, a new major greenfield mine opened on 10 October 2022, with first export targeted for late 2022.

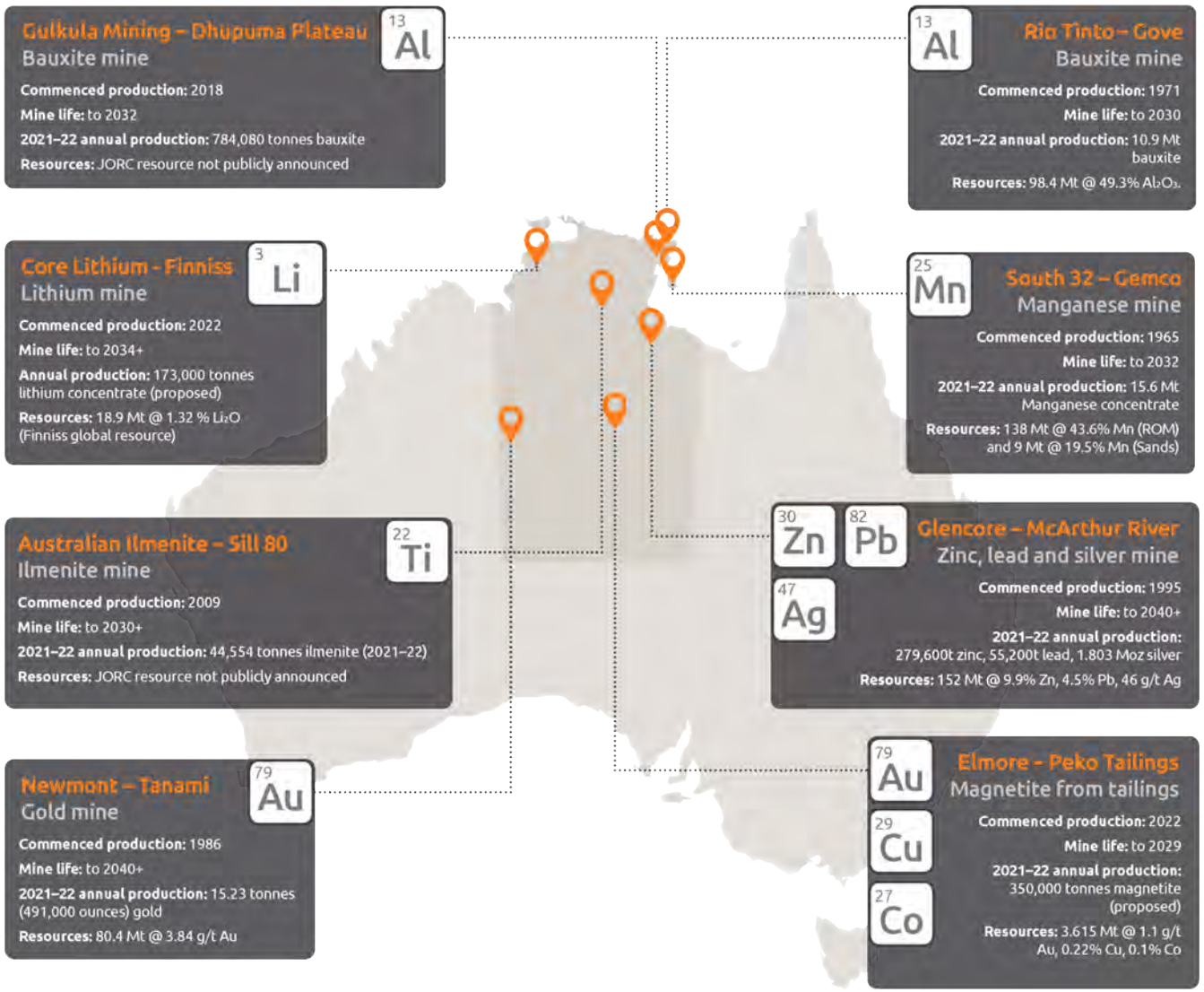
Prior to this, no major new greenfield mine opened since 2006.

The first shipment of magnetite from the reprocessing of tailings by Elmore left the Port of Darwin in late October 2022.

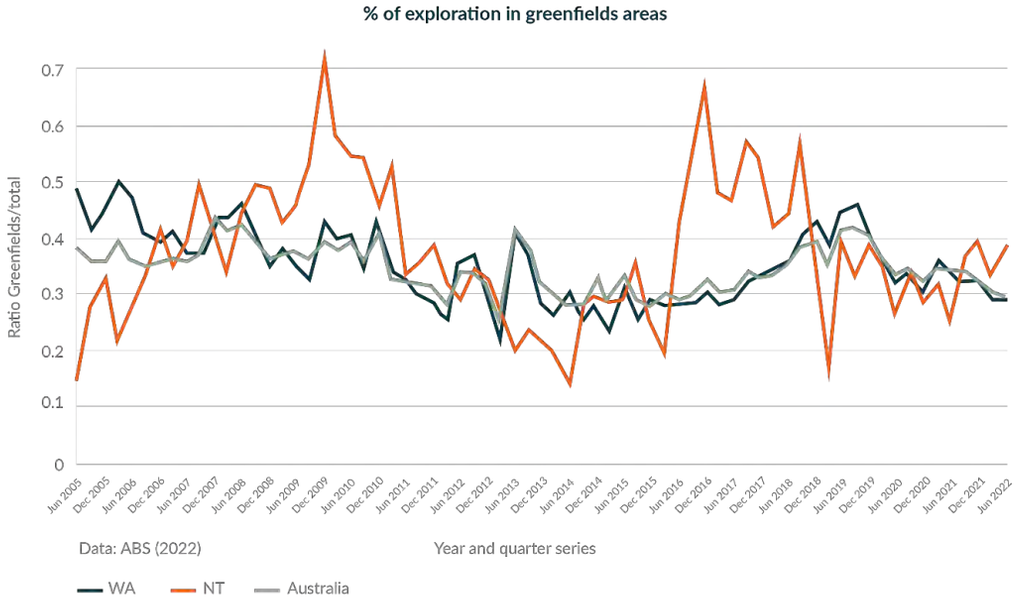
4 mines are expected to close in the next 10 years.

21 mining projects are in various stages of exploration/mining regulatory approvals processes.

Speedier development of new mines is critical to achieving targeted economic outcomes.

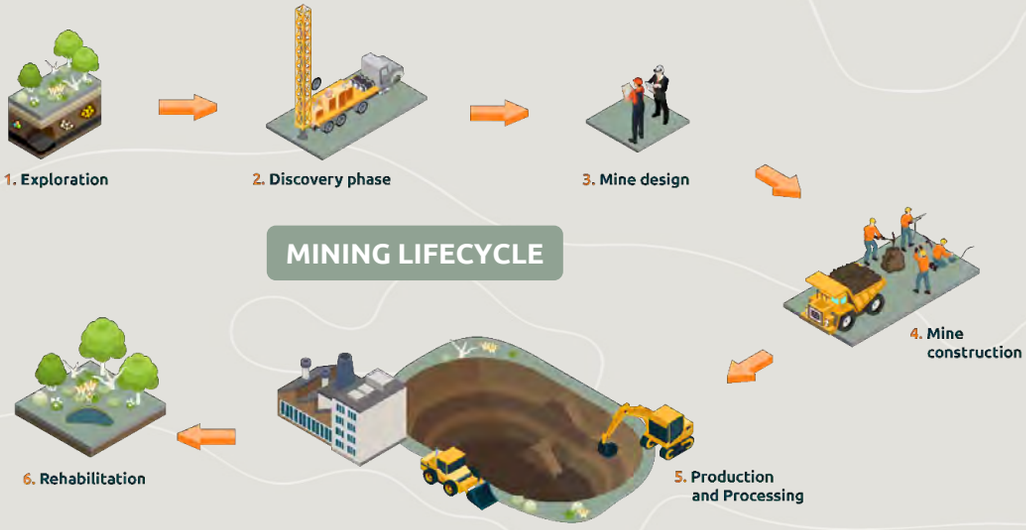


1. Exploration



Source: ABS (2022) 8412.0 Mineral and Petroleum Exploration, Australia. Table 3b. MINERAL EXPLORATION, (Other than for petroleum) - Expenditure by type of deposit. June 2022.

Exploration is the foundation of mining activity.



The Territory has lower drilling density compared with Western Australia and Queensland – some 80% of the Territory has not been systematically explored.

Large areas of exploration tenure have been picked up in the last two years – there is an encouraging trend of mid-tier to major companies investing.

Granted ELs are at their highest level since 2014 – 1,073 as at 23 October 2022.

Exploration expenditure for 2021–22 was $171.5m. An increase of 34% on the previous year[8].

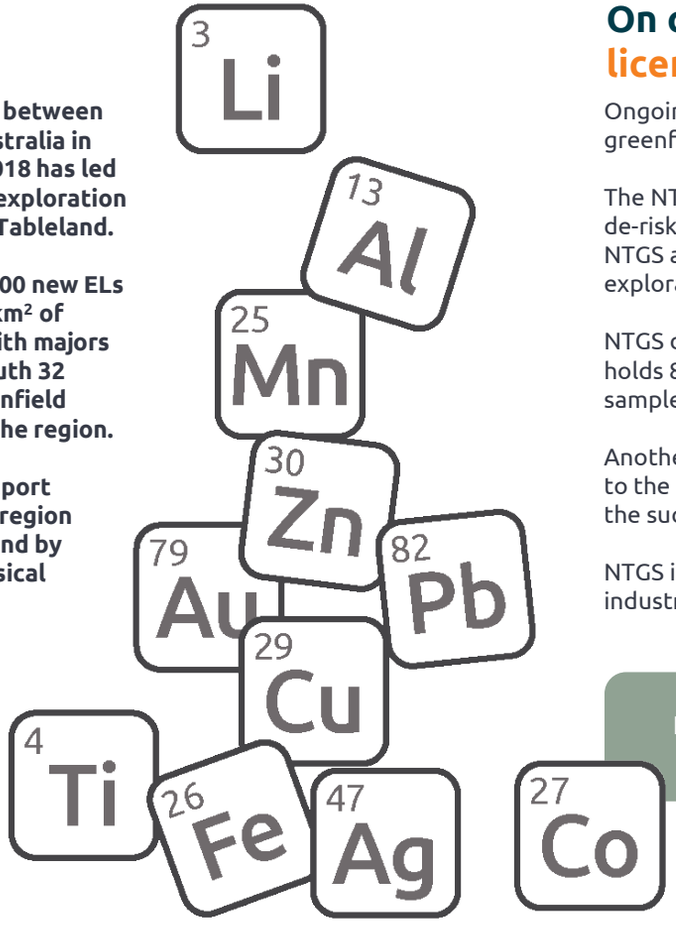
However, exploration in the Territory as a share of total Australian exploration, is declining.

Current mineral exploration covers copper, gold, zinc, cobalt, lithium, vanadium, rare earth elements, uranium, phosphate and manganese.

Geoscience collaboration between NTGS and Geoscience Australia in the Barkly region since 2018 has led to a dramatic increase in exploration tenure across the Barkly Tableland.

This includes more than 100 new ELs across more than 50,000 km² of underexplored ground, with majors such as BHP, Teck and South 32 committing to major greenfield exploration programs in the region.

NTGS is continuing to support exploration in the Barkly region through industry grants and by acquiring further geophysical surveys.



On current statistics, fewer than 1% of exploration licences will convert to a mineral lease.

Ongoing initiatives such as Resourcing The Territory will assist in opening up new greenfield areas for exploration and underpinning industry exploration success.

The NTGS undertakes a diverse range of geoscience programs designed to attract, de-risk and support investment in mineral exploration and development in the NT. NTGS also provides co-funding grants to support industry innovation and share exploration risk.

NTGS distributes large volumes of data and information to industry at no cost and holds 800km of historic drill core from across the NT, that industry can view and sample.

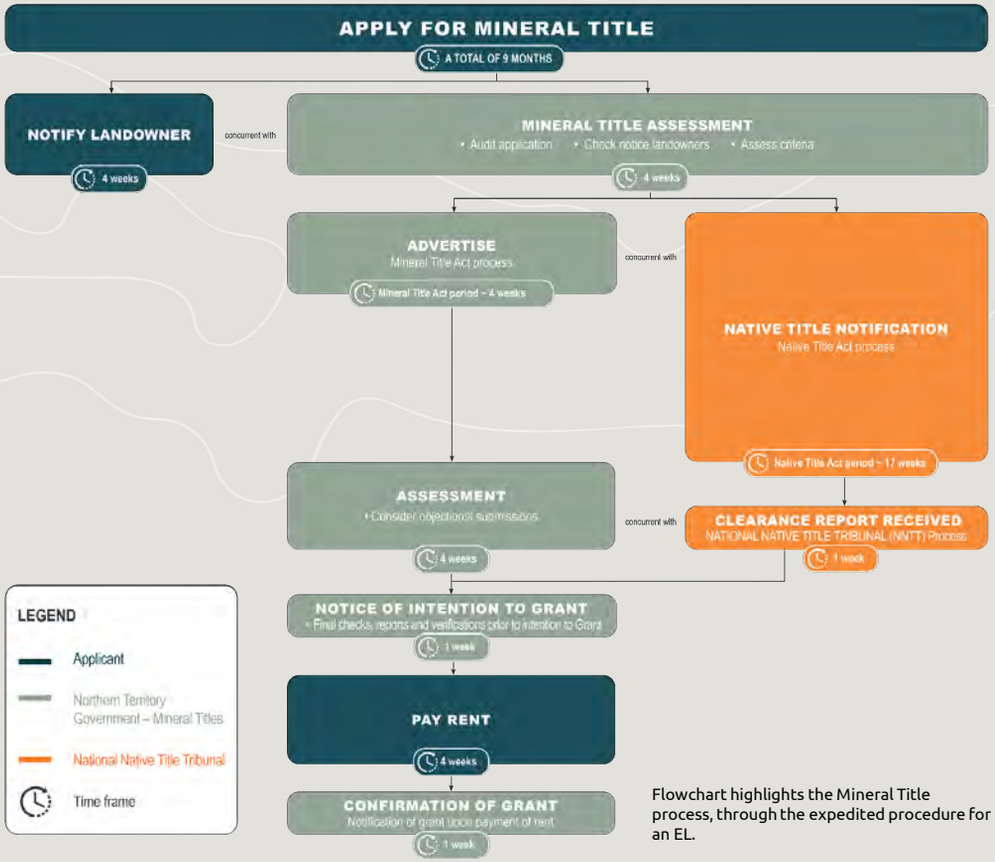
Another key role of the NTGS is to promote the mineral resource potential of the NT to the domestic and global industry to attract further investment, including through the successful AGES event[2].

NTGS is highly regarded by the exploration sector for the quality of its data and its industry-focussed approach[6].

NTGS is a leader in the field and needs to persist in its efforts to market and realise the Territory's mineral potential.

Resourcingtheterritory.nt.gov.au

A transparent and integrated pathway for grant of mineral titles is critical for investment certainty.



Flowchart highlights the Mineral Title process, through the expedited procedure for an EL.

There is a strong industry perception that Territory mineral title processes are complex and lengthy.

When compared against other Australian jurisdictions, there is no evidence that this is reality on land subject to native title. Recent data shows that the Territory process is on par with other jurisdictions, such as Western Australia.

In the Territory, the grant of an EL within 9 months, is targeted 85% of the time. Variables such as lodgement of Native Title Act objections, objections under the Mineral Titles Act, and applicant requested extensions, can impact timeframes.

The following table shows the average times (in months) to grant an EL, on land affected by native title requirements, over the last few quarters for WA and NT noting comparable processes.

	Western Australia[9]	Northern Territory
1 January to 31 March 2022	8.8	7.6
1 April to 30 June 2022	8.4	7.8
1 July to 30 September 2022	9.0	9.0

In relation to MLs on native title land, subject to the 'right to negotiate' process, the average time is 2 to 4 years, due to the requirement to negotiate an agreement between the relevant parties. At its most efficient, and observing all legislated Territory and Commonwealth requirements, the timeframe to grant an EL on native title land is 7.75 months.

Industry's view, is that this level of process efficiency is not always reflected in practice.

A transparent and integrated pathway for grant of mineral titles is critical to dispelling the myth of complex and lengthy title processes.

Potential to consolidate smaller mineral leases.

There is investor interest in the Territory and a real opportunity for existing smaller mineral leases to be consolidated into larger title areas to increase their attractiveness to new capital.

The interests of existing title holders need to be recognised as part of this process.

However, it is important to also recognise that MLs are granted to enable the resource potential of an area to be developed. Unless there is sustained meaningful activity, there is an economic imperative to turn over titles to ensure targeted mine development objectives can be realised.

Consolidation processes do not give rise to an acquisition of property. However, they need to recognise underlying land tenure and not reward land banking.

Granted mineral titles provide access to resources that are owned by the Crown and that do not become the asset of the titleholder by virtue of a mineral title until such time as the resources are extracted.

Small explorers and miners are currently disadvantaged, and mineral title requirements could be scaled to encourage a broader range of activities.

Existing legislation requires evidence of an ore body or anomalous zone of potential economic value when applying for a mineral lease. This disadvantages small miners.

To encourage small mining projects, there is potential for a new form of mineral title to be introduced – potentially restricted in size to 40 hectares.

The objective should be to:

- Better facilitate small scale mining, particularly for non-traditional minerals such as gemstones, with more efficient and less onerous regulatory pathways.
- Reclassify current small mineral leases to enable more effective reporting on the actual purpose and activities being conducted.
- More actively engage with title holders of MLs granted for larger scale mining and development to secure meaningful ongoing private investment.

What needs to be done?

Recommendation	Possible specific actions
1.a.1 **Secure a pipeline of new mines mapped to deliver $40b by 2030**	• Publish a mining industry development and investment attraction strategy, developed in collaboration with industry. • Activate existing MLs and secure new investment by introducing incentives to encourage activity on ELs and MLs, and minimise opportunities for land banking. • Incorporate reportable minimum expenditure conditions on new or extended MLs. • Institute a more aggressive mining project facilitation stance to drive investment opportunities.
1.a.2 **Consolidate small mineral leases to increase investor interest**	• Target consolidation of small adjoining MLs, recognising existing titleholder interests. • Engage in active marketing strategies to increase investor awareness of brownfield opportunities.
1.a.3 **Increase transparency in mineral title processes**	• Engage with applicants earlier on in the mineral title process to ensure a clear understanding of processes and associated costs. • Ensure clear and concise fact sheets, guides and template documents are readily accessible. • Invest in digitisation for all mining title and authorisation applications with readily accessible information on progress through assessment processes and supported by a contemporary and secure mineral titles IT system.
1.a.4 **Enhance the Northern Territory's legislative architecture to better target mining industry investment and development**	• Review and amend the legislative architecture for the Territory's mining industry to make it simpler and more transparent, and to increase focus on sustainable mining industry development. • Enhance the Department of Industry, Tourism and Trade's, industry intelligence capability to improve monitoring of exploration activity and inform promotion of upstream investment opportunities. • Implement a detailed framework for assessments and renewals of EL applications, including to secure rigour in assessment of proponent capacity and capability, with associated annual reporting of performance against licence commitments. • Introduce new ML categories that take a risk-based approach to better recognise and encourage smaller explorers, miners and prospectors. • Introduce additional enforcement practices to encourage meaningful activity and progress towards development of the resource.

(b) Access to land

A collaborative partnership approach is vital to enable access to land.

Land access is governed by a complex mix of Northern Territory and Commonwealth laws.

Most applications for the grant of a mineral title are also subject to either the *Aboriginal Land Rights (NT) Act 1976 (Cth)* (Land Rights Act) or the *Native Title Act 1993 (Cth)* (Native Title Act).

Land Rights Act land is inalienable and held by Aboriginal land trusts; Aboriginal owners have exclusive powers to control access through veto. This tenure is unique to the Territory.

Native title is the set of rights and interests over land and waters that have been established through traditional Aboriginal law and custom and applies Australia wide. Unless native title has been extinguished, the rights exist on all land in the Territory, including pastoral leases.

Overview of Land Rights Act and Native Title Act process

Land Rights Act

- Only applies in the Northern Territory
    - requires an agreement prior to the grant of an EL – 22 months negotiation period
- Part IV process applies
    - provides a fee for service to achieve consent to grant
- Right of veto for grant of EL
- By agreeing to exploration, Traditional Owners are also agreeing to mining
    - before being granted an ML, the applicant must hold, or have held, a granted EL for that area

Native Title Act

- The grant of ELs and MLs are 'future acts' that affect native title rights and interests
- The expedited procedure may apply to the grant of an ELs – no agreement with native title holders is required
- Native title parties can object to the use of the expedited procedure and have their objection heard by an arbitral body
    - If the objection is upheld, the right to negotiate applies
    - If no agreement is reached, there can be an arbitrated outcome from the arbitral body

47% of the Northern Territory is covered by pastoral leases[10].

Pastoral leasehold land is owned by the government and leased to private landholders for pastoral purposes – generally leases are in perpetuity. Native title exists over pastoral land unless extinguished.

The Territory Government recognises the co-existence of pastoral and other industry, including mining, use.

The Pepper Inquiry into hydraulic fracturing recommended introduction of legislated land access agreements for petroleum activities which outline specific matters to be addressed in statutory agreements between petroleum companies and pastoral lessees. This has been established for the petroleum industry[11].

The Territory Government, while recognising the desire and preference of the pastoral sector, considers that current land access processes for the mining industry are appropriate.

The existing code of conduct for mineral explorers on pastoral land provides a proportionate approach to the sharing of leased land by multiple parties, and is considered sufficient to balance the interests of land uses in a manner which does not create additional barriers for external investment in exploration and mining projects.

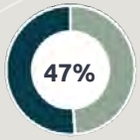
Pastoral industry views

- "Our land is our home. It is where our family lives. It is where we raise our children and look after our animals."
- "As cattlemen is the permanent resident of the land and the miner or explorer is the transient land user, the miner should show respect to cattlemen who, in return, should respect the miners' right to explore."
- "We currently have a code of conduct for land access written by the mining industry, for the mining industry." [The taskforce notes that government and the NT Cattlemen's Association was engaged in this development of the Code of Conduct]
- "The protections outlined in the Pepper Report relate to protection against damage to the pastoral lease and pastoral operations … and would apply equally to any type of industry … wishing to operate on a pastoral lease."
- "… legislated protections, contributes to clarity and certainty for investment both in the pastoral and resource sectors, and provides an assurance that all parties must abide by the same set of equitable rules."

Access to land

Timely and respectful engagement will maximise outcomes.

Land tenure



of the Territory is under pastoral lease

of the Territory is Aboriginal land

of the Territory is subject to native title

Aboriginal land	Native title
ML application – 75.2km² (0.011%)	ML application – 284.1km² (0.04%)
ML granted – 738.7km² (0.11%)	ML granted – 912.5km² (0.13%)
EL application – 196,000km² (30.35%)	EL application – 94,740km² (13.51%)
EL granted – 29,640km² (4.58%)	EL granted – 247,400km² (35.29%)

Total Territory land mass is 1,347,791 km²

Average time to grant–native title

EL 8 – 9 months

ML 2 – 4 years

Comparison of granted EL applications[12]

	Native title	Aboriginal land
2021–22	161	nil
2020 21	156	10
2019–20	61	4

Average time to grant – Aboriginal land

EL 3 – 5 years

ML 1 – 2 years

Timeframes reflect the different legislative processes.

For native title, all MLs for mining are subject to the right to negotiate process.

On Aboriginal land, when Traditional Owners agree to exploration they also agree to mining. This is a conjunctive agreement and shortens the grant period for an ML.

The experience and reality for industry drives investment appetite – land access remains a risk.

The Land Rights Act and Native Title Act balance the rights of Aboriginal Territorians with the right of the Crown to grant mineral titles.

These processes provide an important means of ensuring Traditional Owners have the opportunity to participate in and share the benefits of economic activity on their lands and to protect their cultural heritage.

Legislated requirements governing access to native title and Aboriginal land provide project proponents **process** certainty.

However, timeframes, outcome uncertainty and cost are cited by the mining industry as presenting significant mining project risks.

In negotiation processes, clear and unambiguous statements of:

- project specific scope and impacts from the proponent; and
- site specific expectations and desires of Traditional Owners

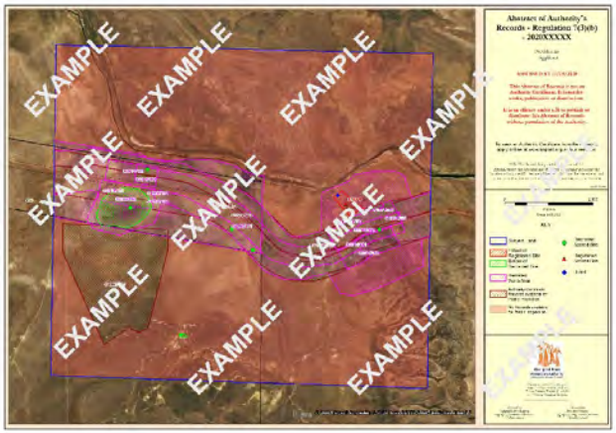
can reduce process delays and improve trust and investment confidence

Land councils can play a significant role to improve the proponent experience to support project delivery and speedy achievement of sustainable economic outcomes for Traditional Owners.

Mining industry views

- Lack of readily available information on how the negotiation process works – fosters uncertainty and risk.
- There is uncertainty and variability in land access negotiation process costs.
- Length of time and uncertainties involved in negotiation processes are a risk to capital.

Sacred sites protection is a critical consideration.



Example of an abstract report

All Territory sacred sites are protected by the *Northern Territory Sacred Sites Act 1989*. It is an offence to enter or work on a sacred site without an authority certificate under the Sacred Sites Act.

Explorers are not exempt – consultation with the Aboriginal Areas Protection Authority (AAPA) is required.

AAPA business systems are critical for efficient processes and to secure valuable historical information–they are currently unstable and outdated.

A significant business risk results if there is duplication between land council and AAPA processes. Any such duplication needs to be resolved.

It has been suggested that authority certificates should be a mandatory requirement for exploration activities, which results in substantial disturbance. This could benefit the expedited procedure process.

Sacred Sites Act

- Aboriginal Areas Protection Authority is the regulator.
- An abstract report can be obtained from the AAPA to support initial due diligence investigations.
- There is mandatory consultation with sacred site custodians.
- Based on advice of custodians, authority certificates are issued.
- Authority certificates provide clear conditions about what can or cannot be done in and around a sacred site.
- Authority certificates provide the holder with a statutory defence against prosecution.
- A new authority certificate should be obtained when an interest in a mineral title is transferred. The buyer or transferee of the mineral title cannot rely on the certificate issued to the previous title holder.
- Early engagement with the AAPA will enable sacred site constraints to be defined early to deliver project certainty.
- Authority certificates are issued on average in 120 days – recent delays are COVID-19 lockdown related.

Protection of natural and cultural heritage places and objects is another critical consideration.

The *Heritage Act 2011* protects both natural and cultural heritage.

The Heritage Register is a tool to aid initial identification of the location of heritage places and objects.

Approval is required to carry out mining activity on a heritage place or object.

Heritage Act Features

- Minister declares a heritage place or object on the advice of the Heritage Council.
- An Aboriginal or Macassan archaeological place or object is deemed a heritage place or object.
- The council maintains a register of heritage places and objects.
- It is an offence to damage, or remove part or all of a heritage place or object archaeological; or fail to report the discovery of an Aboriginal or Macassan place or object.
- A work approval is issued to enable mining activity on a heritage place or object.

What needs to be done?

Recommendations	Possible specific actions
1.b.1 **Increase process clarity and transparency for access to land**	• Publish information on all requirements covering access to land to facilitate early applicant engagement. • Collaborate with land councils, industry and regulators to publish guidance on how proponents should engage, including with native title parties and pastoralists. • Collaborate with land councils to develop and publish guidance notes on land access negotiation scope. • Progress development and rollout of simple graphics (storyboard communications) to support broader understanding of mining industry and activities. • Collaborate with land councils to digitise storyboard communications and create multi-media information, utilising common indigenous languages, to increase information accessibility.
1.b.2 **Reduce risks and streamline processes for access to land**	• For highly prospective mineral provinces, collaborate with land councils, AAPA and Heritage Council to secure publicly available baseline information to geospatially overlay geoscientific data, recognising confidentiality requirements. • Coordinate sharing of data and secure agreement on a consistent and efficient process for sacred site authorisations and certificates. • Invest in modernisation of AAPA business systems to increase sacred sites clearance efficiency. • Strengthen co-existing land use policies and practices to minimise mining industry vulnerability to specific interest group frustration of project and investment opportunities.
1.b.3 **Secure broader economic outcomes for Traditional Owners of land**	• Encourage land owner negotiations to focus on innovative approaches and strategic opportunities that secure enduring economic outcomes for Traditional Owners and Aboriginal communities beyond mine life. • Embed project proponent commitment to local content, including to long term residual benefits for Traditional Owners and Aboriginal businesses. • Foster joint ventures/partnerships with Traditional Owners and land trusts in delivery of mining projects.

(c) Regulatory reforms

Good regulations are transparent, accountable, proportionate, consistent and targeted.

The Territory's mining industry is subject to regulation under the:

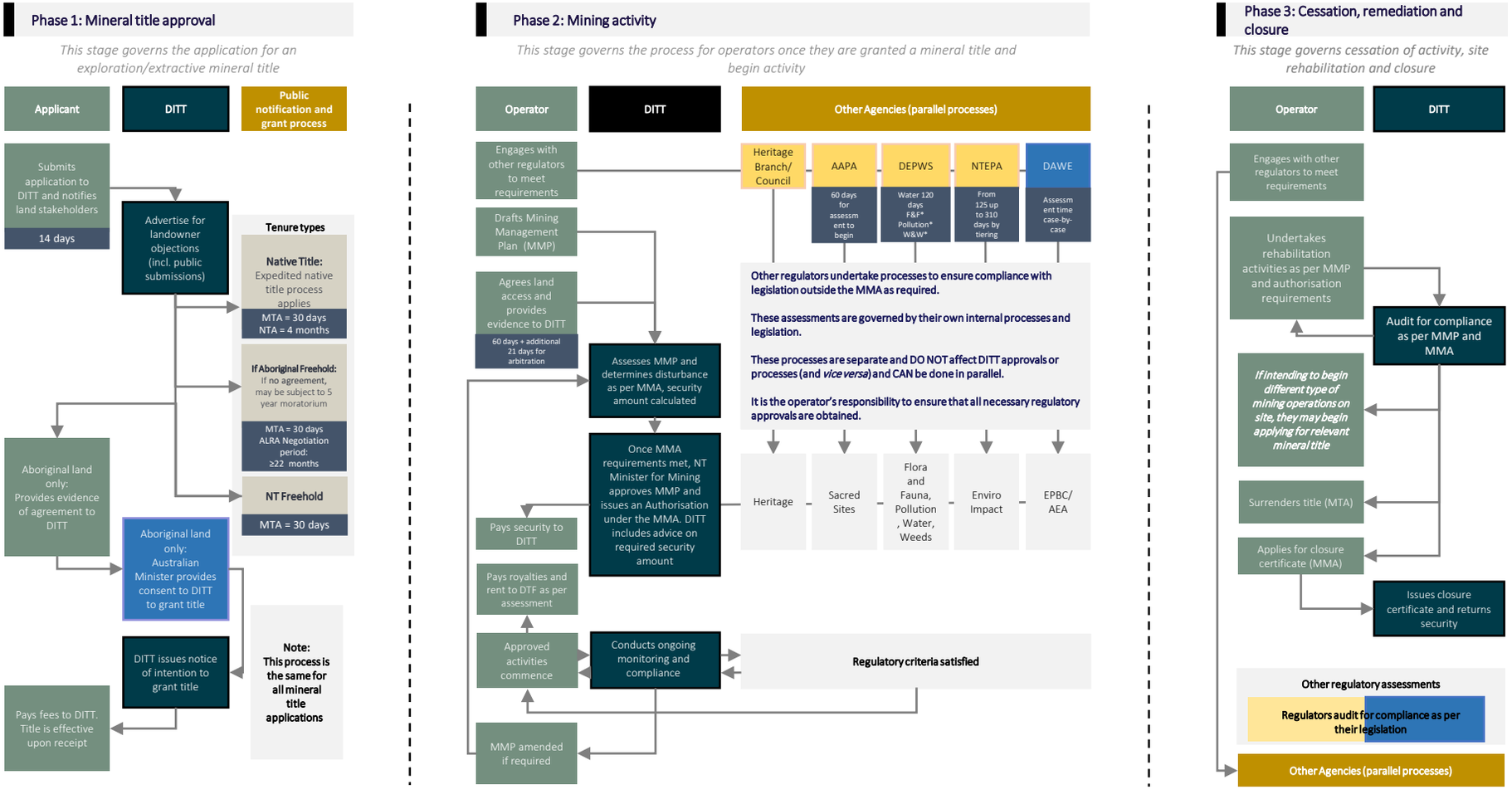
- Mineral Titles Act
- Mining Management Act
- Environmental Protection Act
- Sacred Sites Act
- Heritage Act
- Work Health and Safety Act
- Water Act
- Mineral Royalty Act
- Native Title Act *(as applicable)*
- Aboriginal Land Rights Act *(as applicable)*
- Planning Act *(as applicable)*
- Environment Protection and *Biodiversity Conservation Act (as applicable)*

Increasing focus on balancing competing environment, social and economic objectives is leading to greater complexity in regulatory activities.

Industry views and perceptions

- Regulatory approvals directly impact on project financing – approvals need to be efficient and proportionate – time is money for investors and project proponents.
- Reverse onus of approvals – focus on major issues of concern rather than more minor issues, which cause process delays without genuine consequences.
- Reduce resources at the front end of regulatory processes in favour of stronger monitoring and enforcement – miners generally want to be good corporate citizens.
- Regulatory processes need to be better resourced.

Mining processes in the Northern Territory (minerals and extractives)



Relevant legislation

Northern Territory: Mineral Titles Act 2010 (MTA); Mineral Titles Regulations 2011 (MTR); Mining Management Act 2001 (MMA); Environment Protection Act (EP Act); Aboriginal Land Rights Act 1993 (ALRA); Aboriginal Sacred Sites Act 1989; Heritage Act 2011 (NT) Waste Management and Pollution Control Act 1998 (WMPC); Water Act 1992

Commonwealth: Environmental Protection and Biodiversity Conservation Act (EPBC); Native Title Act 1993 (NTA); Atomic Energy Act 1953

Risk-proportionate outcomes-based regulations must be targeted.

The Territory Economic Reconstruction (TERC) Final Report identified that moving to an integrated risk based regulatory system that provides a seamless experience will contribute to the Territory's competitiveness. It noted that investors seek speed, clarity and transparency, and improving the investor experience in the regulatory process is key to being globally competitive.

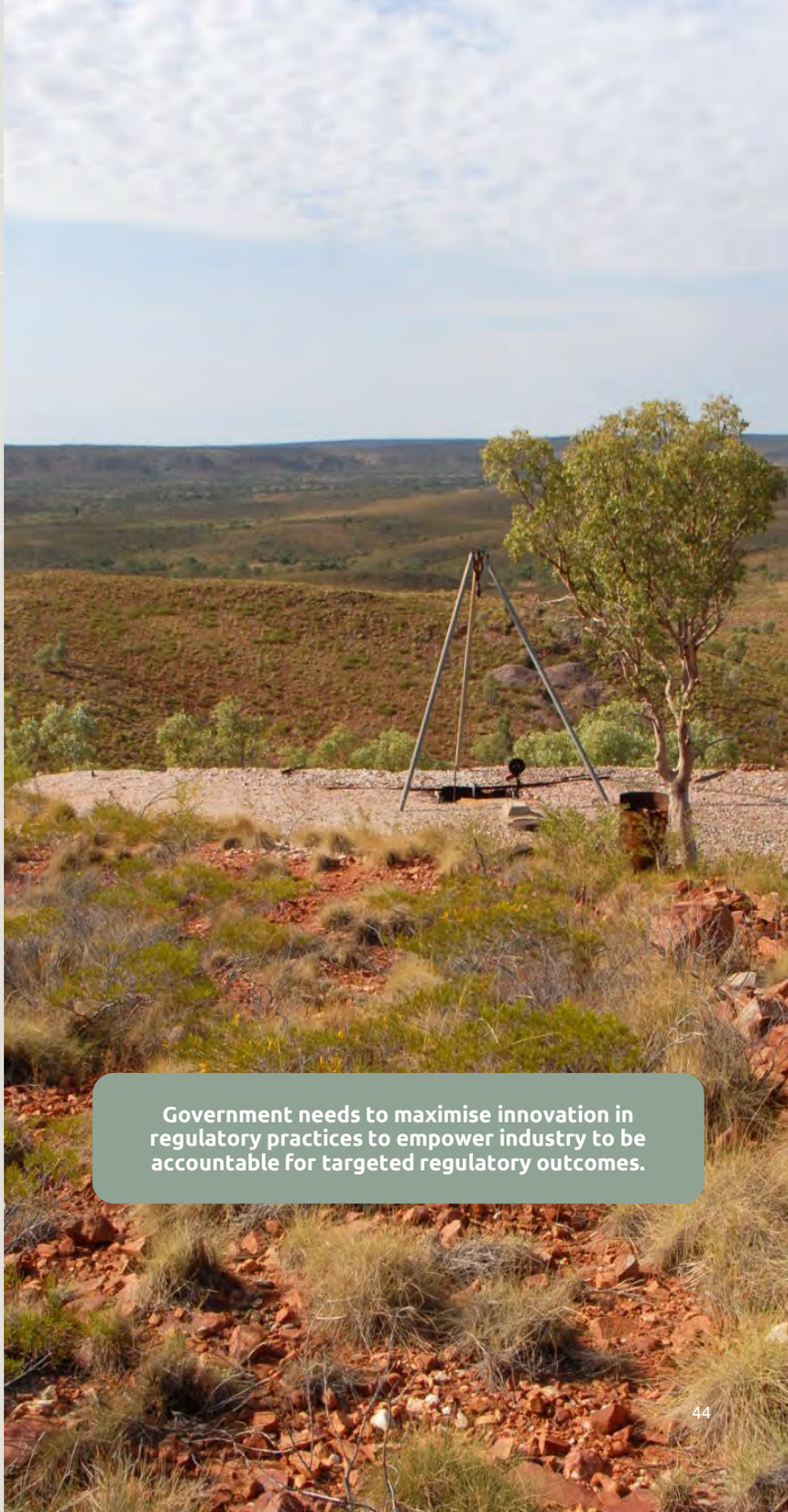
TERC also noted that investors rely on the independence and accountability provided by transparent regulatory processes to assist to build social licence, and that reducing regulatory barriers for business and reducing the cost of complying with regulation will lift competitiveness.

Regulation can take many forms, depending on the issue, and range from prescriptive rules to principles-based approaches, or lighter-touch regulation through guidance material and codes of practice and to self-regulation. There appears to be a general reluctance to consider alternatives to prescriptive regulation – whether stemming from perceptions of risk, institutional impediments or a general desire for greater control.

However, to be competitive, there is a strong imperative to recognise that internationally, best practice regulation is moving away from the traditional 'command and control' models to alternative more outcomes focussed regulatory options, which recognise the benefits in providing flexibility and opportunity for industry to explore and implement bespoke, innovative, cost optimal solutions to achieve government regulatory objectives.

For outcomes-based regulation to succeed, policy/regulatory objectives must be able to be clearly articulated, and effective monitoring and compliance mechanisms are critical. This is an acknowledged capability gap and this resourcing challenge must be addressed.

Industry also has a role to play in ensuring appropriate and responsive engagement with regulatory processes. There must be effort towards mutual collaboration to responsibly secure intended legislative outcomes. Timely responses, while critical for industry administrative certainty, are equally important to government.



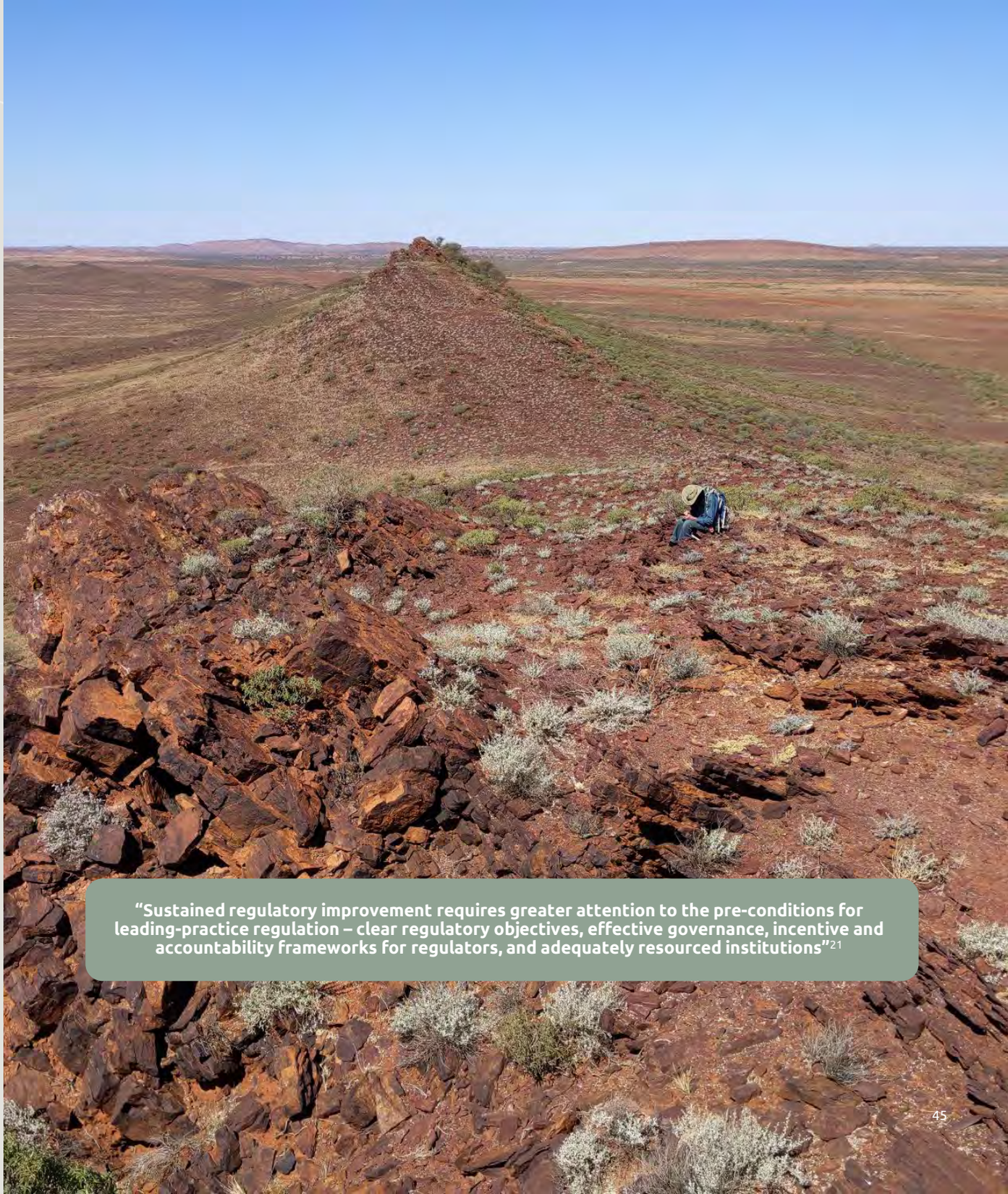
Government needs to maximise innovation in regulatory practices to empower industry to be accountable for targeted regulatory outcomes.

To be competitive, the Northern Territory must adapt regulatory practices to take account of direct impacts of regulations on industry while not compromising targeted regulatory outcomes.

The Productivity Commission in its 2020 study of resources sector regulation makes the point that *"[r]esources activities demand strict, often complex regulation. But if regulation is not done well, it can impose unnecessary costs, fail to meet objectives and diminish net community benefits"*[12].

The commission finds that *"There is considerable scope to improve regulatory processes and reduce unnecessary burdens to encourage resources investment without diluting requirements to mitigate impacts on the environment, heritage, worker safety, landowners and communities"*[12].

It is also of the view that *"[l]eading regulatory practice supports an effective risk-and outcomes-based approach by regulators"*[12].



"Sustained regulatory improvement requires greater attention to the pre-conditions for leading-practice regulation – clear regulatory objectives, effective governance, incentive and accountability frameworks for regulators, and adequately resourced institutions"[21]

Environmental regulatory reforms must recognise its role to proportionately manage disturbance, not try to avoid or prevent it.

Government's stated environmental reform objective:

> *"Ensure our regulatory regime for the mining industry is an effective risk-based, transparent, robust and fair regime that provides certainty to business and industry to encourage and promote investment in prospective and existing projects"*[13]

The taskforce is aware that the Territory Government is currently undertaking a review of environmental regulatory reforms for the mining industry. At the time of preparing this report, the reforms were still under consideration.

The taskforce's view is that proposed environmental regulatory reforms must recognise that mining activities will result in environmental disturbance – this is the starting point.

Environment regulations should seek to manage and mitigate the impacts of such disturbance in a manner that continues to encourage mining investment.

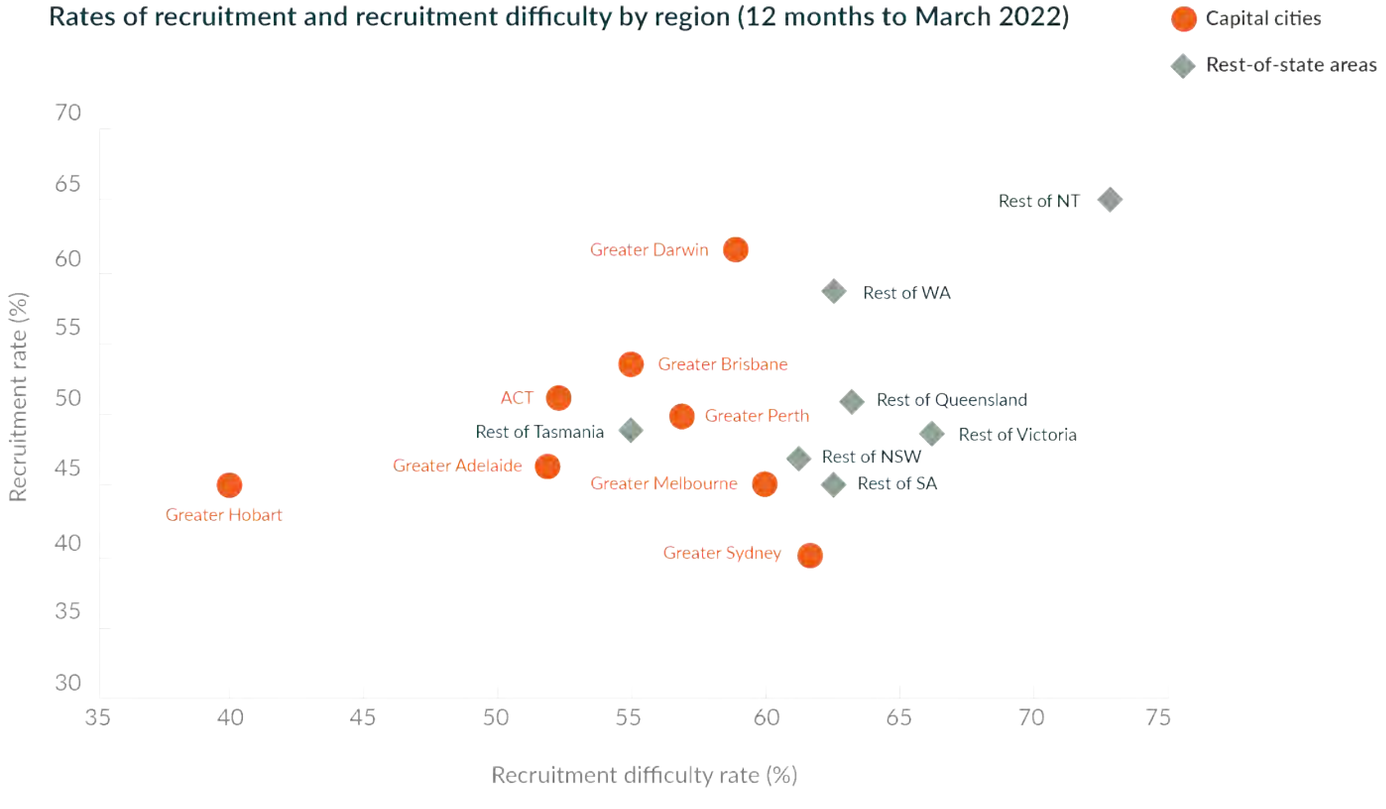
Industry views

- "Good environmental performance is central to modern mining practices."
- "Australia's minerals industry is committed to sustained investment in practical environmental measures ranging from emissions reduction to water conservation to the recovery of threatened species."

What needs to be done?

Recommendation	Possible specific actions
1.c.1 **Build trust in mining industry regulators**	• Urgently develop and implement strategic communications and messaging on the role of the regulator in securing responsible and sustainable mining activity – mining activity will result in environmental disturbance and environment regulation must proportionately manage, not prevent, disturbance. • Produce and publish annual reports on regulatory compliance activities and regulated sites. • Take timely and proportionate action on regulatory breaches and make actions public. • Embed stakeholder and community engagement functions as a core responsibility of all staff.
1.c.2 **Prioritise and implement risk based and proportionate mining industry regulation focussed on outcomes**	• Commit to implement less prescriptive and more risk based outcomes focussed mining regulations. • Ministers issue statements of expectations reflecting broader industry policy drivers and strategic objectives that establish the authorising environment for mining industry regulators and how performance will be measured, and that is tabled in the Legislative Assembly for transparency and accountability. • Introduce environmental regulatory reforms which are risk based to balance the potential seriousness of an adverse outcome and the likelihood of it occurring, and which remove administrative overlap and provide certainty to business and industry.
1.c.3 **Streamline mining industry regulatory processes to secure a red carpet approach to project development and facilitation**	• Take a lead agency approach to regulatory approvals with processes led by sectoral agency. • Implement and publish administrative agreements that define the roles and responsibilities of regulators so that legislative and procedural responsibilities are discharged in an efficient, fair, transparent and consistent manner. • All regulatory agencies to ensure regulatory approvals timeframes are transparent, with annual reporting of performance against timeframes. • Invest in modern digital architecture to deliver a central Territory Government portal covering all mining related regulatory processes and provide transparency on the status of applications and seamless regulatory engagement. • Publish user-friendly guidance material and template documents that comprehensively identify and capture all across-governments mining regulatory requirements. • Implement open data policies and protocols that enable release of collected data to reduce duplication of effort and investment, and facilitate efficiencies in regulatory approvals processes and compliance. • Progress Territory Government-approved recommendations from TERC-commissioned regulatory mapping under the Regulating for Growth action that are targeted at improving mining industry regulatory processes. • Adequately resource regulatory functions, potentially through reprioritisation, to secure engineering, regulatory and technical expertise.

The global labour market is tight – the Territory has the tightest labour market in Australia[14].



Source: NSC, Recruitment Experiences and Outlook Survey, 2021 and 2022

Source: NSC (2022)

The recruitment rate shows the proportion of businesses that are trying to recruit.

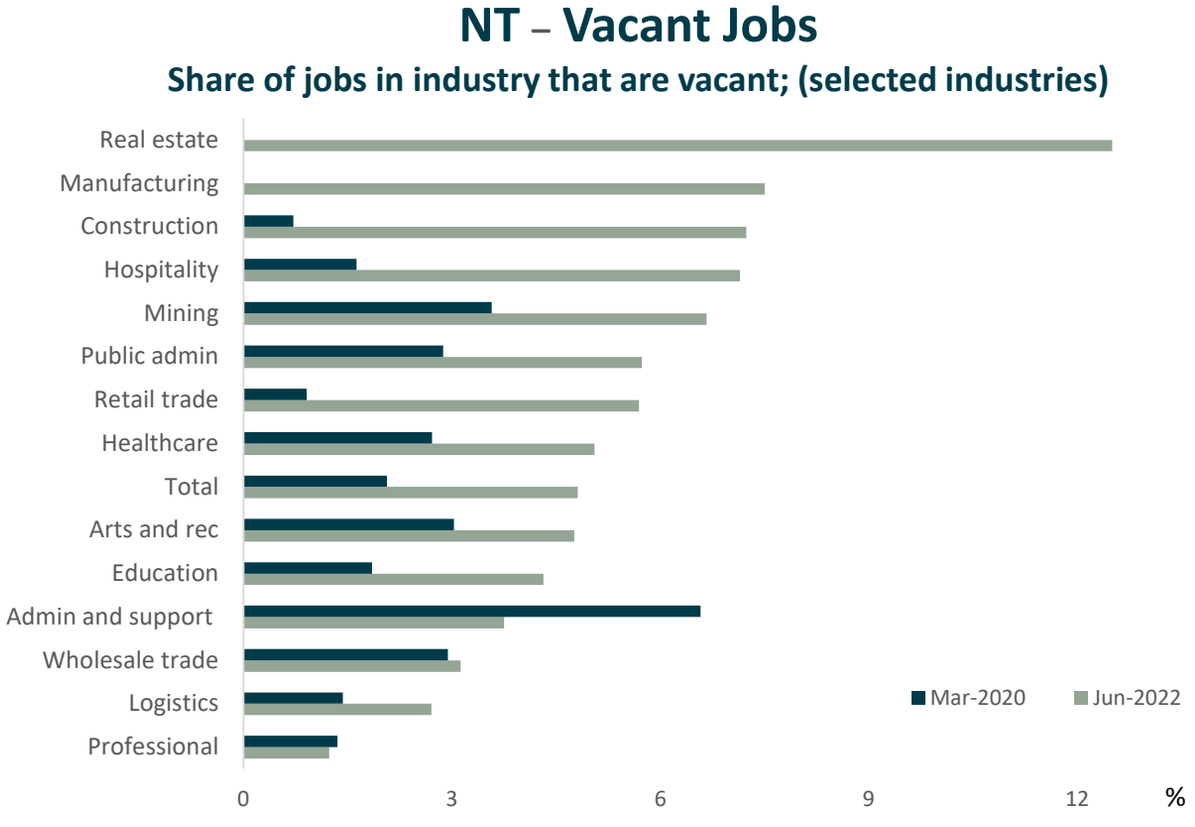
The National skills commission (2022) survey indicates that greater Darwin and the rest of NT have a higher proportion of businesses trying to recruit workers than elsewhere in Australia[14].

The recruitment difficulty rate **demonstrates** the share of those businesses having difficulty filling their vacant positions[12].

At the widest point, the rest of the NT is the place where the highest share of businesses are having difficulty recruiting.

Rest of NT is where the majority of Territory mining projects are located[10].

Competition for workers is fierce – particularly in the mining industry[14].



Source: ABS (2022) Modelling indicative state level industry jobs estimates from the Labour Account.

Total number of jobs in the labour market reached 15 million for the first time in the March quarter 2022 and stands at just under 15.5 million in the June 2022 quarter.

Vacant jobs now account for 3.1% of all jobs, the highest proportion recorded since the series commenced in 1994.

Job vacancies are higher than pre-pandemic levels in all industries.

In the Territory, 4.8% of jobs were vacant, up from 2.1% in March 2020.

In relation to mining jobs, 6.5% of mining jobs (200 out of 31,00 mining jobs across Australia) were vacant in the June 2022 quarter, up from 3.6% in March 2020[15].

A multi-pronged approach is required to address the skill and workforce gap – Territory-specific issues are magnified in the mining industry.

Labour force issues are not addressed by training and upskilling initiatives alone.

The Territory challenges extend to and are amplified in recruitment and retention.

There is also an under-engaged Territory population cohort that presents a significant untapped potential for the mining industry.

Strategies to address the workforce gap need to recognise:

- accessible, affordable accommodation and social infrastructure are key contributors to job decisions
- mines are almost always located in remote, unhospitable areas
- Territory labour force gaps are more likely to be filled from outside Australia.

Industry views

- "The main [workforce] challenges include liveability, attraction and retention, training, inclusion and diversity, and policy and bureaucracy."
- "Priority needs … include liveability issues, increased engagement with school leavers, targeted attraction activities, improved skilled migration levers, and focus on skills and training."
- "Top opportunities for collaboration include educational skills, training and experience; inclusion and diversity; branding and incentives; skilled migration; and collective advocacy and intervention."

The Territory must recognise the new workforce paradigm and capitalise on what it can control.

COVID-19 has driven a major shift in workforce desires and expectation. Advances in technology, big data, digitisation, robotics and broader social dynamics are also influencing worker behaviour.

While the Territory has strong, legitimate ambitions to grow its resident population, with the accelerating trends in automation and the recruitment and retention challenges currently facing the Territory, the new paradigm of remote jobs needs to be recognised.

There are two distinct mine lifecycle phases that are relatively more labour intensive – exploration and construction, and mine operations (production).

Exploration and construction generally requires a workforce in situ. This is the opportunity. There is alignment between the construction workforce for a mine and the construction industry more broadly. Securing a clear and ongoing multi-year pipeline of committed major projects, extending beyond the resources sector, will deliver certainty and enhance the prospects for workforce attraction and retention.

The operating phase of a mine involves a workforce with a more bespoke skills mix. Acknowledgement that a different approach to workforce attraction in this phase is vital to enable the Territory to maximise opportunities for the mining sector.

The Territory has to recognise that the high-tech skills that are increasingly becoming a norm in the mine of the future will not relocate to the Territory, despite best endeavours.

There has to be acceptance that the operating phase of a mine is more conducive to a remote or fly in-fly out workforce and that these arrangements need to be encouraged if the Territory is to secure the appropriate mix of skills critical to leveraging our resource potential. Instead, the focus in the operating phase needs to be on mentoring, and knowledge and skills transfer with strong investment and commitment in growing our own.

Construction + operation = opportunity

What needs to be done?

Recommendation	Possible Specific Actions
1.d.1 **Identify and implement strategies to plug skills and workforce gaps for exploration, mining and downstream manufacturing projects that recognise evolving industry needs and expectations**	• Baseline skills gap for exploration, mining and downstream mineral manufacturing projects over short-, medium- and long terms, recognising the increasing role of technology, automation, artificial intelligence and robotics. • Informed by the baseline skills gap analysis, prepare, in collaboration with multiple industry sectors and the Australian Government, strategies that address specific skills and workforce issues more broadly but recognise the specific requirements of the mining industry.
1.d.2 **Focus on building local skills and growing our own for the mining industry, recognising the growing workforce paradigm of remote jobs**	• Government to collaborate with industry and university and VET sectors to develop and champion pathways for transition from school to jobs for specialist mining sector skills and capability development. • Work with industry to establish apprenticeship programs, targeted at Territorians, to mentor, develop and train a workforce for the future with specific emphasis on Traditional Owners of the land on which their projects are located.

There is a growing infrastructure gap that needs to be urgently addressed to secure new projects.

The NT Infrastructure Strategy 2022 to 2030 articulates a vision for Infrastructure investment that enables growth of the Territory economy and population, underpinned by sustainability and resilience[4].

The strategy identifies that enabling infrastructure ecosystems are necessary to support this growth.

Freight volumes across industry sectors is projected to grow significantly to 2030.

Unless significant effort is invested in enhancing logistics supply chains, infrastructure bottlenecks will present a significant project risk and deterrent to private investment.

Industry views

Mines are where the resource is; often in very remote areas of the NT where supply chain connectivity and the cost of transportation challenge development of strong business cases – government support is needed to address infrastructure gaps.

- The lack of suitable infrastructure in the Territory results in high transportation costs, which materially adversely affect project financing prospects.

Industry, financiers and a skilled workforce expect demonstrated delivery of infrastructure to address gaps.

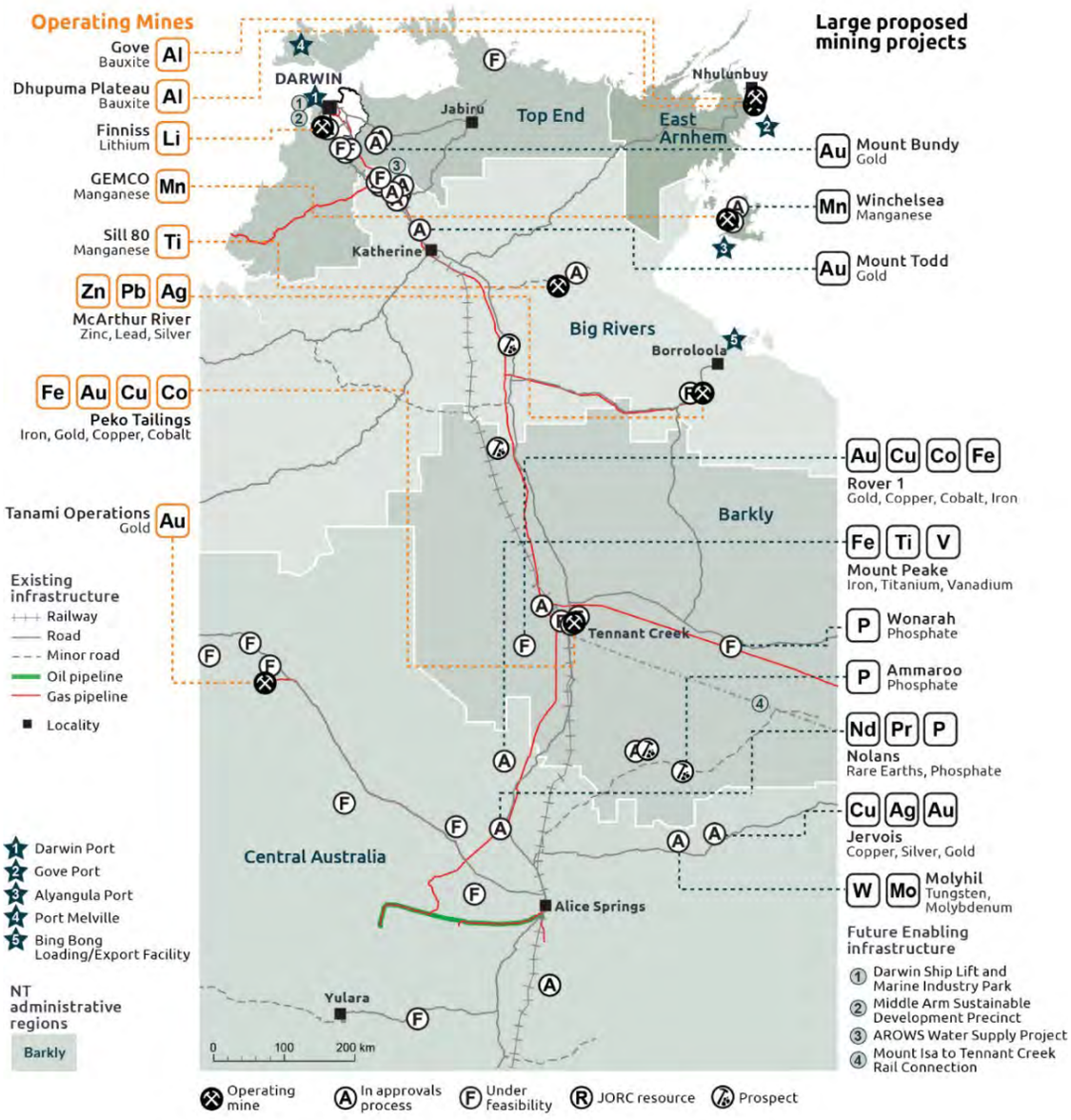
The Northern Territory is in the development phase when viewed from the perspective of infrastructure adequacy.

A lack of established supply chain capability, specifically for transport, processing and manufacturing, is a significant barrier to the swift expansion of mining activity and a step increase in mining and downstream value-add activities.

The availability of other economic infrastructure such as energy, water and telecommunications is also critical to project economics.

Social infrastructure, homes, schools, medical centres and recreation facilities influence decisions made by the labour market, which, in turn, have significant bearing on project delivery.

The challenge for the Territory is to close the infrastructure gap in a fiscally appropriate manner recognising that until investment is made, the significant economic activity required to deliver its ambitious economic targets will be limited.



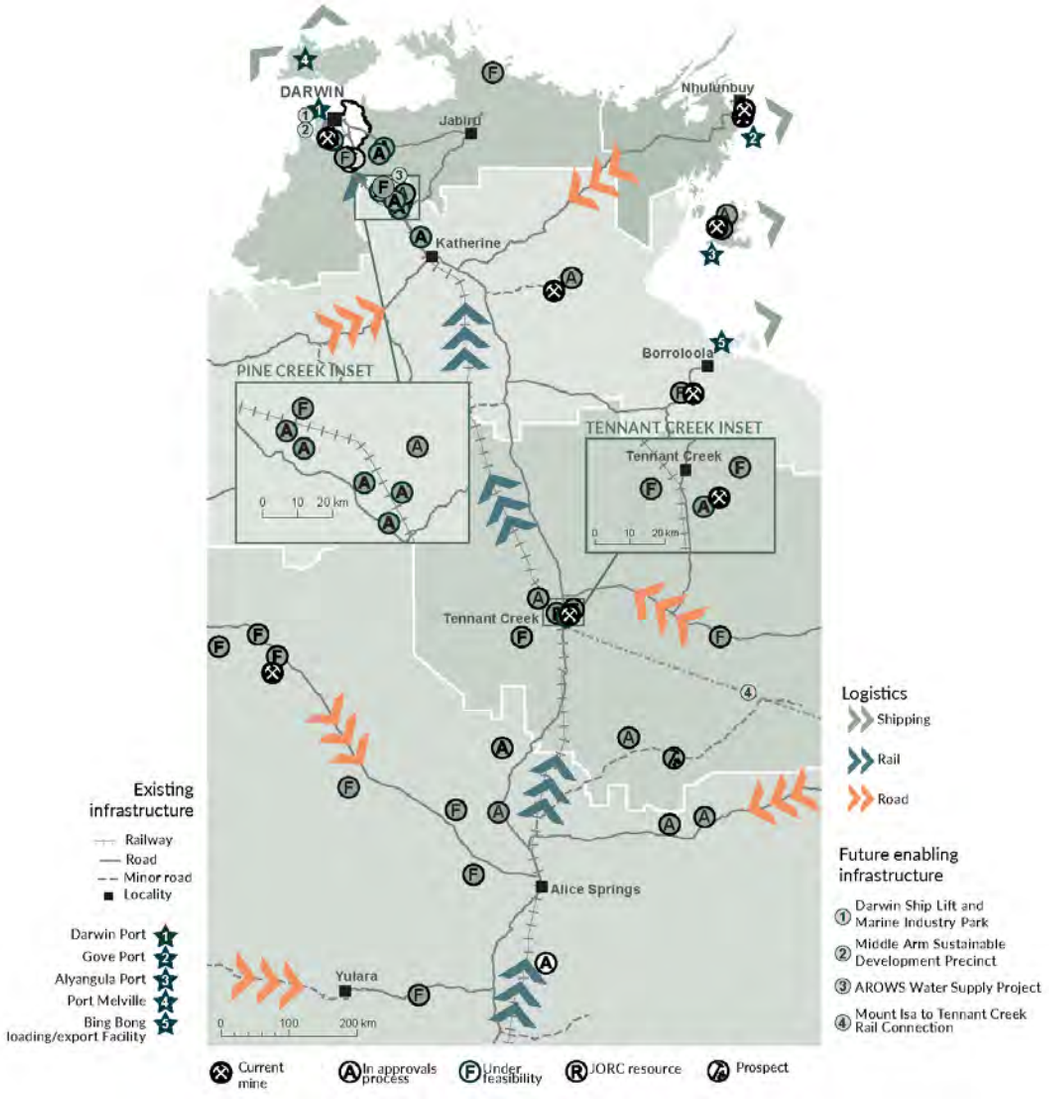
To de-risk mining projects, the Territory Government has to move quickly from infrastructure planning to timely infrastructure delivery, recognising supply chain and lead time constraints.

The Northern Territory, and Australia more broadly, undertakes very limited local downstream value-add processing of minerals The majority of mine output is exported to more established and mature production and beneficiation markets **– this is an opportunity**.

The increasing focus on critical minerals requires infrastructure planning and delivery to recognise the evolving nature of the mining sector. This includes the need for access to significant amounts of energy and water resources, telecommunications technology, and appropriate waste storage and management systems.

Common-use or shared mining infrastructure and processing plants will minimise costs and maximise opportunities to drive the necessary scale efficiencies and benefits beyond single mine capabilities– Government can facilitate connections between potential partners, identify and master plan strategic development areas, and, potentially, seed fund infrastructure on a cost recovery basis.

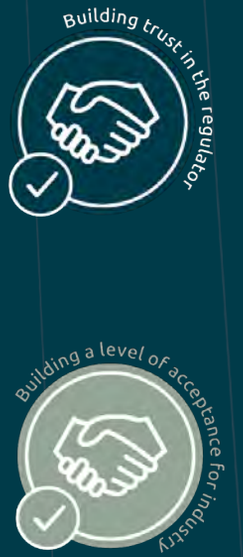
Investment in and the establishment of critical minerals supply chain infrastructure is vital to establishing a local processing and manufacturing industry and capability, and the only way to break current raw or intermediate production mining cycle.



What needs to be done?

Recommendation	Possible specific actions
1.e.1 **Secure timely delivery of supply chain and other physical infrastructure necessary to underpin and attract new investment in exploration, mining and downstream value-add projects, recognising lead times and supply chain constraints**	• Finalise planning and design, and construct multi-use regional logistics hubs in Tennant Creek, Alice Springs and Katherine to ensure infrastructure is in place to de-risk mining project and downstream mineral processing opportunities. • Engage with project-to-port logistics chain stakeholders, including Aurizon and Darwin Port, to secure necessary infrastructure capacity to accommodate project requirements and avert bottlenecks. • Implement strategies which improve supply chain economics and reduce supply chain costs through multi-use efficiency, synergies and technology. • Work with industry to ensure the Territory's mining and downstream mineral manufacturing industry is future-proofed in low emissions supply chains and with the common use infrastructure necessary to support circular economy aspirations in place.
1.e.2 **Ensure infrastructure planning and delivery recognise and address the evolving nature of the mining industry**	• Government infrastructure planning to prioritise common-use infrastructure, and identify, de-risk and allocate project ready land in appropriate locations proximate to logistics, telecommunications and essential services infrastructure for mining projects and downstream minerals processing opportunities.

(f) Social licence



The success of the mining industry depends on its ability to align with community expectations.

To secure social licence, mining projects must be safe and environmentally, socially and culturally responsible.

The mining industry is committed to being a responsible supplier of choice to provide minerals needed for a sustainable future.

Government policies, strategies, public commentary and messaging must recognise and reinforce trust in the mining industry's commitment to meeting community expectations and prioritise collaboration with Traditional Owners to secure economic, social, environmental and cultural outcomes.

There is growing special interest group activism targeted at delaying or frustrating mining projects, which must be swiftly and decisively addressed.

Social licence is a collective effort – the Territory Government has to be strong and unequivocal in its support for the sector.

Social licence must be secured to ensure community endorsement and acceptance of the industry.

Globally, societal values are changing, with increased activism relating to issues of climate change, use of fossil fuels, water, respecting Aboriginal rights and ensuring benefits for Aboriginal people and mining legacy issues.

In particular, respecting Aboriginal heritage and culture has been a focus across Australia, recognising the importance of protecting important cultural values.

Building trust in the Northern Territory's regulatory regime, increasing awareness of community benefits of mining and dispelling mistruths, is something that both government and industry need to address collectively.

A 2020 World Economic Forum report identified 'trust deficit' as the key risk facing the mining industry today[16].

Community attitudes towards mining.

The 2017 CSIRO citizen survey found that overall, mining was seen as central to Australia and that the industry contributes significantly to Australia's economy and to the standard of living in Australia[17].

The benefits of mining identified by the CSIRO citizen survey were:[17]

- creation of jobs (81.7% of respondents), including employment and training opportunities in regional areas and for Aboriginal people and women
- regional benefits (59.5%)
- improvements to infrastructure across regional Australia
- important contribution to the development of young Australians.

The Northern Territory ranked third most attractive jurisdiction in Australia in the Fraser Institute Annual Survey of Mining Companies, 2021[6].

Summary of concerns:

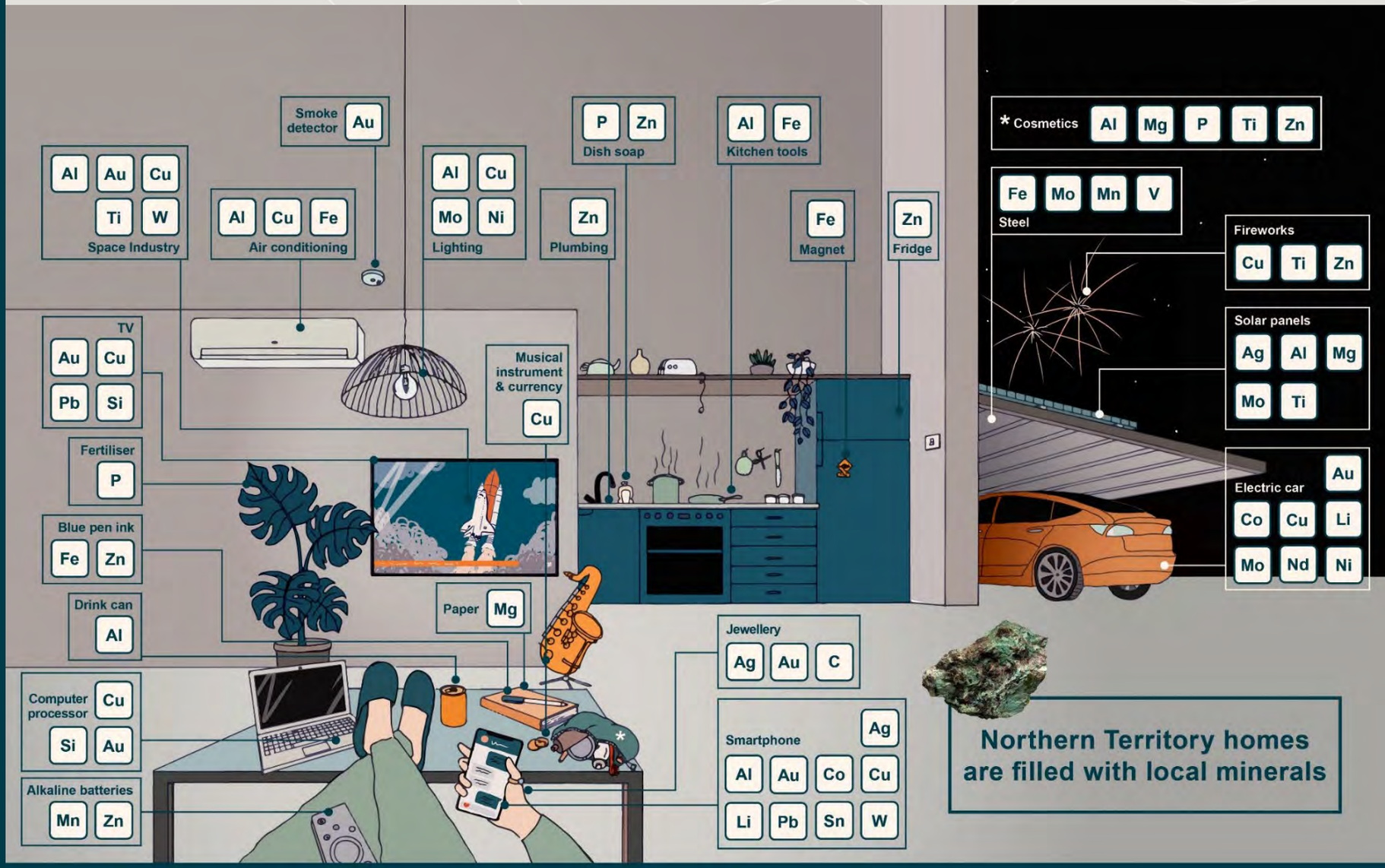
- regulatory reform
- increased royalties
- adoption of additional levy on environmental bonds
- transparency associated with granting of permits or lack of understanding of the rules and how they are applied.

Mining provides essential elements for modern life

Responsible development of mineral resources will sustain the Territory's economic growth, creating further jobs and revenue that helps support the delivery of health, education and emergency services.

Mining is the largest contributor to the Northern Territory economy and generates local employment, service and supply opportunities, royalties and benefits to regional areas.

Maintaining regulatory rigour and ensuring best practice mineral exploration and development in the Territory that balances mining with ESG principles is integral for all Territorians and the industry organisations that choose to operate here.



Environment, social and governance principles are a shared responsibility.

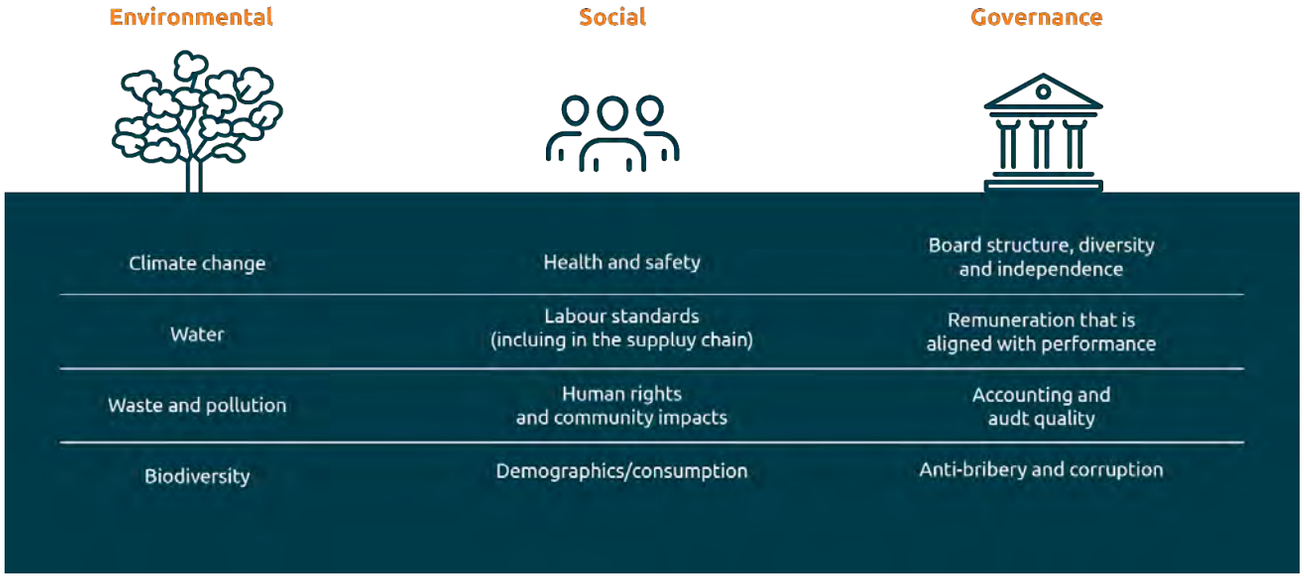
Environment, social and governance (ESG) describes the three broad areas of company focus to ensure responsible and sustainable operations. Increasingly, cultural considerations have become prominent.

In the Northern Territory, cultural accountability has always been a critical consideration, reflecting the strong connection that the Territory has with First Nations people and our deep respect for cultural heritage and values.

Investors, regulators, financiers and society demand a clean track record of ESG credentials and are penalising companies for poor performance in these areas.

The Australian mining industry is committed to sustained investment in practical environmental measures ranging from emissions reduction to water conservation to the recovery of threatened species.

The expertise, commitment and experience being delivered in mine rehabilitation across the Territory is gaining global recognition, especially as it relates to cultural imperatives, and is a clear opportunity.



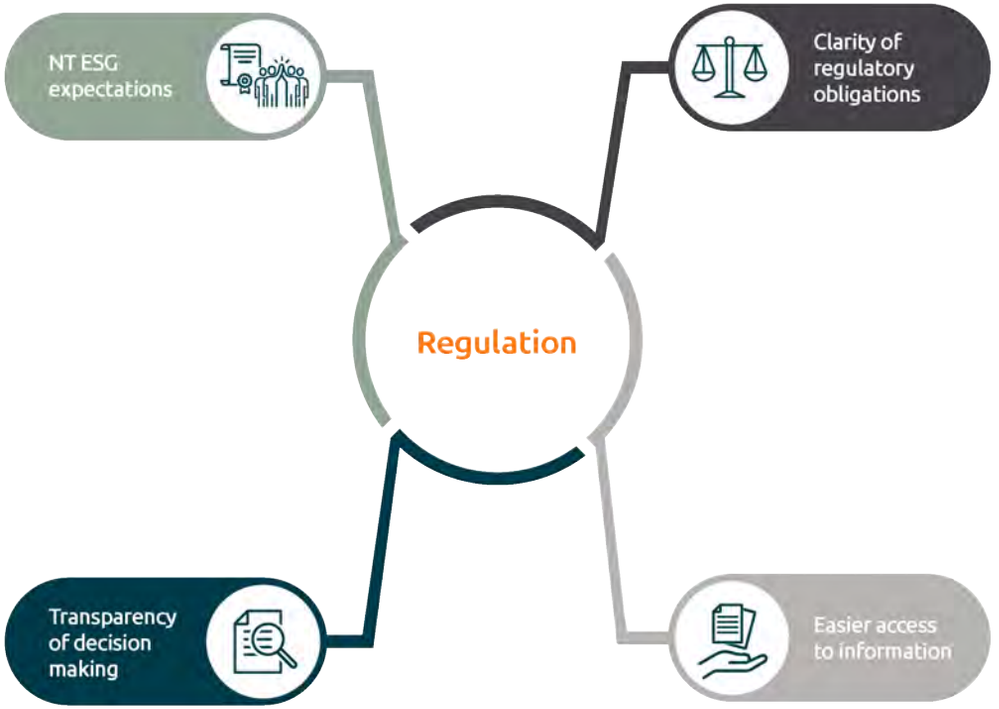
Trust in the regulator is key to public acceptance and confidence in the mining industry.

Mining makes a significant contribution to the Northern Territory economy. It is vital that the industry is able to continue to expand sustainable, recognising that clearly demonstrating ESG commitments and credentials are now a commercial imperative.

Historical issues at McArthur River Mine and legacy projects like Redbank and Rum Jungle, are used as props to prosecute cases against mining expansion.

Demonstrating excellence in mining rehabilitation; delivering clear, transparent and consistent regulatory rigour; and communicating timely and proportionate actions for regulatory breaches is key to allaying concerns and managing criticisms about regulatory decisions.

Industry needs to continue to build legitimacy, credibility and evidence its ability to deliver on ESG expectations.



What needs to be done?

Recommendation	Possible specific actions
1.f.1 **Balance negative public commentary on mining industry development**	• Develop and implement targeted strategic media and communications that include proactive campaigns to inform public commentary. • Take pre-emptive action to deal with issues – real or perceived – and get off the back foot and onto the front foot to dispel myths and promote facts-based industry discourse. • Create a platform to share positive stories.
1.f.2 **Build mining industry credibility, legitimacy and acceptance in collaboration with industry**	• Campaign to promote industry alignment with a sustainable future, focussed on proven ESG credentials. • Promote industry benefits and make it real – creates jobs for your mother, uncle, daughter, brother and friend; increases opportunities and builds regional communities and leads to improved infrastructure in remote and regional Australia. • Partner with industry to demonstrate commitment to and embed practices that optimise resource extraction, minimise waste generation and deliver closed lifecycle use of resources. • Investigate and partner with industry to implement block chain and distributed ledger technologies to enable provenance tracing through chain of custody.
1.f.3 **Harness expertise, commitment and experience to be a mine rehabilitation centre of excellence**	• Establish the Northern Territory as a centre of excellence for mining remediation, rehabilitation and closure, including through investigating establishing a Mining Remediation and Rehabilitation Cooperative Research Centre, in partnership with the Charles Darwin University, Traditional Owners and industry. • Territory Government to collaborate with private sector to develop models to identify and embed innovation opportunities in the rehabilitation and remediation of end-of-life mines and legacy mine sites based on science and evolving community expectations.

What success looks like

2 years

- Increased investment in the mining sector in line with trajectory required to achieve the industry's contribution to $40b by 2030
- Mining industry development and attraction strategy, with specific actions that target mining industry growth and new investment in exploration and mining publicly released
- Review of mining industry legislative architecture and industry consultation commenced
- Business case approved and design of a single Territory Government portal covering all mining related regulatory processes and mineral titling system well progressed
- Ministerial statements of expectations for mining industry regulators tabled and annual reports of mining industry regulatory activities published
- Commitments secured from key stakeholders to develop protocols for data sharing, release comprehensive baseline information and develop streamlined process guidelines for access to land
- Observable increase in new investment in brownfield mineral leases from 2022 levels
- Strategic media and communications to build mining industry credibility, legitimacy and acceptance operationalised
- Actions to establish the Northern Territory as a mining rehabilitation centre of excellence progressed.

5 years

- Ongoing investment in the mining sector in line with trajectory required to achieve the industry's contribution to $40b by 2030
- New mining industry legislative architecture, including proportionate minimum expenditure conditions on new or extended mineral leases, promulgated
- Single Territory Government portal covering all mining related regulatory operating enabling seamless regulatory engagement and proponents able to track application status
- Increase in new ongoing investment in brownfield mineral leases from 2024 levels
- Observable reduction in negative public commentary on mining industry and actions seeking to delay or frustrate industry activities
- Enabling infrastructure keeping pace with industry requirements.

10 years

- Investment in the mining sector achieves the industry's contribution to $40b by 2030, with momentum continuing to target an ongoing CAGR of 5%.

Section 2
Accelerate project investment

Overview

To capitalise on opportunities for development of Northern Territory mineral resources, finance and funding from all components of the capital market will be critical.

Section 2 considers options to accelerate project investment decisions through the lens of an investor.

The market for investment capital is tight for Northern Territory mining projects for a range of reasons. However, finance will flow to projects that can demonstrate an acceptable balance between risk and reward.

There are in excess of 21 mining projects in the pipeline for development and more are currently investigating investment opportunities. Conditions for investment need to be attractive to bring these projects to fruition and to secure an ongoing pipeline of capital for the discovery and development of the Territory's mineral potential.

The taskforce received widespread feedback that the Territory's royalty scheme is uncompetitive and a significant deterrent to private investment. Given this, the government commissioned an independent comparative analysis of the royalty scheme and an assessment of potential alternative frameworks that could deliver more competitive project outcomes while preserving the key policy tenets of efficiency, adequacy, certainty, simplicity and transparency.

The taskforce also recognises that any changes to the royalty scheme could have broader implications, particularly for the Aboriginals Benefit Account.

This section also analyses the drivers for the various components of the financing market for mining projects. It seeks to identify where governments have a role to play in enhancing project financing opportunities, with particular focus on the parts of the lifecycle of a mining project that are most vulnerable to a lack of investor interest.

(a) Royalties

The Territory has a profit-based scheme with a minimum royalty.

Royalties are charged for the transfer of the right to extract a mineral resource.

In the 2018–19 Budget, the minimum royalty scheme alongside a profits based scheme was introduced to ensure a payment of royalty by all mining operations.

Prior to 2018–19, more than half of all Territory operating mines did not pay a royalty[18].

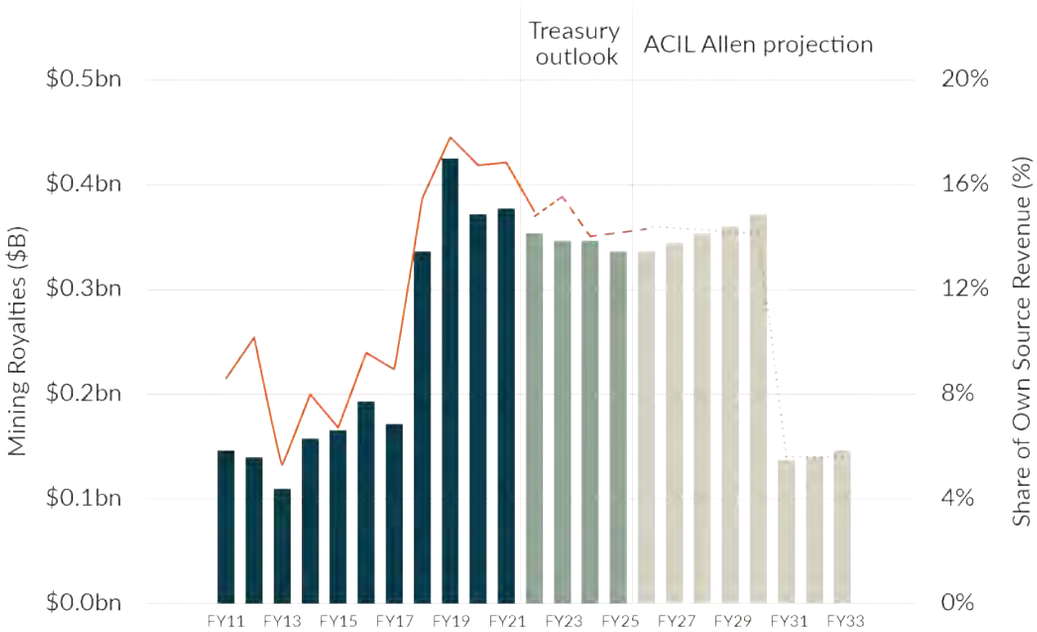
Currently, about half of operating mines pay the minimum royalty (at a royalty rate of 1% to 2.5%)[18].

The significant increase in royalty revenue from 2017–18 was mainly attributable to higher production and improved mine profitability[18].

Based on the expected life of existing mines, royalties are projected to fall by a significant margin after 2030, as two large mines are expected to close by that time[19].

To preserve this revenue base, immediate strategic actions need to be taken to ensure sustained royalty revenues past 2030.

Mineral Royalty Revenue



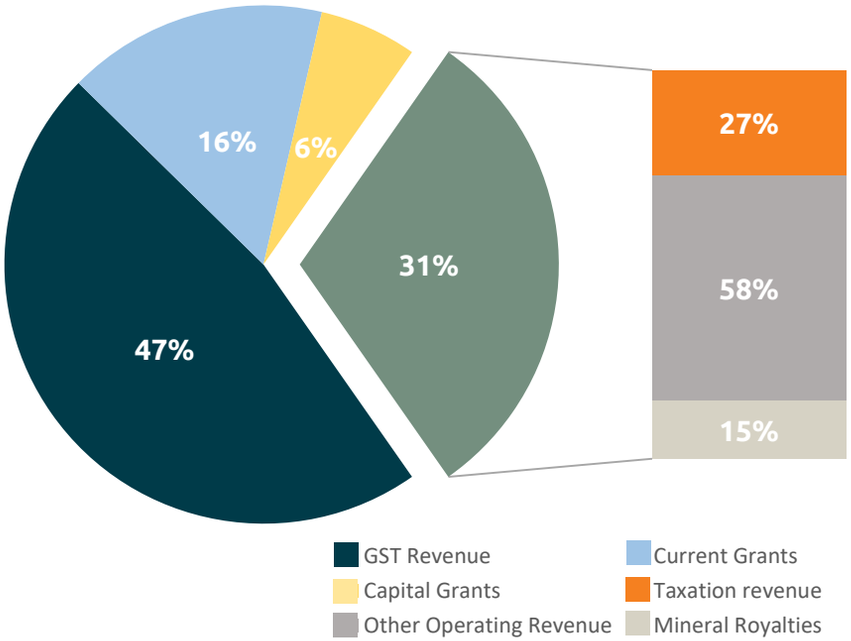
Source: ACIL Allen (2022).

Royalties

Royalties are a significant contributor to total Territory revenue.

The Territory is more reliant on Australian Government funding than other Australian jurisdictions (with a state average of 50%). In 2022–23, 69% of the total non-financial public sector revenue was from the Commonwealth, comprising 68% in untied funding and the remaining 32% in tied grants[20].

Mineral royalties contribute to about 15% of the Territory own-source revenue, or 4.5% of the total revenue.



Source: NTG (2022) Budget 2021–22, Budget Paper.

Overview of mineral royalty in the Territory

- Mineral royalties are payable under the *Mineral Royalty Act 1982* (NT) (MRA) or agreement Acts as applicable to some legacy mines.
- The MRA applies royalties to profits derived from minerals extracted from a project area.
- The scheme applies uniformly to all minerals other than uranium, which is owned by the Commonwealth.
- The royalty payable in a royalty year is the greater of:
    - 20% of profit or net value, less $10,000 or
    - a percentage of gross revenue (ranging from 1% in the first year to 2.5% in the third year)
- No royalty is payable where annual gross production revenue is $500,000 or less.
- Royalty profit is similar to accounting profit, but with non mining related revenue and costs excluded.
- Extractive minerals are generally not subject to royalty.
- $345m in royalties is budgeted for 2022–23.

Royalties

The current royalty regime places the Territory at a competitive disadvantage relative to other jurisdictions in Australia and internationally.

Industry views

- "The NT is the most uncompetitive and expensive tax jurisdiction in the world".
- "There is a difference between the NT and WA, and its not the geology".
- "When financiers look at the NT, they see 20% and profits based, and they fall off their chairs".
- "The scheme is too complex and lacks certainty and predictability – you shouldn't need to employ an external advisor to complete a royalty return".

Concerns regarding royalty administration

- There is a view that there is a lack of capability and capacity within the NT Government to assess and interpret the royalty legislation.
- There were reports of significant delays in audits and royalty assessments of over 12 months.
- There are concerns with constant policy changes to the royalty regime, which affects the amount of royalty payable, creating uncertainty and sovereign risk – the Territory loses a royalty case and changes the law.
- Labour has always been scarce in the NT, and this has been amplified in more recent times. However, under the NT's regime, FIFO workforce travel related expenses are non-deductible for royalty calculation purposes.

Royalties as an incentive mechanism

- The royalty system is one of the most effective ways the NT Government can stimulate any industry and "is a lever they should use".
- There is a need to catalyse the industry, which can be achieved through projects on the "junior" end of the spectrum. The royalty system can support this.

Related issues

- Any changes to the royalty scheme, could affect funding of the Aboriginals Benefit Account.
- Adverse effects on the Aboriginals Benefit Account, may be able to be addressed, through policy and administrative changes.
- Any changes to the royalty scheme, could also affect the NT's share of GST distribution.

Royalty review findings are pertinent to consideration of alternative schemes[19].

Modelling of mining projects based on key mineral commodities shows the Territory's current mineral royalty scheme is uncompetitive.

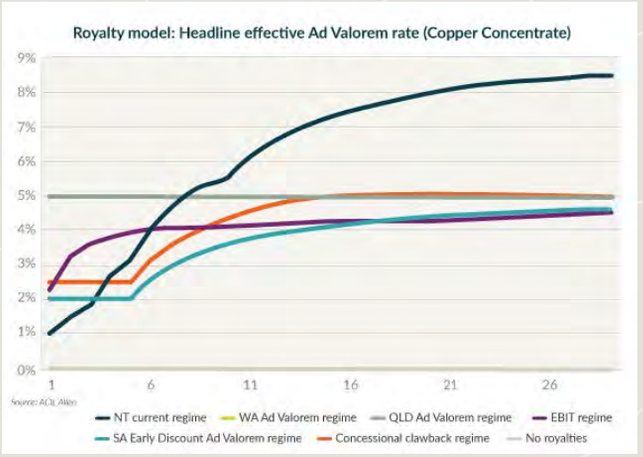
- Effective headline royalty rate of 6.5% to 13.1% (cumulative over 10 years). This is the highest in Australia, aside from the Queensland Government's step rate royalty for coal.
- Over 20% of pre-tax cashflows are paid in royalties, leaving less than 80% to repay capital, cover other taxes and generate a return to the owners of the capital (debt and equity)
    - in comparison, most other Australian regimes result in between 10% to 12% of project-free cashflow going to royalties.
- Projects with a relatively long project life will pay more in royalties once the deduction on capital assets is exhausted, typically after 10 years.
- The Territory's scheme captures a significant share of upside value but maintains a minimum royalty when cashflows are weak.
- Although capital deduction is uplifted to recognise the cost of capital, benchmarking the deduction factors to the effective risk-free rate (the 10 year Australian Government security rate) plus 2% results in a deduction below the cost of capital for mining, particularly greenfield and small projects.
- Investors view the current system as complex and extremely high risk. This is a deterrent to investment occurring compared to other Australian and international jurisdictions.

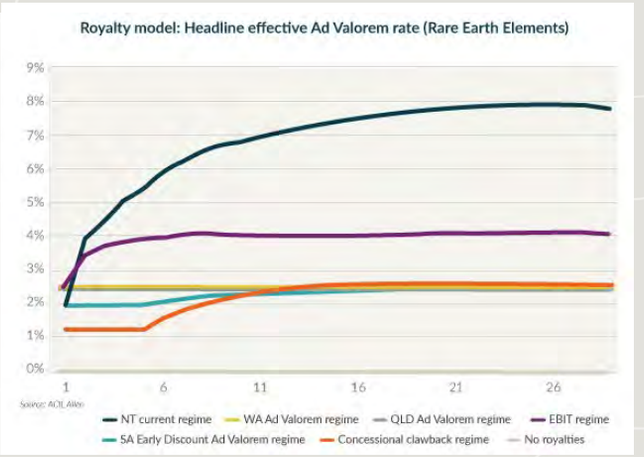
Headline royalty rates.

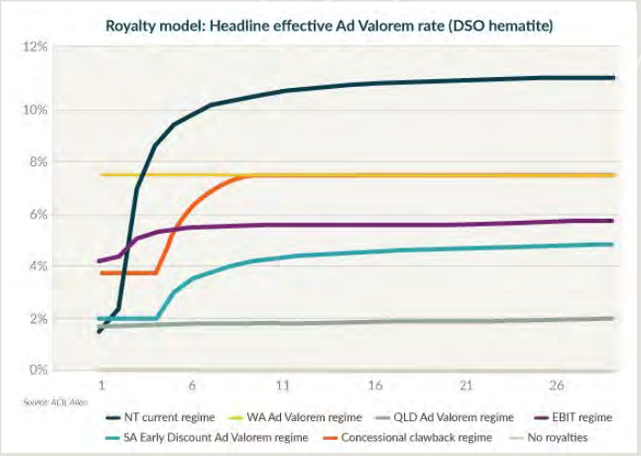
This analysis compares the Territory's royalty regime, against the ad valorem equivalent rate of royalty applied in other Australian jurisdictions.

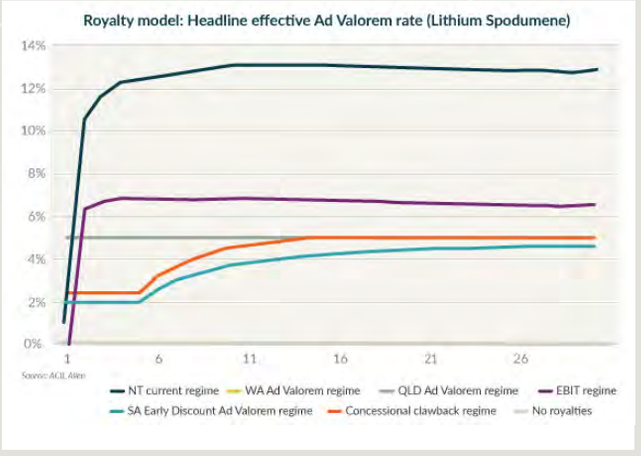
The Territory's current mineral royalty scheme, consistently results in a higher royalty rate than other royalty schemes (over 30 years life of mine).

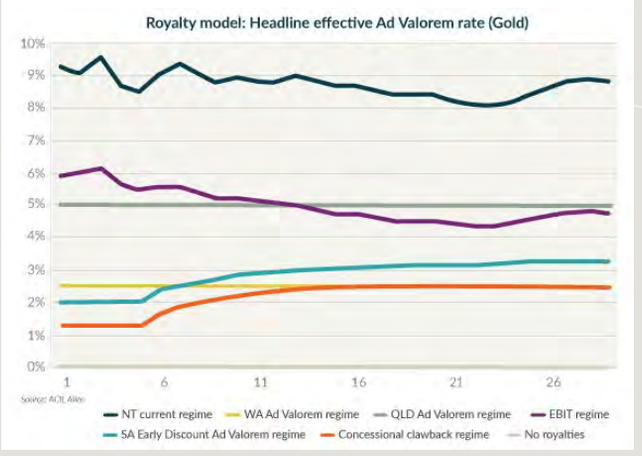
Source: ACIL Allen (2022)









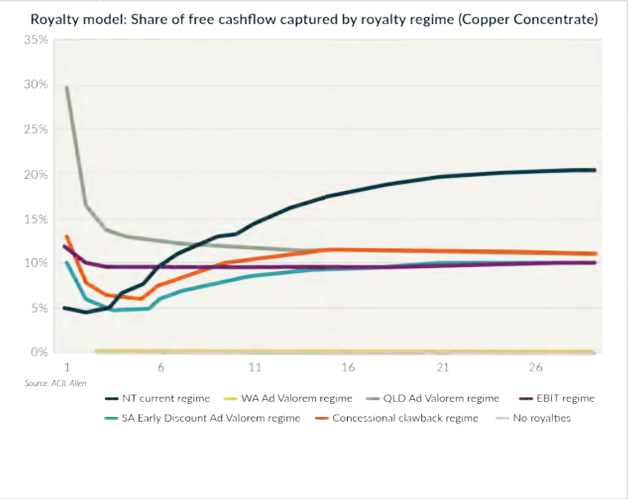


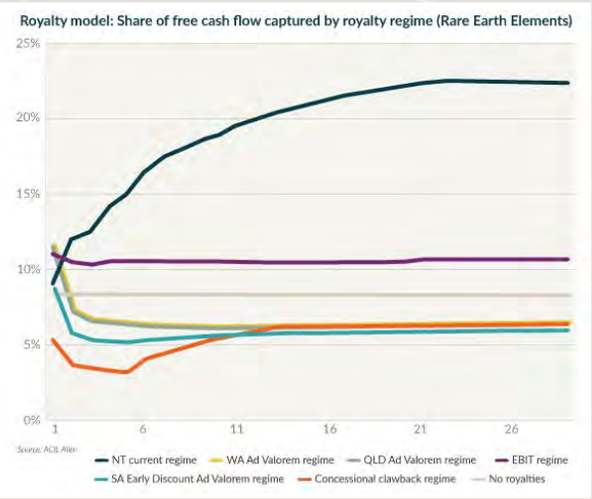
Royalty as a share of free cashflow.

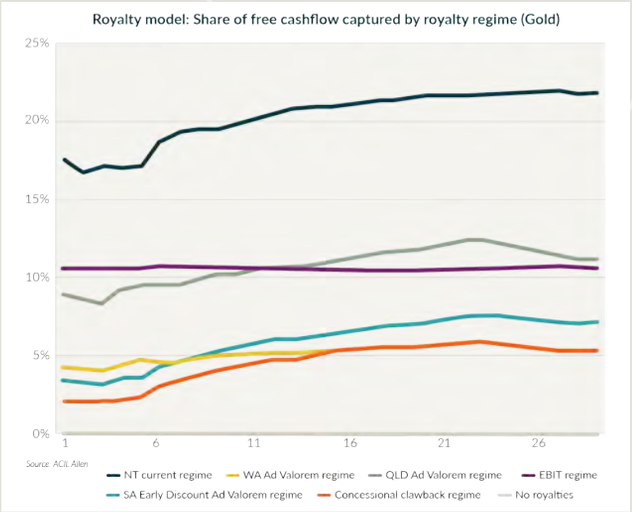
This analysis compares royalty paid as a proportion of a project's free cashflows.

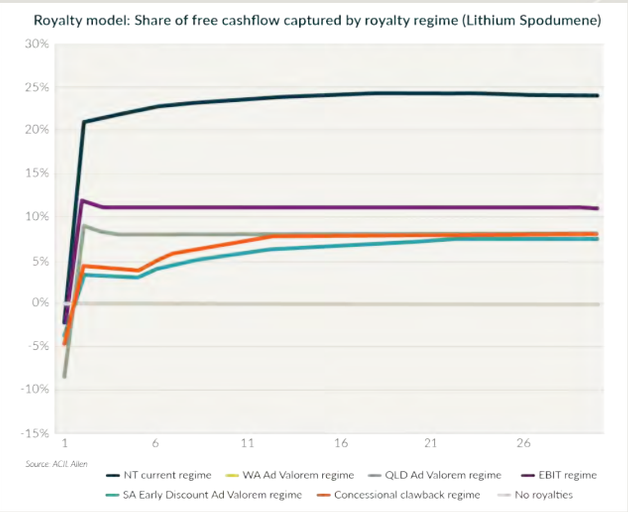
Although the Territory's current mineral royalty scheme provides some early year cashflow support, the free cashflows that are paid in royalties, are significantly higher than other schemes over a longer term (particularly for long life projects).

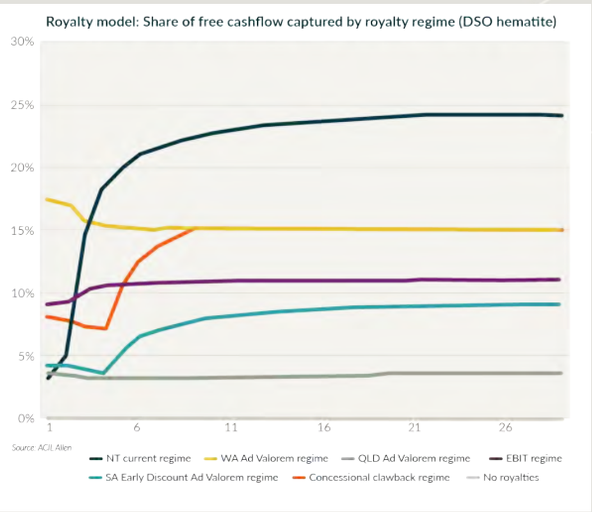
Source: ACIL Allen (2022)









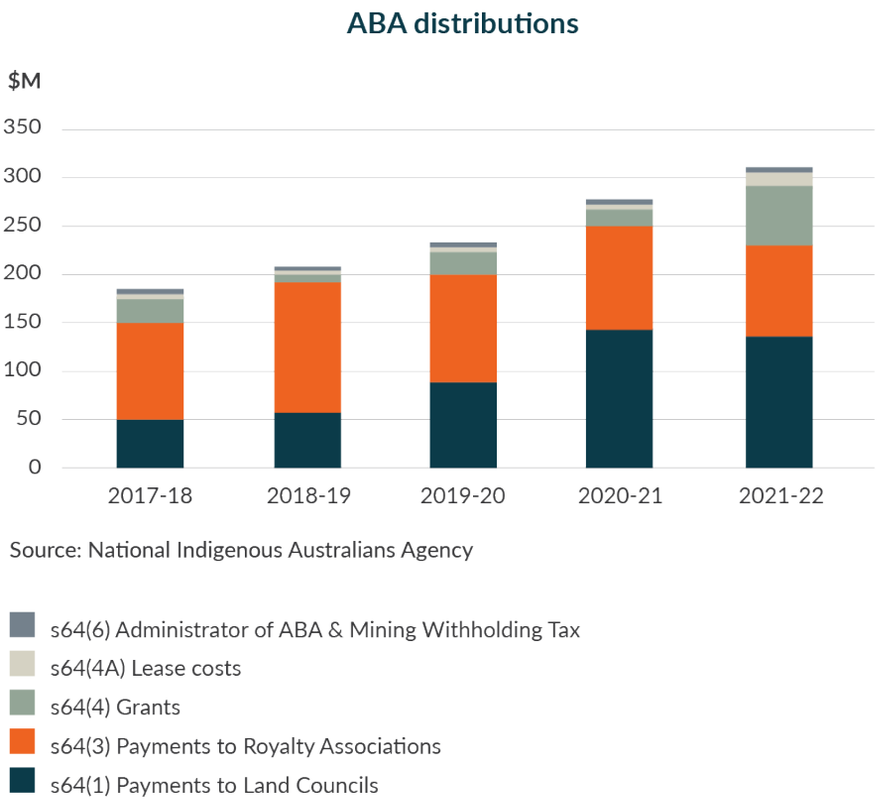


Broader economic impacts of the Territory's mineral royalty scheme.

The structure and design of the Territory's royalty scheme affects 2 other significant arrangements.

Aboriginals Benefit Account (ABA) – as provided for in the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) (ALRA).

- The ABA is a special account established and administered by the Commonwealth and independent funding for land councils and Aboriginal Territorians.
- Funding of the ABA is provided by the Commonwealth based on an amount equivalent to the royalty received by the Territory from mining on Aboriginal land.
- Funds paid into the ABA are distributed (in accordance with ALRA) to the following recipients. In 2021-22:
    - Land councils were paid 41% of the total ABA distribution as royalty equivalent. The quantum of payment is not fixed and may vary from year to year.
    - Land councils received 31% of the total ABA distribution for redistribution to Aboriginal associations, communities or groups for the benefit of Aboriginal people affected by mining operations. The percentage is provided in ALRA at 30%.
    - Grant funding to projects, enterprises or organisations supporting Aboriginals living in the Northern Territory amounted to 18%.
    - The balance of some 9% was distributed for other purposes including ABA administration costs and mining withholding tax[21].



Source: National Indigenous Australians Agency

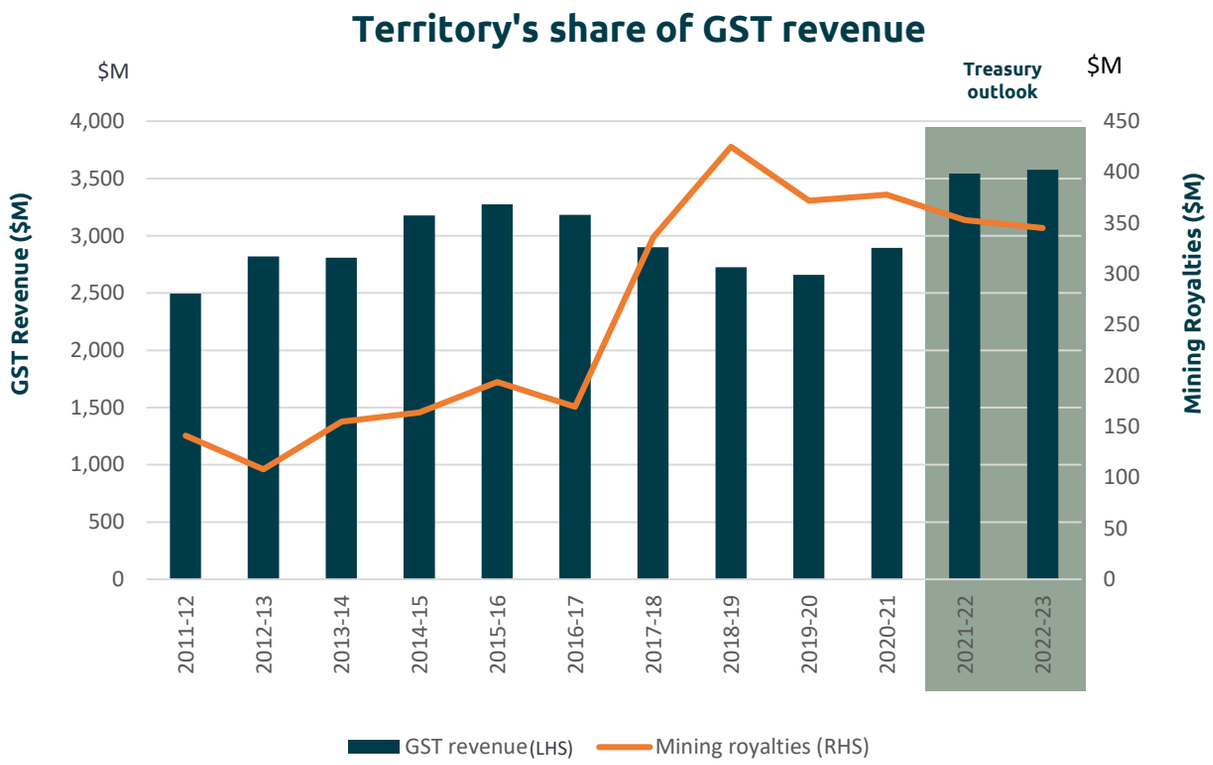
Aboriginals Benefit Account (ABA).

- The Northern Territory Aboriginal Investment Corporation (NTAIC) has recently been established to make payments (including the provision of grants) and invest money from the ABA for economic betterment of Aboriginal Territorians, including support for their culture and self-determination[22].
- ABA funding has positive impacts on Aboriginal communities and the broader Territory economy. However, distributions from the ABA are affected by the mining withholding tax, which is payable at the rate of 4% to the Commonwealth.
- Traditional Owners will be directly affected by any reduction in ABA funds and rely on this funding for broader community-based development activities.
- Unless more new mines commence production, Northern Territory royalty revenue is predicted to significantly reduce from 2030. This will have a detrimental impact on the ABA.
- To ensure ongoing financial sustainability and to preserve the significant broader economic benefits able to be achieved through the ABA, greater focus needs to be given to consideration of options that support and preserve funding to the ABA.
- Land councils and governments, Territory and Australian, need to collaborate to identify and implement strategies that will determine and create opportunities for ongoing ABA revenue.

Broader economic impacts of the Territory's mineral royalty scheme (continued).

Territory's share of goods and services tax (GST) distribution[23].

- The expenditure requirements of states and territories exceed the amount of revenue they can raise. Accordingly, revenue transfer from the Commonwealth is necessary to ensure that the same standard of government services are provided to all Australian citizens.
- GST is the single largest revenue transfer from the Commonwealth to the Territory.
- Mining revenue is one component in the calculation of GST relativities which in turn impacts the distribution of GST revenue between states and territories.
- Where a state's effective rate of royalty is higher than the national average, this could result in a reduction in GST revenue allocation to that state. This is currently the case for the Territory.



Source: Northern Territory Budget Papers (no: 2 Budget Strategy and Outlook), 2011-12 to 2022-23

Ad valorem regimes versus a profit-based approach (the Territory Government system is a hybrid of 2 schemes).

Ad valorem

Stable and predictable – important for industry when sourcing finance and developing business models.

Simple – only the revenue component is required in the calculation, resulting in lower administrative and compliance costs. However, complexity associated with valuation remains, particularly with polymetallic deposits.

Less equitable – it does not recognise differences in resource economics between deposits or projects.

Regardless of company profitability, the government receives royalty revenue. It recognises that every unit of resource has a value, which is equivalent to the market price.

Fewer opportunities for royalty minimisation.

More familiar to industry and global investment community.

The revenue collector benefits from the same cycle as the producer.

Profit-Based Regime

Less stable and predictable – rises and falls in line with net value, commodity pricing cycle and operational circumstances.

More complex – it requires consideration of revenue, operating and capital costs, resulting in higher compliance effort.

Equitable – recognises underlying project economics. The royalty burden is adjusted in line with changes in commodity prices and costs, with un-deducted royalty losses allowed for carry forward.

Return to government is in line with a mine's profitability – more royalty as profit increases and lower in times of less favourable economic, resulting in government bearing some market and operating risks.

Multiple components used in the calculation could result in perverse incentives for royalty gaming.

It is not commonly applied in Australia, other than the Commonwealth's petroleum resource rent tax and the Barrow Island royalty arrangement.

Multi criteria analysis has ranked options for alternative royalty arrangements – top 5 are ad valorem.

While the taskforce is not recommending a preferred ad valorem royalty regime, the three ad valorem options it considers to be most prospective are highlighted in the table below.

1	Ad valorem with early holiday and repayment	A flat rate on the gross value of minerals. To reflect the importance of early free cashflow in mineral economics, the first 5 years royalties are deferred but must be repaid in later years. The deferred royalties are tracked and uplifted annually to reflect interest charges and are repaid over a period of time after year 5.
2	Competitive ad valorem	A flat rate on the gross value of minerals. As an incentive, a lower rate would be applied to facilitate new projects.
3	Ad valorem with early discount and repayment	A flat rate on the gross value of minerals (at a lower rate in the first 5 years and normalised in the sixth year). To reflect the importance of early free cashflow in mineral economics, a lower royalty rate applies in the first 5 years, with payment deferred to later years. The deferred royalties are tracked and uplifted annually to reflect interest charges and repaid over a period of time after year 5.
4	Ad valorem with early discount	A flat rate on the gross value of minerals with a discount for the first 5 years to reflect the importance of early free cashflow in mineral economics. The royalty rate will normalise after the fifth year.
5	Scaled ad valorem	Modelled off the Western Australia scheme. Various rates are applicable, depending on the level of processing of the mineral. For example 7.5 % for bulk ore, 5 % for concentrate and 2.5 % for metallic

What needs to be done?

Recommendations	Possible specific actions
2.a.1 **Fundamentally reform the Territory royalty scheme – replace with an ad valorem scheme which is simple, competitive, delivers appropriate returns for non-renewable resources and delivers investment certainty**[1]	• Introduce by 2024 a replacement ad valorem royalty scheme with legislated certainty in terms of application and supported by modelling to provide information on the broader economic impacts of this change. • Work with industry and land councils to manage the broader implications of the new scheme and potential for grandfathering of the current scheme to soften short-term royalty change impacts o The replacement ad valorem scheme should incorporate modern and contemporary design features, and further detailed design work is necessary to confirm its operation and application, particularly the following areas: ▪ valuation arrangements for mineral commodities ▪ administrative arrangements,
2.a.2 **Improve existing capability and capacity in government to administer the Territory's mineral royalty scheme**	• Adequately resource the efficient and effective administration of the Territory's mineral royalty scheme • Introduce early engagement strategies and publish guidance material to support new and emerging royalty payers in their understanding of the application and operation of the Territory's mineral royalty scheme.

(b) Capital markets

The type and availability of finance is determined by the stage of the mine lifecycle.

Capital markets are driven by risk and return.

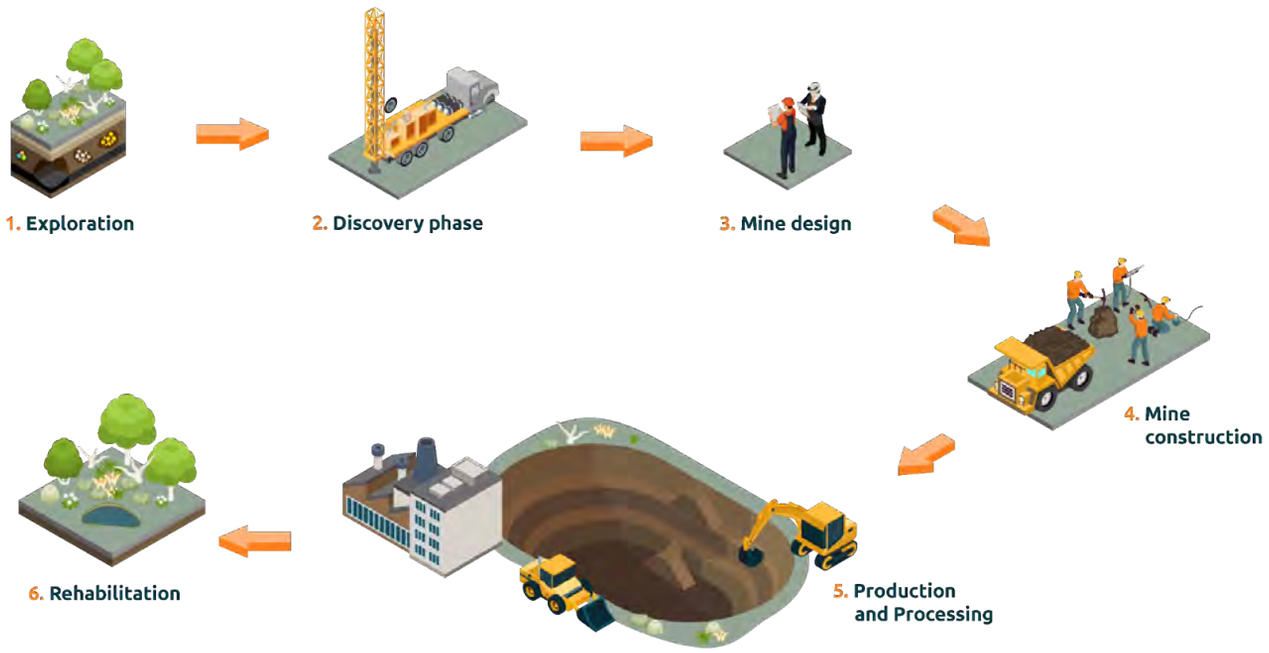
For the funding and financing of mining projects, capital market participants range from equity investors (including venture capital), debt, insurers and offtakers.

Capital is most at risk during early stage greenfield exploration, where mineral potential, feasibility and regulatory approvals are either unknown or not confirmed.

In this early phase, equity capital plays a significant role and government support is most valuable.

The production phase involves extraction, processing and sale of mineral commodities. Project risks are materially reduced through technical, geological and economic assessments and a broader range of financing options are becoming available.

The rehabilitation phase can take many years to complete and is typically funded through company reserves as institutional investors withdraw during mine closure and rehabilitation.



Equity finance

Equity financing is one of the more expensive sources of capital and is the primary source of funds during exploration, as early-stage companies rarely have securable assets to use as collateral for other sources of finance.

As a junior company progresses to maturity, several rounds of equity raising will be necessary from institutional investors, financial institutions or public offering, which can be costly and challenging. However, project dynamics are driving innovative equity structures.

Due to the inherent risks, equity investors expect above average returns (driven by the market and typically a minimum of 2.5 to 3 multiple) on invested capital with an investment horizon of 5 to 7 years. Some investors require a return multiple of 10 or more[24].

External equity investors require all regulatory approvals to be obtained prior to finance – valid tenure, land access, sacred site clearance, environmental approvals and exploration authorisation.

Industry views

- The Northern Australia Infrastructure Facility (NAIF) and the Territory's Local Jobs Fund provide limited equity for mining projects but not for the exploration phase. However, there is opportunity for funds to be redirected to target projects pre-FID to accelerate their transitioning to development.
- In periods of sustained commodity price increases, there is funding for speculative exploration. However, moving to the development stage is more challenging as technical reports are expensive and there is limited funding available. This is an area for direct government support.
- Regulatory approvals directly impact on project financing – these need to be efficient and proportionate – capital is conscious of the time and cost of regulatory requirements.
- Presence of strategic partners on the project's share register is highly beneficial in opening up other financing options.
- Government assistance is highly valuable in attracting potential financiers. The Australian Government already provides a number of tax incentives that benefit equity investors:
  - Tax credits to investors who purchase newly issued shares in eligible entities undertaking greenfield mineral exploration (Junior Minerals Exploration Incentive). Credits are capped at $25M per year, and the Incentive has been extended to 2024–25.
  - Capital gains tax exemption for fund managers and eligible foreign investors to stimulate venture capital investment.

Debt finance

Debt finance is a cheaper form of capital and becomes more accessible as a project advances, particularly for metals mines that have fixed price and hedging arrangements in place.

Mines with industrial minerals have higher pricing risks and are less preferred by debt financiers.

Debt potentially involves several lending institutions to minimise risk. The existence of offtake, fixed price contracts or hedging arrangements are viewed favourably by financiers.

Debt is generally used in conjunction with equity finance with a conservative capital structure of 40:60 (equity to debt ratio). The ratio varies depending on investors' risk appetite and investment objectives[24].

Debt financiers are becoming risk adverse beyond 5 years and seek a high degree of confidence of the project's ability to generate sufficient free cash to repay principal and interest[24].

Debt finance expects regular repayments (interest and principal) and will require offtake arrangements to be set in place to secure future cashflows. The extent of the offtake exposure (quantum and length of time) is dependent on commodity type.

Project viability evidenced by independent bankable feasibility studies and technical economic assessments is critical.

Completion of all regulatory approvals is essential.

Industry views

- Marginal projects with single digit returns are unattractive to financiers – project needs to be economically viable.
- Minimum hurdle rates of return on investment are advised to be 13% to 15%.
- Having government sitting alongside other financiers builds investor confidence.
- The lack of suitable infrastructure in the Territory results in high transportation costs which will materially adversely affect project financing prospects – there is a role for government to provide a solution.
- The Territory's mineral royalty scheme is difficult to forecast and complicates project financing.
- Robust and timely regulatory processes will promote investment attractiveness.

Offtake

Offtake arrangements can provide an alternative to traditional sources of project capital and are an essential element for Territory mining projects, particularly for non-precious metals and commodities not sold on the open market such as lithium and rare earth elements.

Offtake partners can also provide loan or equity funds for project development, filling the funding gap left by equity and senior debt, and delivering strategic project benefits including potentially lowering investment risk for equity and debt and, by extension, financing costs for the project proponent.

Offtake agreements are generally negotiated after project feasibility is established but prior to mine construction, including to facilitate project financing.

Senior debt often expects offtake agreements to mitigate its risks.

Guarantees, performance and warranty bonds may be used to mitigate offtake risks, particularly for high risk offtake partners.

Offtake arrangement is generally secured before project commencement

Insurance

Exploration – insurance is relatively simple and inexpensive.

Design and construction – insurance is most complicated and expensive to secure.

Production – almost as difficult to secure as for design and construction phase.

Closure and rehabilitation – insurance is easier to secure and is cost effective.

Depending on the resource being mined, the number of available insurers may be limited. For example, most insurers will not be involved in coal mining.

Over the past few years, traditional insurance has struggled and alternative insurance based on risk transfer methods have become more common:

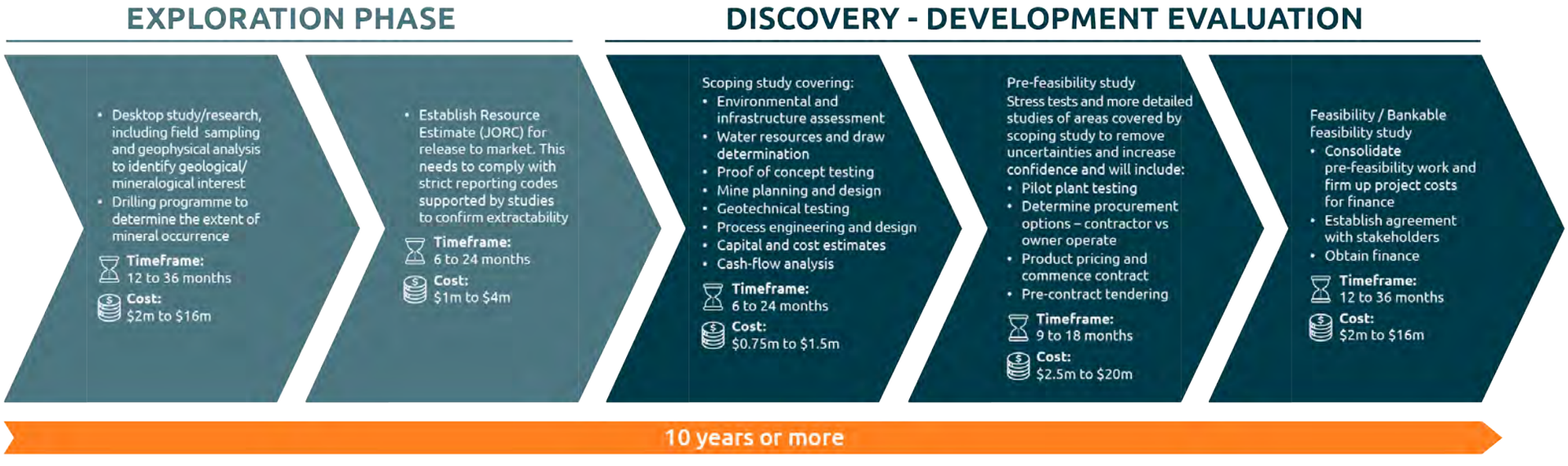
- parametric insurance which is designed to supplement traditional insurance by providing cover where there are gaps or significant deductibles.
- insurance sureties or insurance bonds as alternative to bank guarantees do not sit on the miners' books therefore, access to or use of funds is not restricted.

Industry views

- Insurers have an appetite for mining and are willing to participate in each stage of mining lifecycle to de-risk projects.
- All insurances are exposed to 'insurance cycles'
    - soft cycle: insurance is readily available, cost effective and cover is more expansive
    - hard cycle: insurance is difficult to secure, limited in terms of cover and expensive
- Insurance currently in hard cycle due to adverse claims experiences and reduced investment returns on premiums – expected to run for 12 to 24 months.
- Insurance for mining projects in the Territory will always be more difficult and the cover will be more restrictive due to:
    - exposure to seasonal and extreme weather events
    - insufficient infrastructure, labour shortages, and distance from supply chains and support mechanisms.

Case study – Optimal times for government capital support.

To advance projects from exploration to development will generally involve the following steps:



Exploration and development evaluation may vary significantly between projects in time and cost–depending on various factors including geology, environmental sensitivity, location, infrastructure requirement, project scope, size, complexity and technology (new or tested). These studies are typically complex, costly and difficult to finance (as a project's commerciality has not been proven).

Arafura Rare Earths Limited commenced exploration in 1997 and subsequently progressed to pre-feasibility study in 2007, definitive feasibility study in 2019[25] and updated its feasibility study in 2021[26]. Advancing the project from pre-feasibility to feasibility has taken Arafura more than 10 years.

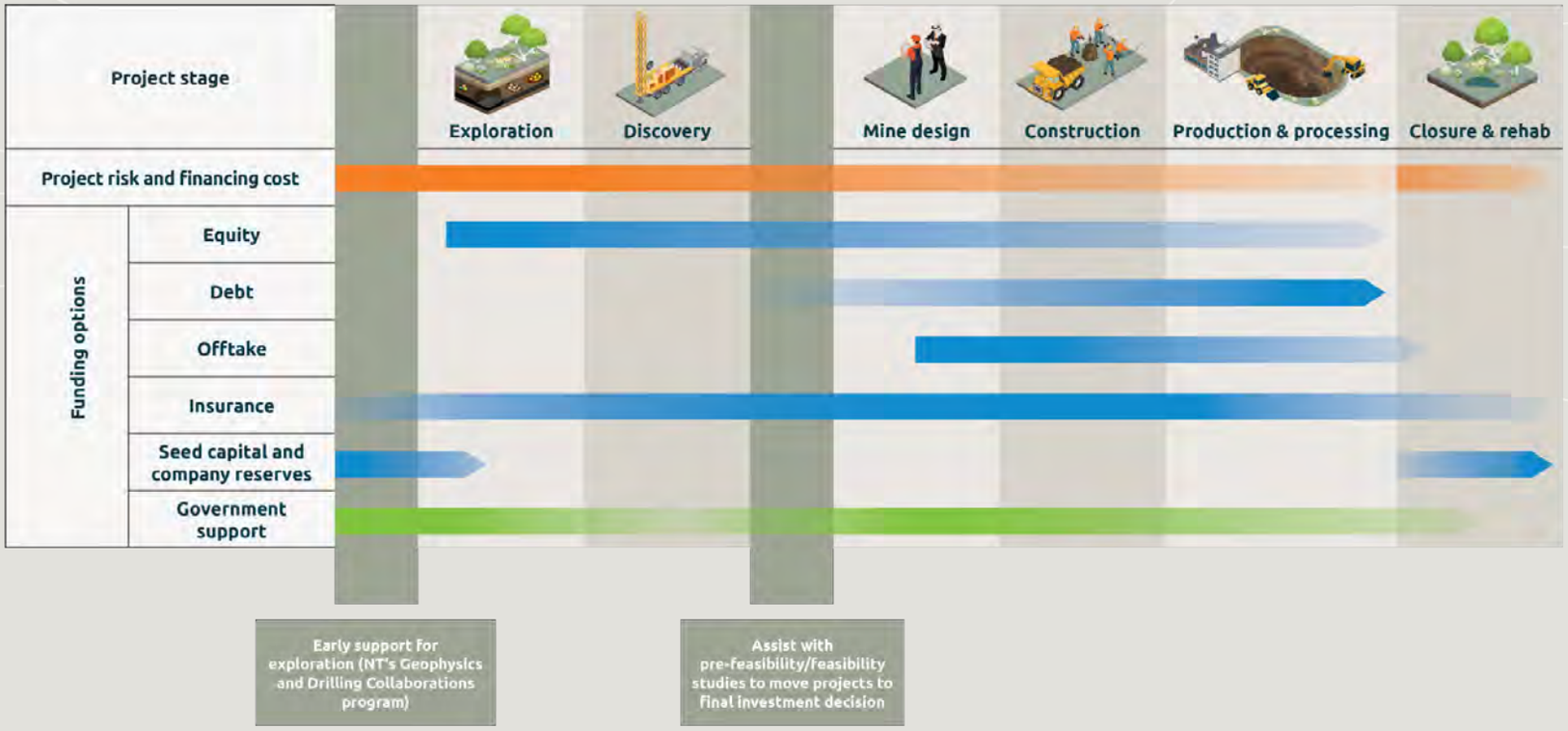
Targeted government assistance at pre-feasibility or feasibility stage could be beneficial in accelerating exploration projects to Final Investment Decision.

When the specific requirements of each financing party is overlayed, the gap for Government support is evident.

Financing options are limited and more costly to secure at the exploration and discovery stages.

Moving projects to development is challenging (in time and cost). NAIF, Export Finance Australia, the Territory's Local Jobs Fund and other government –backed funding and financing entities will only assist projects that are proven to be commercial but not at the exploration or discovery and mine design stages.

There is an opportunity for government to provide targeted support to accelerate exploration projects to development.



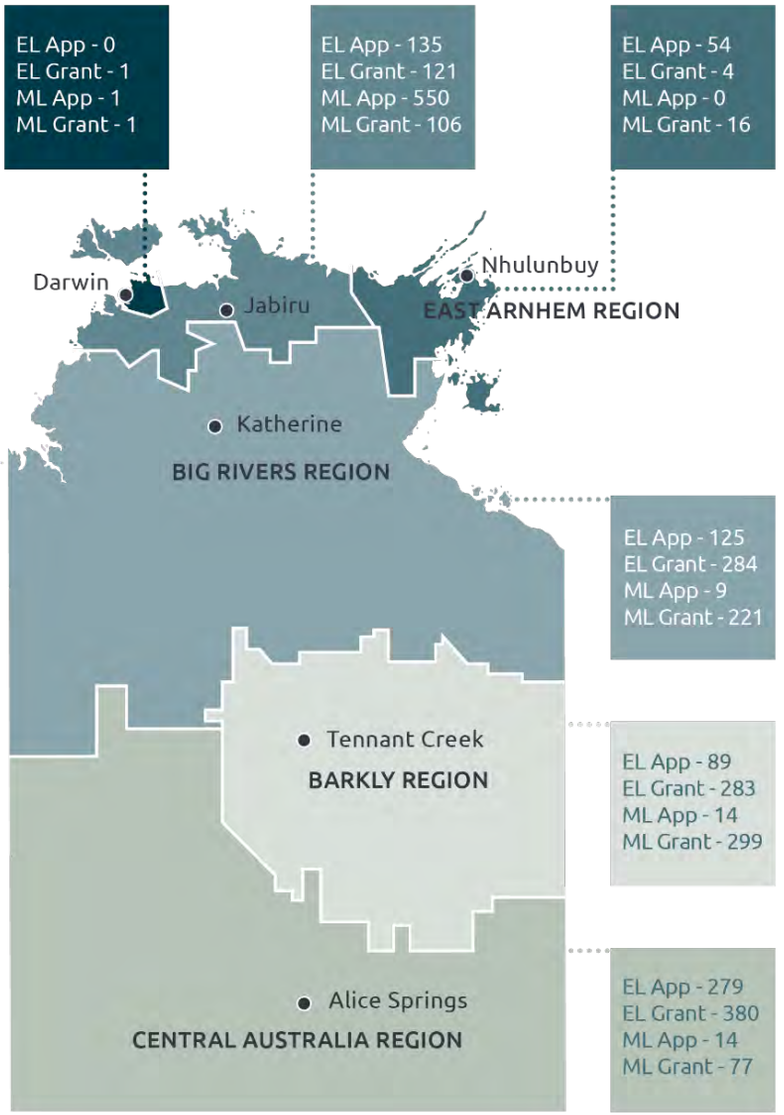
The scale of funding required to finance mining projects in the pipeline is not insignificant and investors will fund projects that pose the least risk and deliver maximum returns.

There are 21 mining projects in approvals processes, with combined capital investment of some $8.2b.

As at 23 October 2022, there were 1,073 granted ELs. Based on the current 1% conversion rate, about 10 will result in commercial discovery (potential for development). Current information tells us that about $6b will be required to fund development.

There are about 720 granted MLs, only about 68 of these relate to operating mines, and 41 are for ancillary or fossicking purpose. The remaining 611 MLs will require active work program or remediation.

The economic benefits for potential projects are substantial, and collaboration between government, industry and investors is critical to unlock finance and accelerate project delivery – in excess of $15b is required in the short-term.



What needs to be done?

Recommendation	Possible Specific Actions
2.b.1 **Focus financing effort in early stage mining exploration and feasibility assessment to secure a sound business case for FID and project delivery**	• The Territory Government to request that the Australian Government reconsiders NAIF design so as to secure support based on identified gaps in project financing opportunities, particularly for early stages of mining project feasibility and regulatory approvals phases. • Review the scope and reach of the Local Jobs Fund to likewise target the gap in current financing opportunities • Work with industry to support junior explorers and small miners to progress to pre-feasibility and bankable feasibility studies.

What success looks like

2 years

- New competitive royalty scheme implemented
- Royalty is not an impediment to investment.
- Aboriginals Benefit Account future proofed from changes to the Territory's mineral royalty scheme
- Competitive mineral royalty scheme with contemporary administrative arrangements established and adequately resourced for implementation and on-going administration
- Commonwealth funding secured to provide targeted investment in most vulnerable stages of mining project lifecycle
- Local Jobs Fund effective in driving exploration, conversion to producing mines and supporting downstream value- add manufacturing
- Reporting system to track and monitor the effectiveness of government funding programs implemented to inform ongoing program effectiveness reviews.

5 years

- Higher levels of voluntary royalty compliance; royalty disputes substantially reduced
- Observable reduction in royalty administration and compliance costs
- Evidence of increased private investment and business confidence
- Observable increase in projects advancing to construction and production
- Measurable improvement in the effectiveness of government funding programs facilitated by a process of on-going program refinement which ensures that government capital is effectively targeted
- Increase in mineral exploration, with the Territory gaining an increasing share of the total Australian exploration commitment.

10 years

- 5 or more new operating mines
- A broader royalty base resulting from new projects and mine expansions
- Increase in royalty collection permits Government to consider other tax reforms to grow the Territory.

Section 3
Harness sustainable downstream value-add opportunities

Overview

With the wealth of the Territory's mineral resources, **there is opportunity to break the current primary mining pattern to encourage greater levels of product value-add within the Northern Territory.**

This could strengthen the Territory's ability to be a direct supplier of input into plant and equipment manufacturing beyond emissions reduction technologies, and has potential to not just deliver a step change to the Territory's economic fundamentals but also diversify and expand manufacturing capabilities with flow on positive repercussions for jobs and regional prosperity.

Section 3 analyses the beneficiation and downstream value-add opportunities for a select range of critical minerals – lithium, manganese, rare earth elements, phosphate, vanadium and high-purity silica. While time and resourcing constraints meant only 6 minerals were prioritised for detailed analysis, the taskforce is of the view that other minerals could hold similar potential.

Acknowledging the reality of the Territory's context, the analyses involved a detailed ecosystem map of the value chain for each of the 6 minerals, including identification of the stage at which downstream manufacturing opportunities have the potential to present the optimal economic outcomes for investors and the Territory. This work drew from the previous mine to market value chain analysis undertaken by independent consultant CRU Consulting for the Department of the Chief Minister and Cabinet. The CRU analysis provided valuable context and background for 5 of the 6 commodities identified by the taskforce for analysis, the exception being high-purity silica.

The next-level analysis was a high level review of the identified optimal value chain opportunity for each commodity to establish common inputs and enablers for more focussed government attention and action. The key enablers, of themselves, could present new market opportunities.

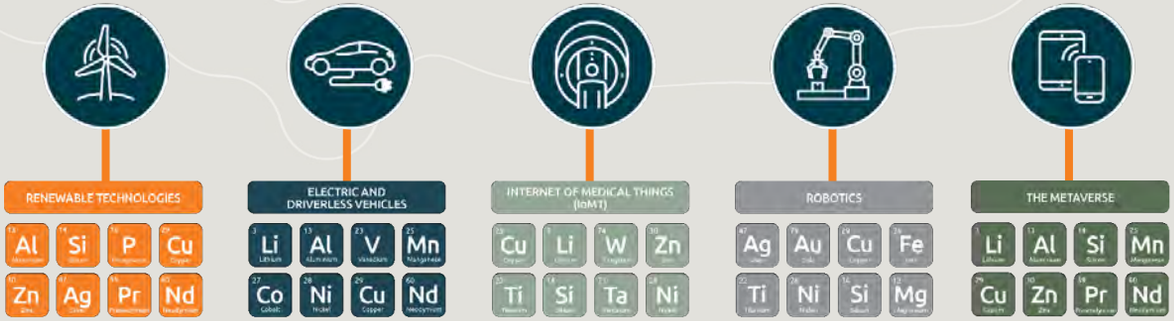
The results of this high level mapping exercise suggest that downstream chemical processing or intermediate processing could be economically viable based on predicted medium-to long-term product prices. While production costs in the Territory are generally at the higher end of the scale, there are broader strategic, economic, social, supply chain security and national interest considerations that could justify a case for government intervention to support downstream value-add initiatives.

A range of key enablers to support the competitive positioning of the Territory's mining industry have already been canvassed in sections 1 and 2 above. These were not further considered as part of section 3.

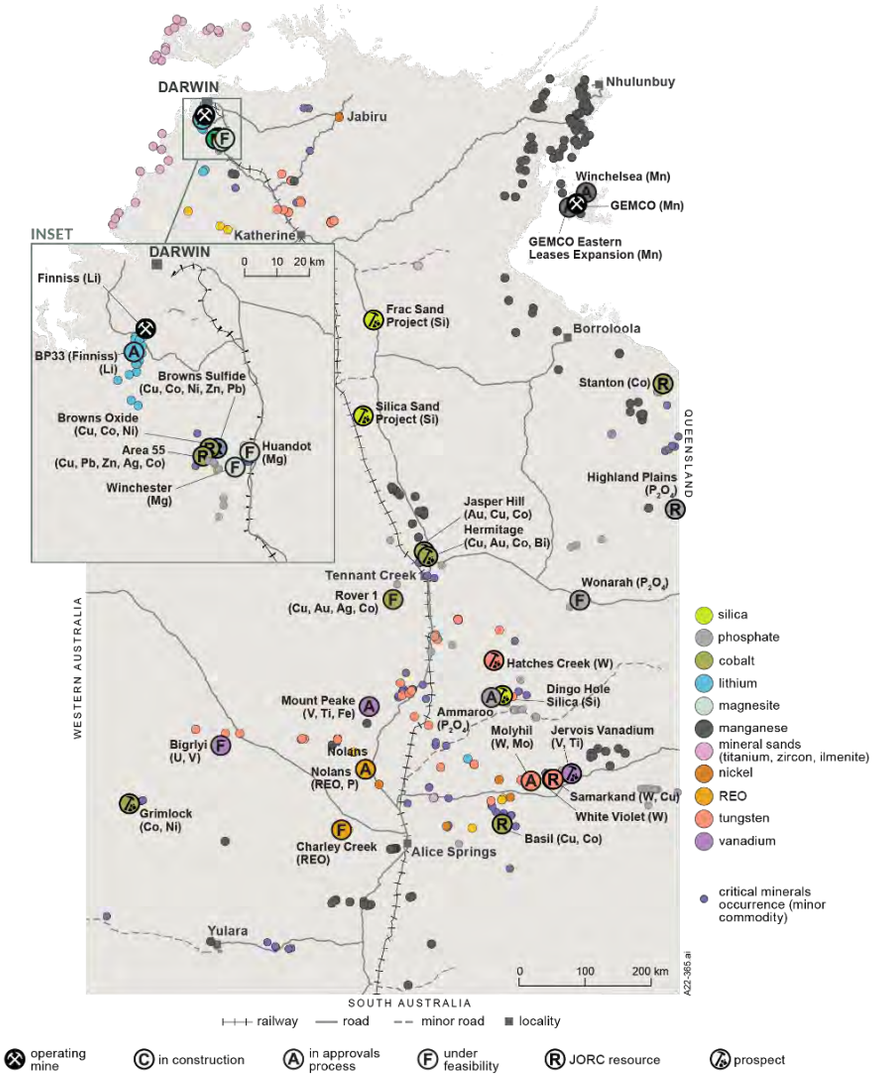
The Territory is well endowed with minerals that are the building blocks for a clean and technology-enabled future[1].

Advancing technologies are revolutionising the way we live and do business; from artificial intelligence to cloud robotics and the internet of medical things. Global events are influencing our economic and geopolitical future.

Both highlight the need to develop strong and diversified mineral supply chains and ensure maximum local value capture from our raw materials.



The Territory's mineral potential

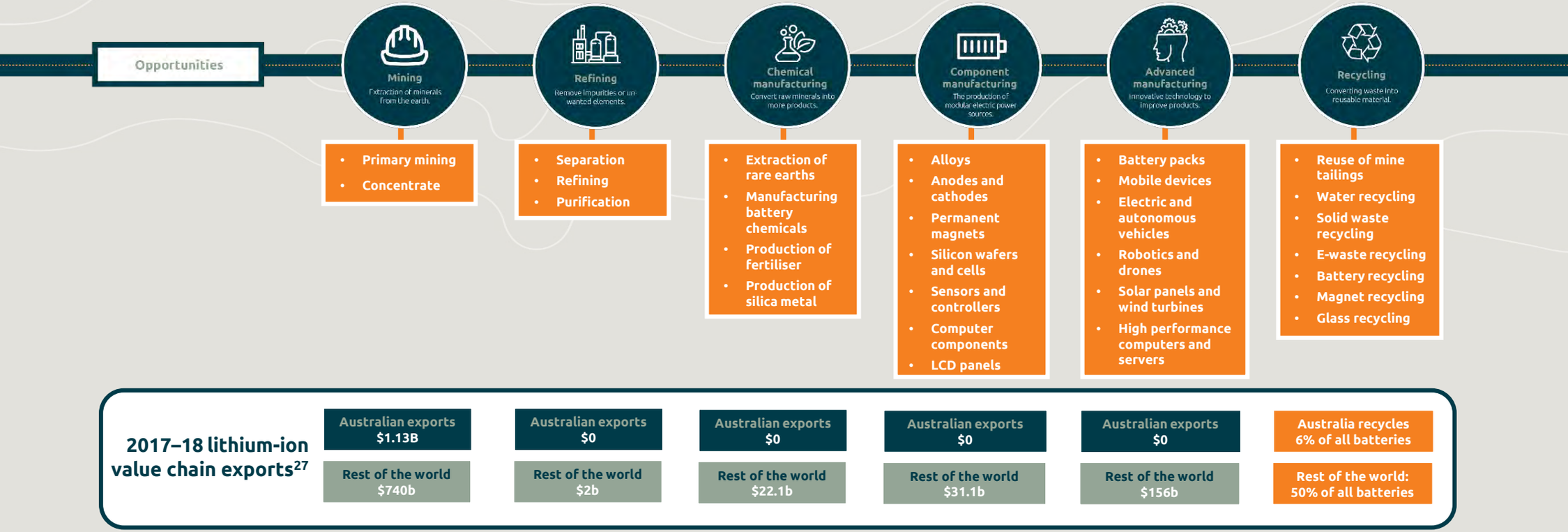


(a) Value chain mapping

There is an opportunity for the Territory to add value to the critical mineral supply chain.

Critical and high value minerals are essential building blocks for a clean and technology enabled future. The Territory has a global supply chain advantage, with the resources and ability to support a high-tech future[1]. However, we are not realising our potential with opportunity for increased midstream and downstream value-add processing.

For example, in 2017–18, Australia only realised 0.53% of the total value chain for lithium-ion batteries[27]. The Territory is exporting lithium ore. Export of concentrate export is targeted for 2023. However, there is opportunity to improve on this and target the export of lithium hydroxide.



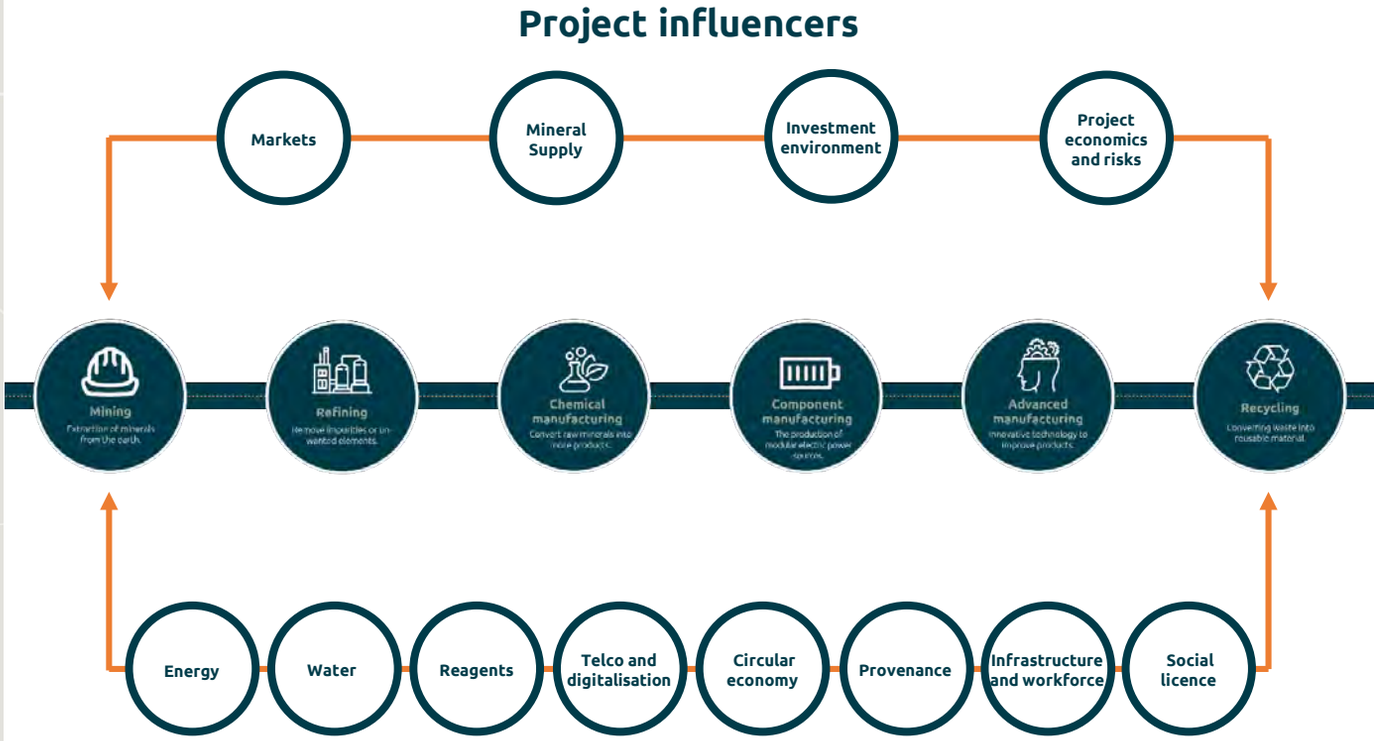
2017–18 lithium-ion value chain exports[27]

Mining	Refining	Chemical manufacturing	Component manufacturing	Advanced manufacturing	Recycling
Australian exports $1.13B	Australian exports $0	Australian exports $0	Australian exports $0	Australian exports $0	Australia recycles 6% of all batteries
Rest of the world $740b	Rest of the world $2b	Rest of the world $22.1b	Rest of the world $31.1b	Rest of the world $156b	Rest of the world: 50% of all batteries

(a) Value chain mapping

Moving up the mineral value chain is complex and requires cost competitive access to enablers with secure supply chains.

- Value-add processes vary between commodities – not just by the type of mineral but also by the engineering flowsheet, and processing operations adopted at each mine.
- Traditional metallic minerals that require smelting, such as copper and gold, have established supply chains.
- Opportunities for Territory-based value-add are limited.
- Taskforce analysis indicates that there are beneficiation and downstream value-add opportunities for the selected range of critical minerals – lithium, manganese, rare earth elements, phosphate, vanadium and high-purity silica.
- Benefits can be generated from the clustering of service and supply industries around targeted downstream manufacturing. These should be pursued with equal rigour, to ensure Territory-based value-add opportunities can be maximised.



There is predicted to be strong, sustained, global demand for lithium.

Demand and supply projections[28]

Global lithium demand is driven by battery applications.

The demand for battery-grade lithium hydroxide is predicted to grow at a CAGR of 26% from 2020 to 2030, with demand far outweighing supply.

A relatively small amount of battery-grade lithium carbonate or battery grade lithium hydroxide is consumed outside Asia. The Territory's proximity to Asia will be a competitive advantage.

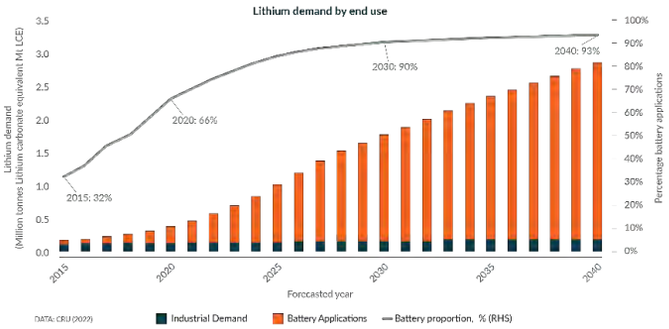
NT lithium potential

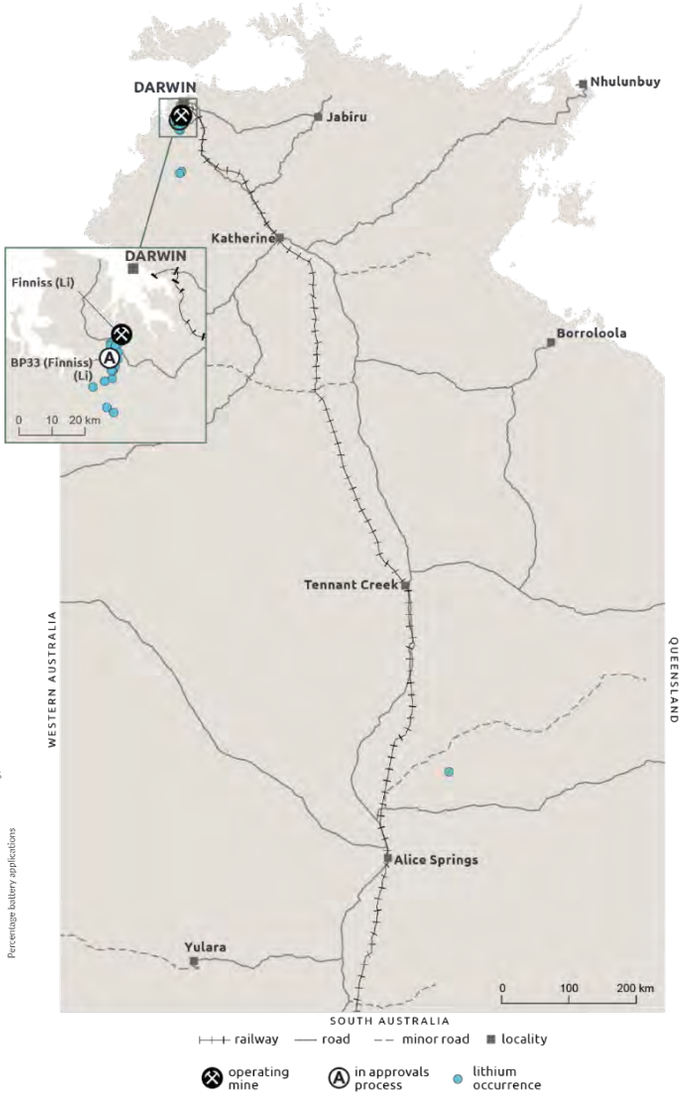
The Territory's first lithium mine, Core Lithium Ltd's Finniss mine opened on 10 October 2022, with the first shipment of Direct Shipping Ore (DSO) expected by the end of 2022 and spodumene targeted for export in the first half of 2023[29].

The Finniss mine is close to Darwin and part of the Bynoe Pegmatite Field where a number of projects are undergoing feasibility studies. Exploration for lithium is also active in the Anningie Pegmatite Field in the Tennant Creek region.

Industry snapshot: Finniss mine[29]

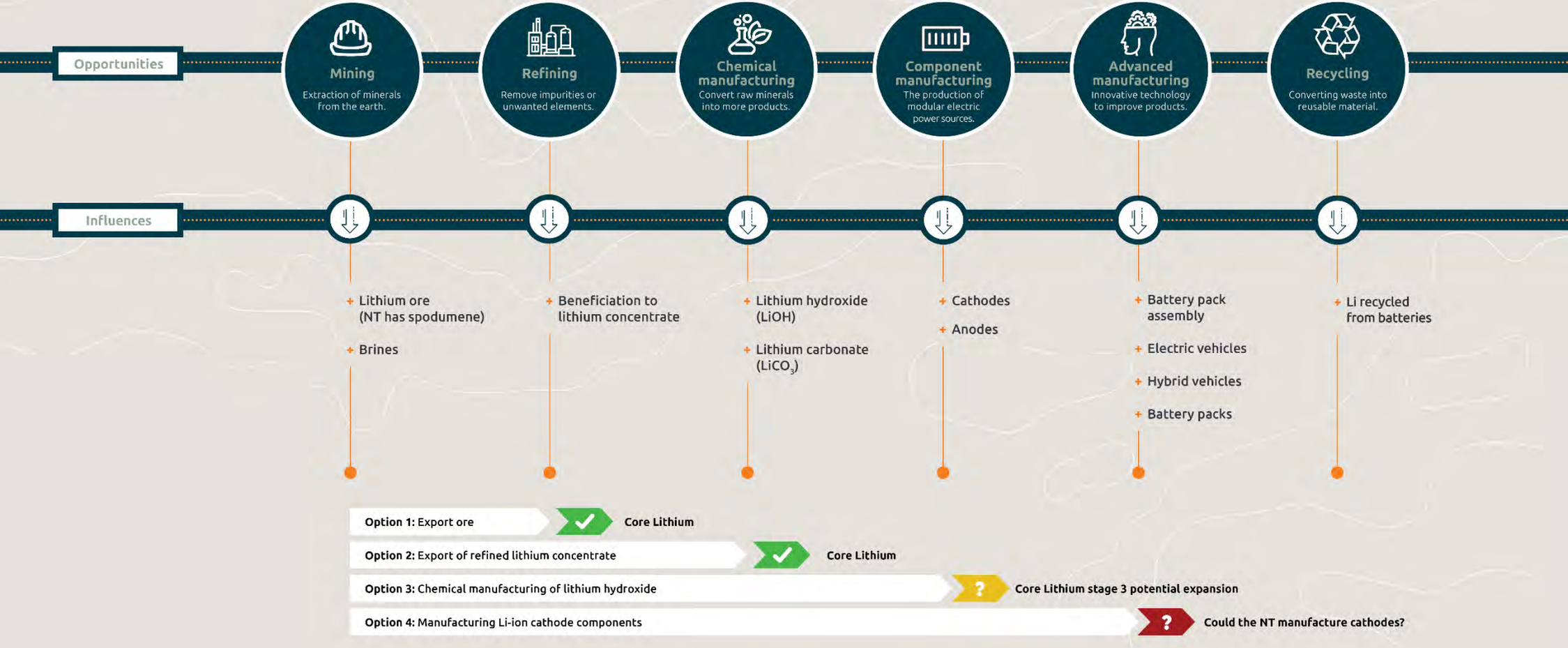
- CAPEX A$80m
- JORC resources 18.9 Mt @ 1.32% Li_2O
- Jobs 60 construction 120–150 mining
- 10+ year mine life
- Production rate 173,000tpa Li concentrate (proposed)
- Close to logistics
- Binding offtake agreements
- Exploring downstream opportunities





Lithium value chain

3 Li



Option 1: Export ore ✓ **Core Lithium**

Option 2: Export of refined lithium concentrate ✓ **Core Lithium**

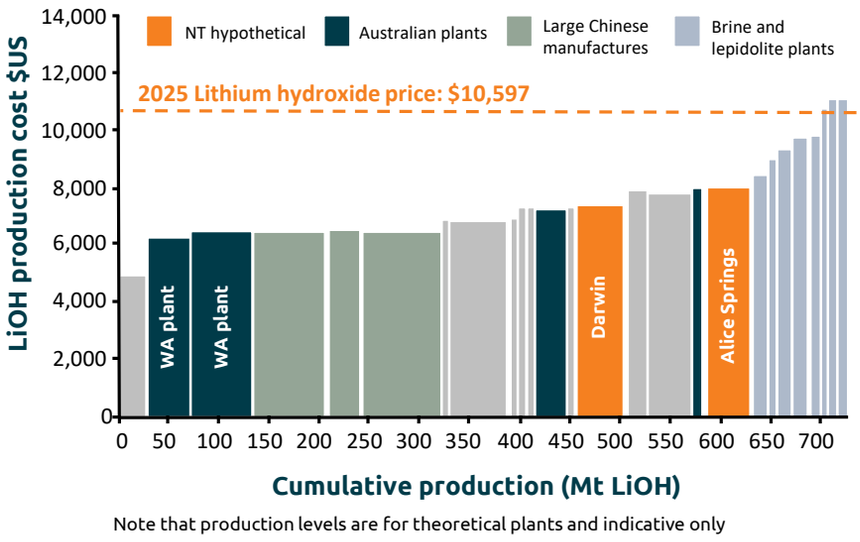
Option 3: Chemical manufacturing of lithium hydroxide ? **Core Lithium stage 3 potential expansion**

Option 4: Manufacturing Li-ion cathode components ? **Could the NT manufacture cathodes?**

Manufacturing lithium hydroxide in Darwin could be economic.

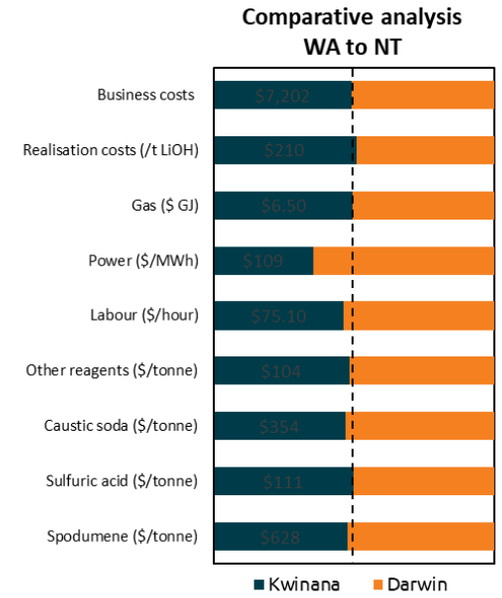
- The proximity of the Finniss Lithium mine to power sources as well as transport and logistics infrastructure is a competitive advantage.
- Current analysis indicates that chemical manufacturing in the Territory will be more expensive than in WA, driven by higher raw material, power, fuel and labour costs[28].
- However, when compared against the forecast market price of lithium hydroxide and broader strategic economic development objectives, the economics of Territory manufacture could stack up[28].
- The next step of Li-ion cathode component manufacturing could be a possibility once chemical manufacturing is established.
- JVs with current cathode manufacturers or government support initiatives could expedite the process.

The Territory could move up the value chain to the chemical manufacturing of lithium hydroxide.



Note that production levels are for theoretical plants and indicative only

CRU (2022)



Data: CRU (2022)

There is predicted to be strong sustained global demand for manganese.

Demand and supply projections[28]

There is a strong demand for thermally stable batteries with a long shelf life, such as lithium-ion manganese oxide (LMO) batteries.

High-purity manganese sulphate monohydrate (HPMSM) is a critical component of LMO batteries, with a CAGR of 16% from 2020 to 2030. There is expected to be a 32kt gap in the market in 2025 that is predicted to increase over the next decade.

NT manganese potential

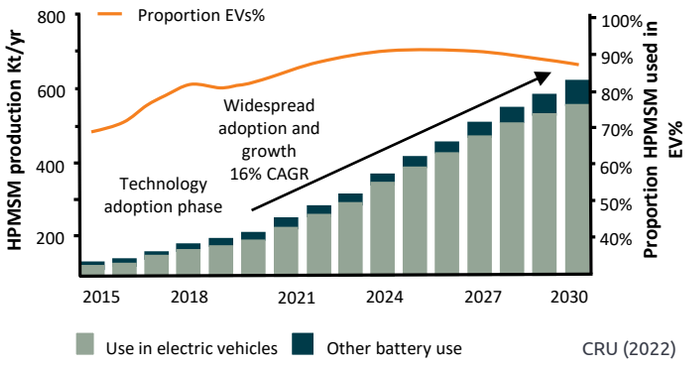
GEMCO on Groote Eylandt supplies more than 15% of the world's manganese ore with a 2020–21 production of 5.62Mt and value of $1.65 billion. Manganese occurrences are also known throughout the Territory.

The Winchelsea Manganese Mine Project on Groote Eylandt is in the regulatory approvals stage, targeting production in 2024. The mine has capacity to meet the current predicted minimum market gap and a DSO option.

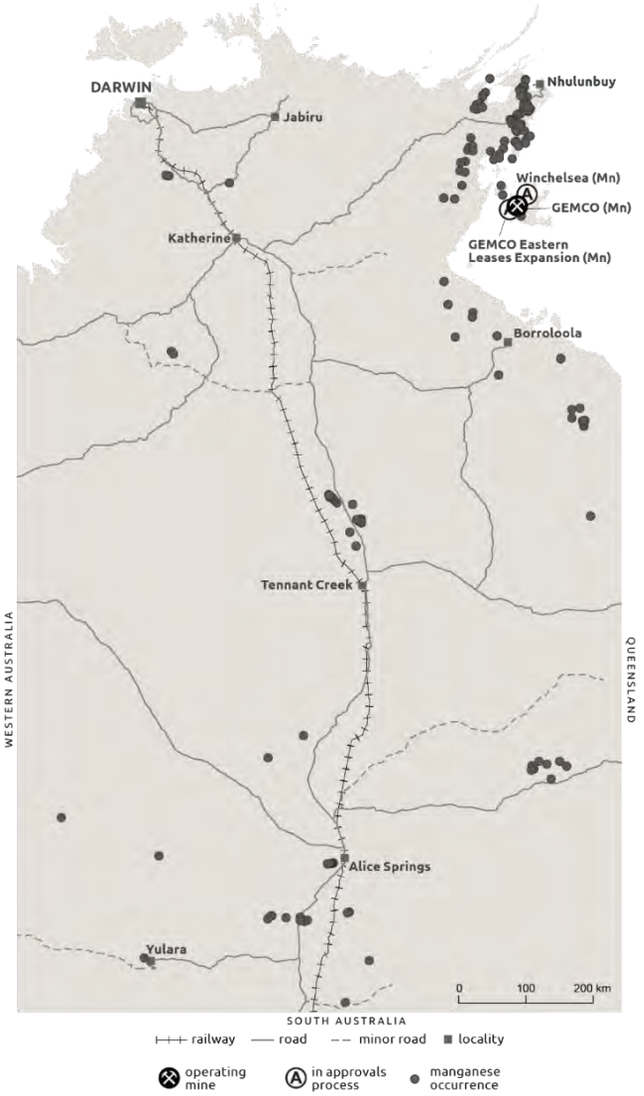
Industry Snapshot: Winchelsea Manganese Mine Project[30]

- CAPEX A$100M
- JORC resources 18.5 Mt @ 20.9% Mn
- Jobs 100 construction 155 mining
- 16 year initial mine life
- Mining agreement with Anindilyakwa Land Council
- Mineral lease granted March 2022
- Mine Management Plan submitted
- Exploring downstream opportunities

HPMSM demand by end-use

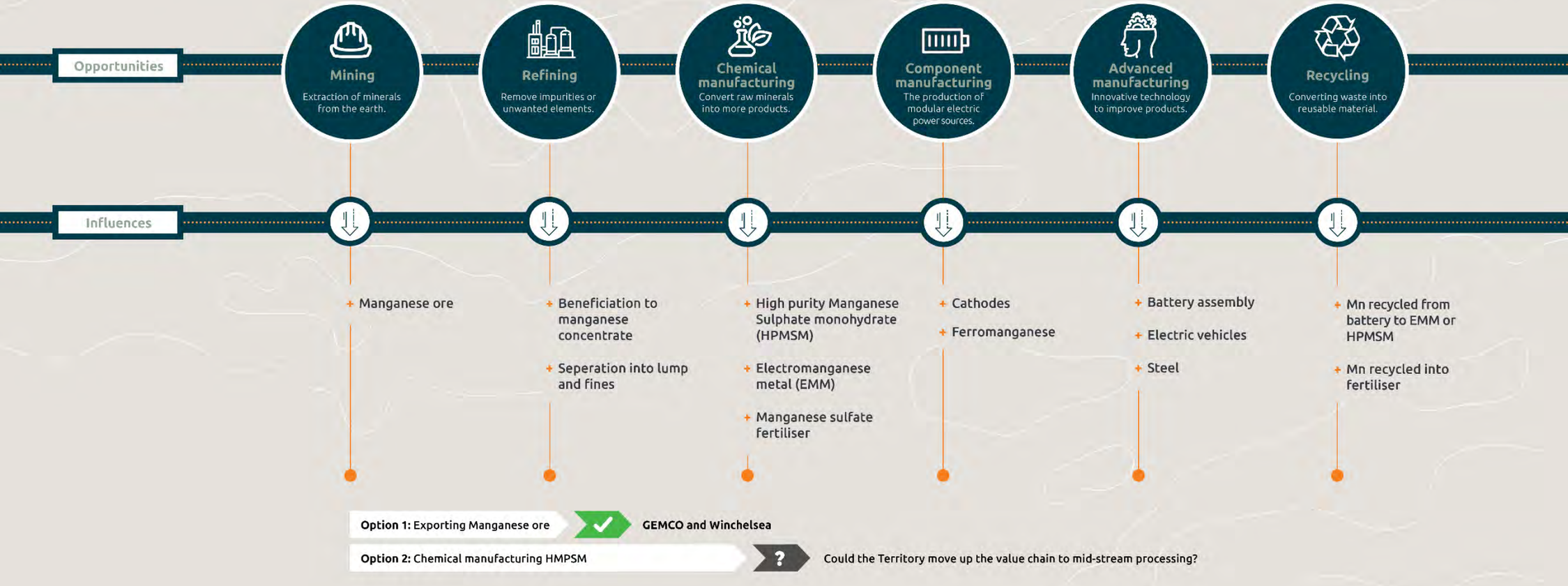


CRU (2022)



Manganese value chain

25 Mn



Option 1: Exporting Manganese ore ✓ **GEMCO and Winchelsea**

Option 2: Chemical manufacturing HMPSM ? Could the Territory move up the value chain to mid-stream processing?

Manufacturing HPMSM in the Territory could be economic.

Analysis indicates that it is more expensive to produce High-purity Manganese Sulphate Monohydrate (HPMSM) in the Territory.

However, when compared against the forecast market price of HPMSM, the economics of Territory manufacture stack up[28].

Broader strategic policy drivers could also support this position.

Winchelsea could provide high quality and low cost ore for a modest HPMSM plant with the ability to ramp up if required.

The use of tailings from other mines (e.g. GEMCO) could increase HPMSM plant life and support circular economy objectives.

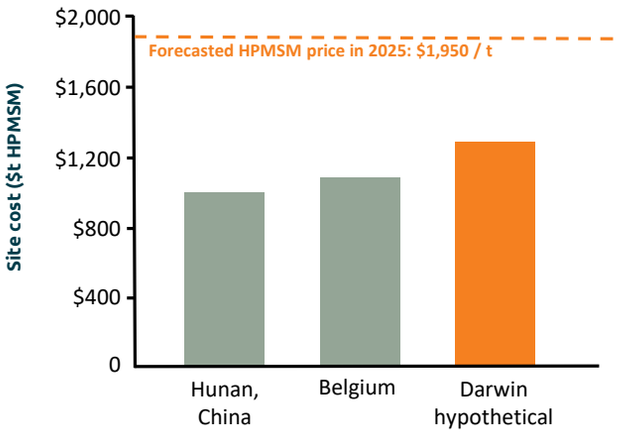
There are HPMSM value-add opportunities through production of fertiliser and electro manganese metal.

The Territory could move up the value chain to the chemical manufacturing of high-purity manganese sulphate monohydrate (HPMSM).

Australian-produced HPMSM will have higher cost curves than Chinese and European plants due primarily to higher labour costs[28].

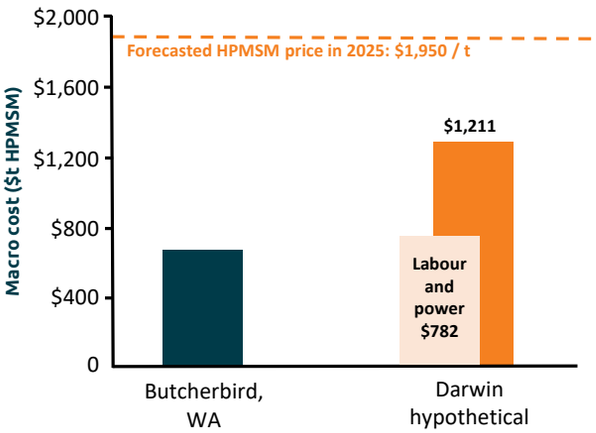
While an HPMSM plant in Darwin is not currently cost competitive compared with, for example, the similarly sized Butcherbird plant in WA (indicatively, total HPSM production costs in WA are broadly equivalent to the costs of labour and power only in the Territory)[31], the opportunity to reduce input costs across the board should the Territory focus. The total HPMSM production cost in WA is broadly equivalent to costs of labour and power only in the Territory.

Total site costs for HPMSM plants, 2025 ($t HPMSM)



Data: CRU (2022)

Operating costs for Australian HPMSM plants ($t HPMSM)



NT data: CRU (2022)
WA Data: Moore Australia (2022)

The Territory is home to a world-class resource of magnet-feed rare earths.

Demand and supply projections[28]

There is a strong demand for permanent NdFeB magnets used in wind turbines, audio and electronics, and electric vehicles. The demand for renewables is the key driver in the market, with a CAGR of 12% from 2020 to 2030.

In 2028, there is forecast to be a market supply gap of 268,500 tonnes per annum of the chemical intermediate NdPr oxide. New mines and recycling of permanent magnets is essential to meet the high demand for rare earths.

While 28% of mined rare earths are used in permanent magnets, an essential component of wind turbines, this comprises 73% of market value.

There is a high demand for NdFeB magnets, with a predicted CAGR of 12% over the next decade and market gap of 6,481tpa.

The demand for the chemical intermediate NdPr oxide is also high, with a predicted CAGR of 9.9% and a market gap of 26,500 tpa.

NT rare earth elements potential

Arafura Rare Earths Ltd rare earth and phosphate deposit is located 135km north of Alice Springs and is one of the largest rare earth deposits in the world. It will be a major global supplier to the permanent magnet market[32].

Mineral potential also exists west of Alice Springs at the Enova Mining Ltd's Charley Creek deposit, with a JORC compliant resource of 805 Mt @ 0.029% REO. Other known occurrences are in the Tiwi Islands and Pine Creek regions.

Industry snapshot: Nolan's project[32]

CAPEX A$1.06B
OPEX A$200 M

JORC resources 56 Mt @ 2.6% REO 11% phosphate

Jobs: 620 construction 280 mining

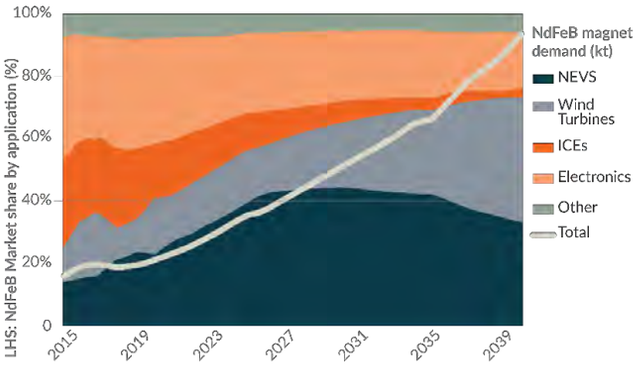
>39 year mine life

MMP submitted Dec 2021

Extensive flowsheet pilot program

Binding offtake agreements

Onsite downstream production



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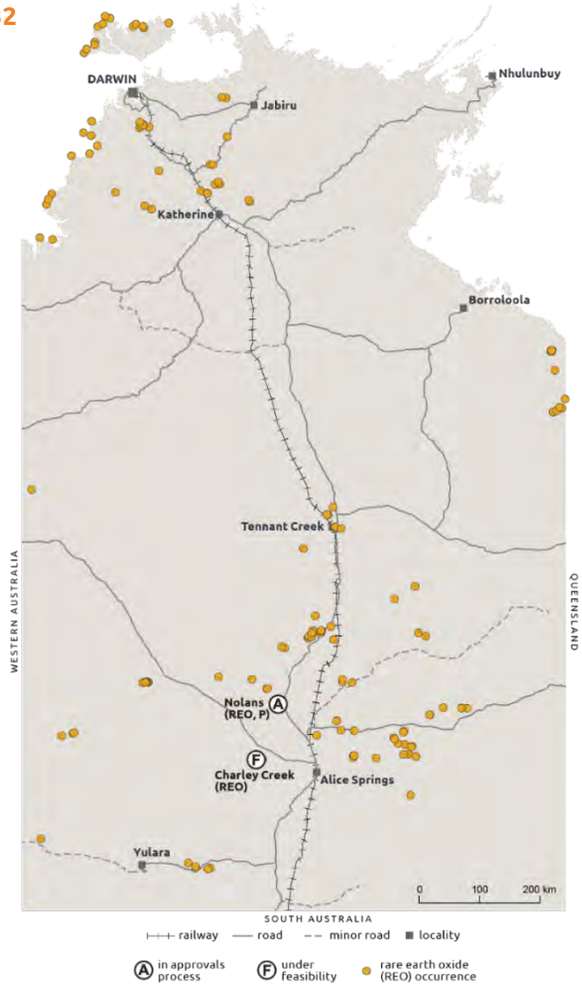
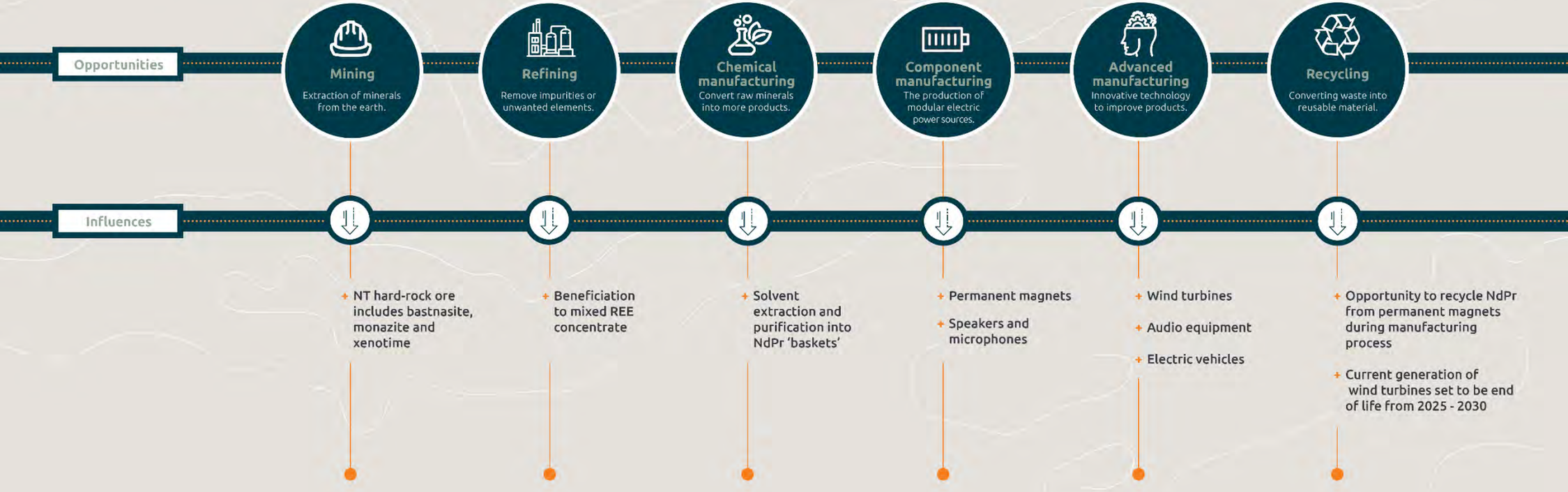


Rare earth elements value chain

60 Nd

59 Pr



Option 1: Export ore or concentrate — Arafura Rare Earths

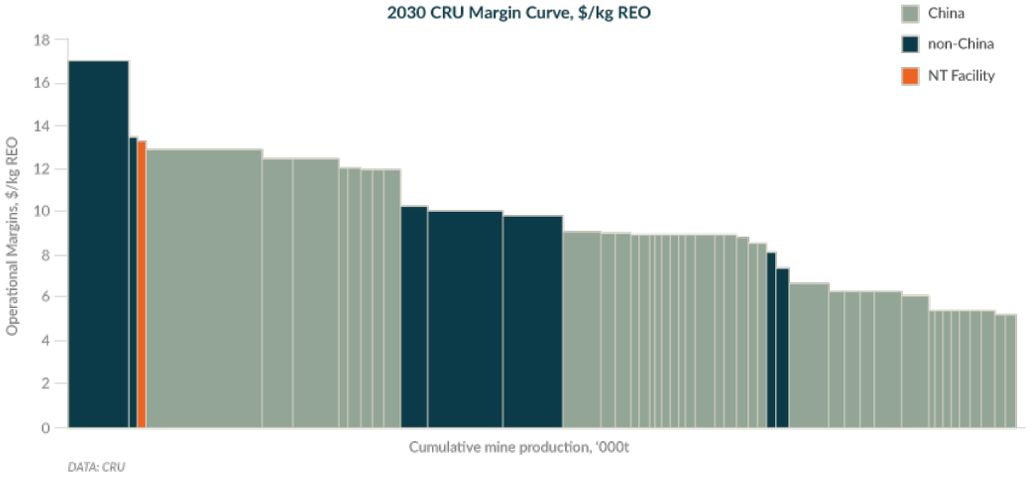
Option 2: Purification and export of purified NdPr — Arafura Rare Earths

Option 3: Production and export of permanent magnets — ? Could the Territory produce magnets?

The NT has potential in REE separation and/or magnet manufacture[28].

- NdFeB magnets used in offshore wind turbines generally require a 650kg NdFeB per MW magnet with REEs accounting for around a third of the magnet weight.
- While analysis indicates that manufacturing costs in the Territory will be comparatively higher due primarily to feed stock costs, there is a strong case for supply chain diversification and national strategic positioning.
- Magnet making may not be feasible without significant government incentives.
- USA is proposing $20/kg subsidies. Any potential NT plant would be relatively uncompetitive without assistance.

There is a strategic case for Territory-based separation of REE and manufacture of permanent magnets, but significant government support is likely to be required.



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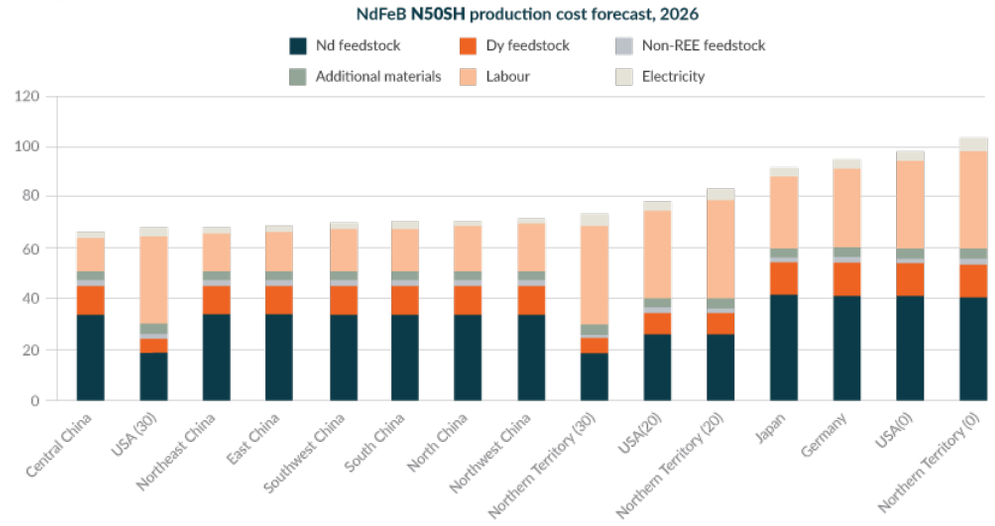


Data: CRU (2022)

The Territory could supply phosphate to meet the global demand for fertilisers and batteries.

Demand and supply projections

87% of world phosphate demand is attributable to fertiliser products. Phosphate demand is expected to increase by CAGR of 2.85% from 2020 to 2040. Australia annually imports 1.2 Mt DAP and MAP, which could be produced in Australia using Territory rock phosphate[28].

Demand for lithium iron phosphate ($LiFePO_4$) cathodes is increasing, with a CAGR of 4.97% between 2020 and 2030[33].

There are global concerns about potential conflict between phosphate for future energy and food requirements[34].

NT phosphate potential

The Territory has Australia's largest undeveloped rock phosphate deposits. Verdant Minerals Ltd's Ammaroo deposit in the Georgina Basin has a JORC resource of 1.145 billion tonnes at 14%P_2O_5[35].

Avenira Ltd's Wonarah deposit in the same basin is smaller but still a significant JORC resource of 842Mt at 18.1% P_2O_5[36]. Arafura's Nolans project in the Aileron Province also has a modest phosphate JORC resource of 56 Mt at 11% P_2O_5[32] .

A number of smaller yet significant deposits are also under feasibility assessment, including Verdant Minerals Ltd's Karinga Lakes potash project in the Amadeus Basin and Batchelor phosphate close to Darwin.

Industry snapshot: Ammaroo project[35]

CAPEX A$2.5B

JORC resources 1.145 Bt @ 14% P_2O_5

Jobs: 1,500 construction 400 production

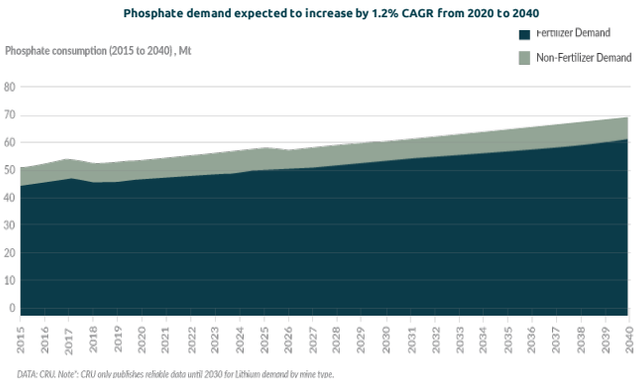
25 to 100 year mine life

Environmental approvals in place

Major project status NT and Australian

Offtake agreements

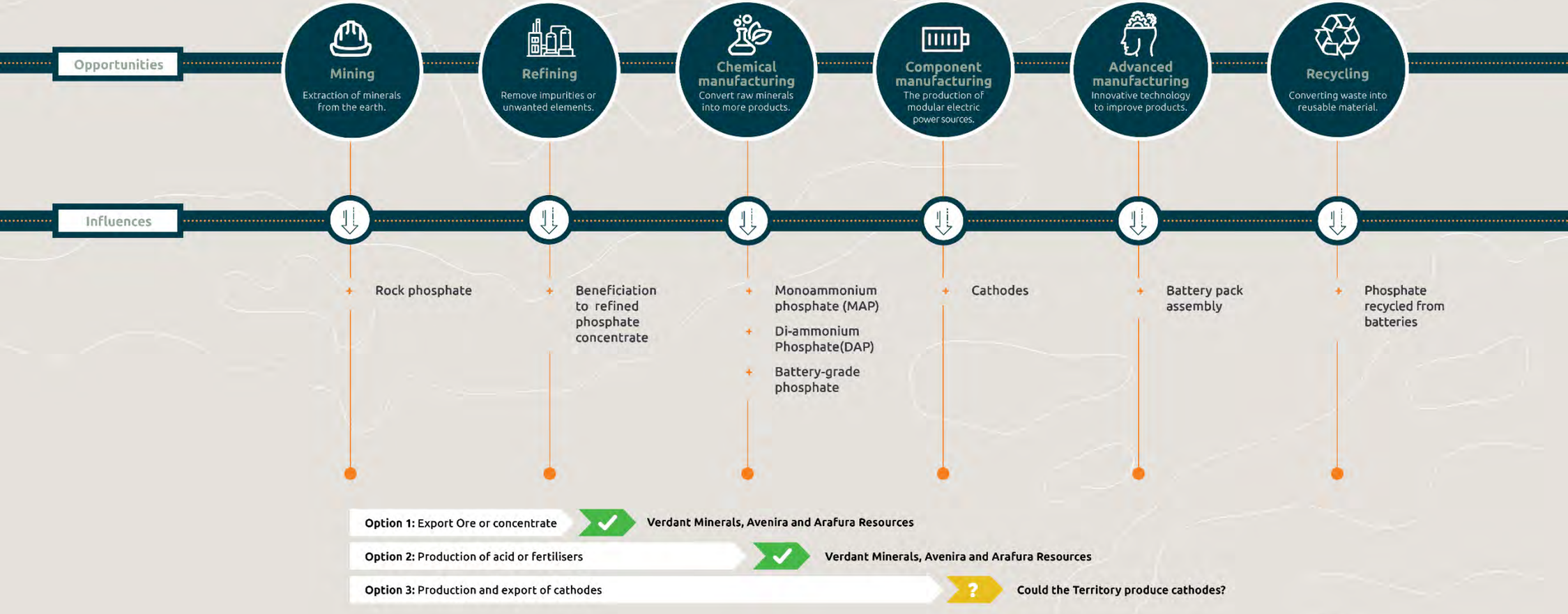
Downstream phosphate fertiliser project



Data: CRU (2022)

Phosphate value chain

15
P



Option 1: Export Ore or concentrate — **Verdant Minerals, Avenira and Arafura Resources**

Option 2: Production of acid or fertilisers — **Verdant Minerals, Avenira and Arafura Resources**

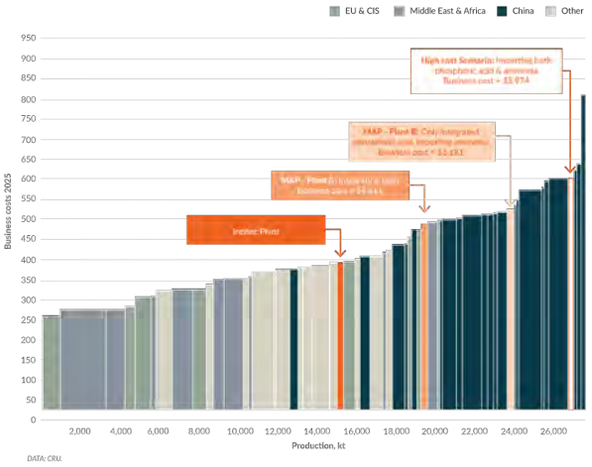
Option 3: Production and export of cathodes — **Could the Territory produce cathodes?**

Phosphate manufacturing analysis

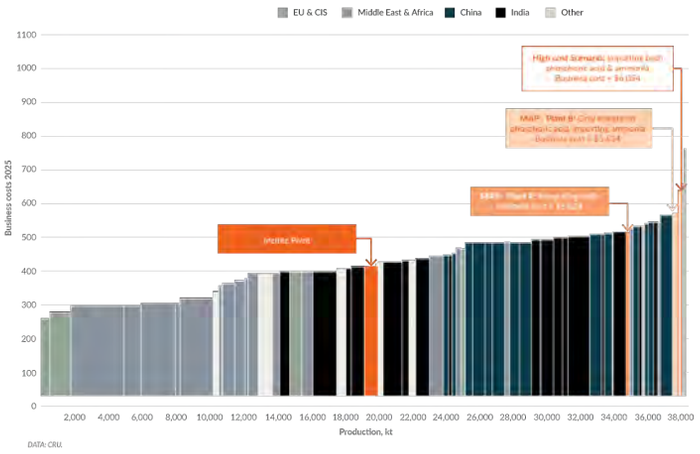
The Territory has the right conditions to establish phosphate-based chemical manufacturing[28].

- There are 2 major processes of phosphate beneficiation: Wet method for fertilisers and dry (thermal) for batteries.
- Both methods have high costs, including reagents, power and labour.
- Phosphoric acid costs are currently 73% for DAP and 63% for MAP plants.
- Queensland-based Incitec Pivot produces phosphoric acid and fertilisers, competitive due to an onsite sulphuric acid plant and cost competitive source of sulphur.
- Avenira is at the early stages of scoping; at the time of writing, cost stacks are not available but costs are broadly similar to the wet method (noting higher energy inputs and waste outputs).

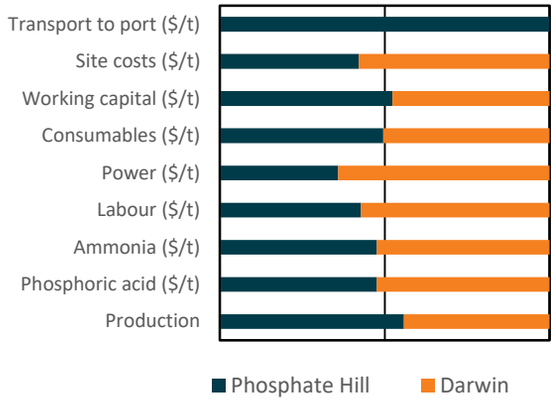
MAP Business cost curve (2025)



DAP Business cost curve (2025)

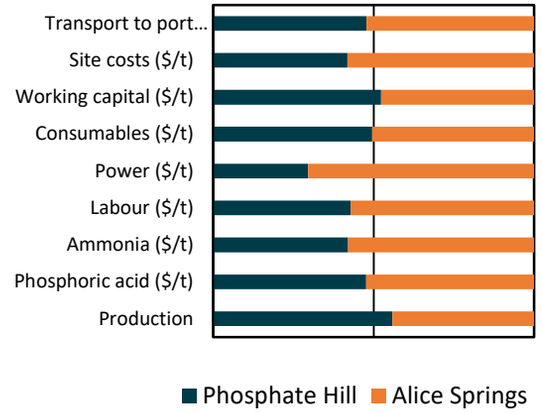


MAP cost stacks: Queensland versus Darwin



CRU (2022)

MAP cost stacks: Queensland versus Alice Springs



CRU (2022)

There is predicted to be strong, sustained, global demand for vanadium.

Demand and supply projections[28]

In 2020, the demand for vanadium (93%) was driven by the steel and alloy industry. The uptake of large scale redox flow batteries is increasing the demand of vanadium, with consumption for batteries doubling between 2019 and 2022 and a longer term predicted CAGR of 39% from 2020 to 2040.

Global supply is declining. CRU predicts a market gap of 39 Kt by 2030. This presents a significant opportunity for the Territory.

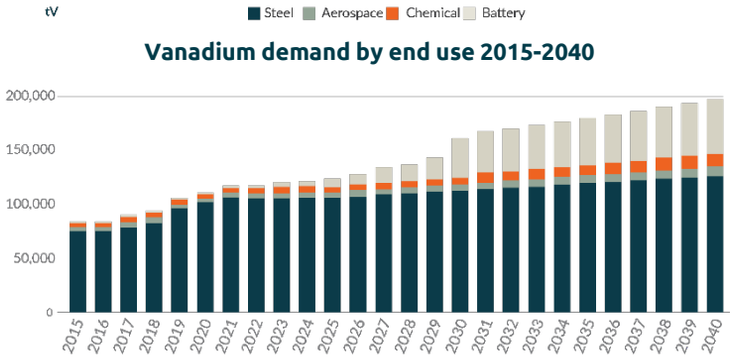
NT vanadium potential

TNG Ltd's Mount Peake deposit located 185 km north of Alice Springs is the Territory's largest high grade vanadium resource, with JORC resource of 160 Mt at 0.3% and a projected output of 6 kt/year[37].

Other vanadium occurrences and mineral potential exist in the Alice Springs region, including Jervis vanadium and the Bigrlyi vanadium-uranium deposit.

Industry snapshot: Mount Peake Project[37]

- CAPEX A$848 M
- JORC resources 160 Mt @ 0.3% V_2O_5 5% TiO3, 23% Fe
- Jobs 1800 construction 1200 mining
- 37 year mine life
- Mining licences and most approvals
- Innovative and sustainable flowsheet
- Binding offtake agreements
- Onsite downstream production of three products

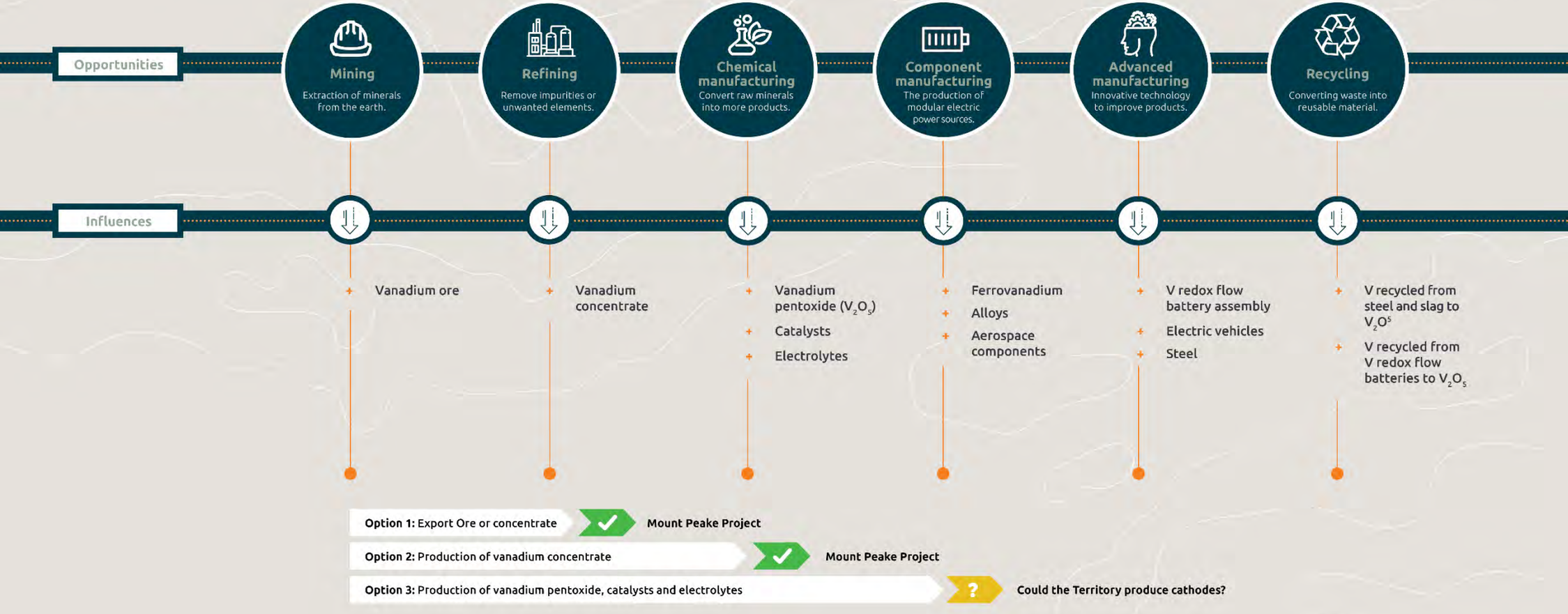


Vanadium demand by end use 2015-2040

Data: CRU (2022)

Vanadium value chain

23 V



Option 1: Export Ore or concentrate ✓ **Mount Peake Project**

Option 2: Production of vanadium concentrate ✓ **Mount Peake Project**

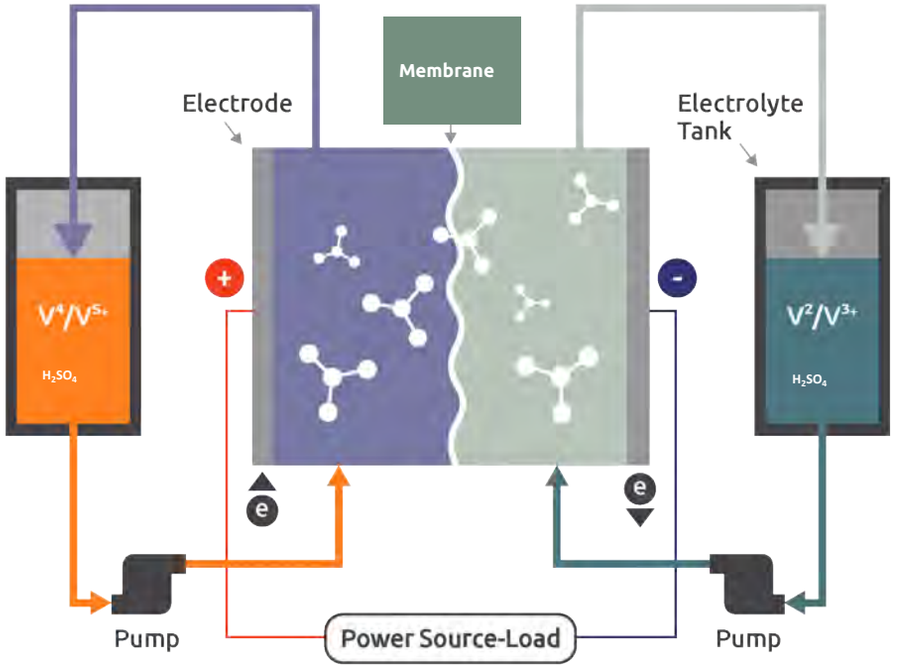
Option 3: Production of vanadium pentoxide, catalysts and electrolytes ? **Could the Territory produce cathodes?**

Processing the battery precursor, chemical vanadium oxide, in the Territory is economic and competitive.

- Vanadium redox flow batteries are an Australian-invented technology with great potential as a long-term, large-scale battery that is able to withstand high temperatures and humidity[38].
- TNG Ltd has partnered with CDU to trial redox flow batteries at the Renewable Energy Microgrid Hub for Applied Research and Training (REMHART) at East Arm[37].

The Territory could be a competitive manufacturer of vanadium battery chemicals.

- TNG Ltd's V_2O_5 project plant has a positive benefit cost ratio, with the ability to ramp up to meet demand[37].
- TNG Ltd will concentrate ore to produce high-purity vanadium pentoxide (V_2O_5) at its Mount Peake mine site. This reduces waste transport and double handling, saving 14% in CAPEX, as well as a reduced carbon footprint[37].
- Highest risks are the difficulty predicting market demand as Lithium-ion batteries currently dominate the market[28].
- There are opportunities to prove up the redox flow battery technology by supporting testing and a trial in remote regions of the Territory, including in one or more remote Aboriginal communities or mine sites.



Schematic diagram of a vanadium redox flow battery[38].

The Territory could have significant resources of high-purity silica, a critical mineral.

Demand and supply projections

The strong demand for high-purity silica sand is driven by solar panel uptake and is predicted to have a CAGR of 6.75% between 2022 and 2032[39] Frac sand is also in high demand across the globe with a market value of US $7.2 billion in 2020 with a CAGR of 7.5% between 2022 and 2027[40].

NT high-purity silica potential

Territory Sands Pty Ltd is currently exploring for high-purity silica sand (and frac sand) in the Carpentaria Basin along the rail corridor close to the Beetaloo Sub-basin[41].

JORC resource is expected to be determined by the end of 2022. If successful, the project could provide high tonnages of high-purity silica that could fill the current market gap.

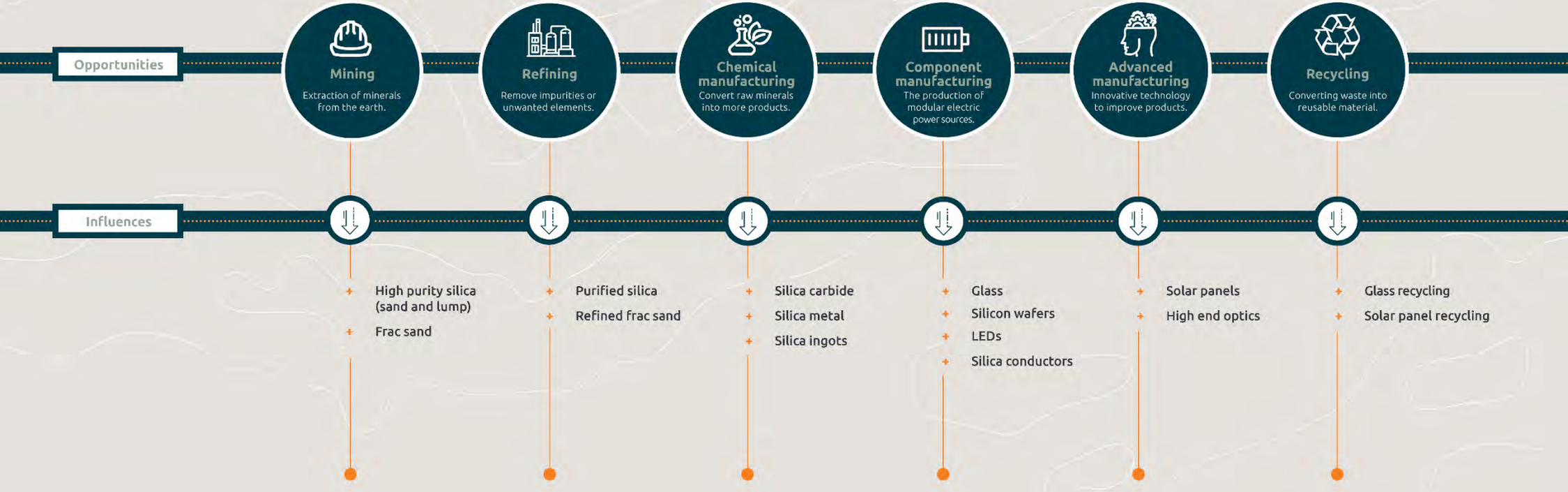
Verdant Minerals Ltd also has potential at Dingo Hole at the Ammaroo project[35].

Industry Snapshot: Silica and high-purity silica sand projects[41].

Silicon supply and demand curves from 2011 to 2021[42]

High-purity silica value chain

14
Si



Option 1: Export ore ✓ **Territory Sands**

Option 2: Refined high purity silica sand or frac sand ✓ **Territory Sands**

Option 3: Production of silica metal or ingots for solar panels ?

Option 4: Production of glassware or solar panel components ?

High-purity silica manufacturing analysis

The Territory must ensure the conditions are right to establish a high-purity silica manufacturing industry.

Industry consultation

- Silica sand projects are currently in the exploration phase, with applications lodged for mineral extractive leases.
- Silica is at shallow depths, and projects have low capital and operating costs with fast progression to mining after final investment decisions are made.
- Current challenges are land access, timeframes for approvals and identifying business partners with the intellectual property for downstream processing.

There is significant opportunity to capitalise on the expected high-purity silica potential of the Territory.

- High-purity silica (99.9%) is an important industrial material, widely used in the production of glass for solar panels, optic fibre, laser and aerospace. It is a newly defined critical commodity for the Australian Government's Critical Minerals Strategy[43].
- Silica metal is produced by fusing high-purity silicon with a carbon source. SIMCOA in Western Australia uses charcoal,[44] and advanced manufacturers are trialling the use of methane as a carbon source[45]. With Territory petrochemical opportunities, R&D collaboration is needed to prove up processing economics.
- The development of the Beetaloo Sub-basin will also result in increased demand for silica sand as propant. Each production well requires 6,000 to 10,900 tonnes of frac sand, with an estimate of Beetaloo demand of between 240,000 to 1.8M tonnes. Currently, all frac sand for the Beetaloo is imported[46].
- Territory Sands has identified a frac sand deposit of 130 million tonnes, with ongoing exploration predicted to increase this value. Beetaloo project proponents have expressed interest[41].
- Highest project risk relates to access to land. The extractives industry has identified that project certainty is critical to capital investment and binding offtake agreements. Despite industry efforts, there is no current certainty of local supply and there is a real risk that long-term import contracts will be established, resulting in significant lost local opportunities to grow a new industry.

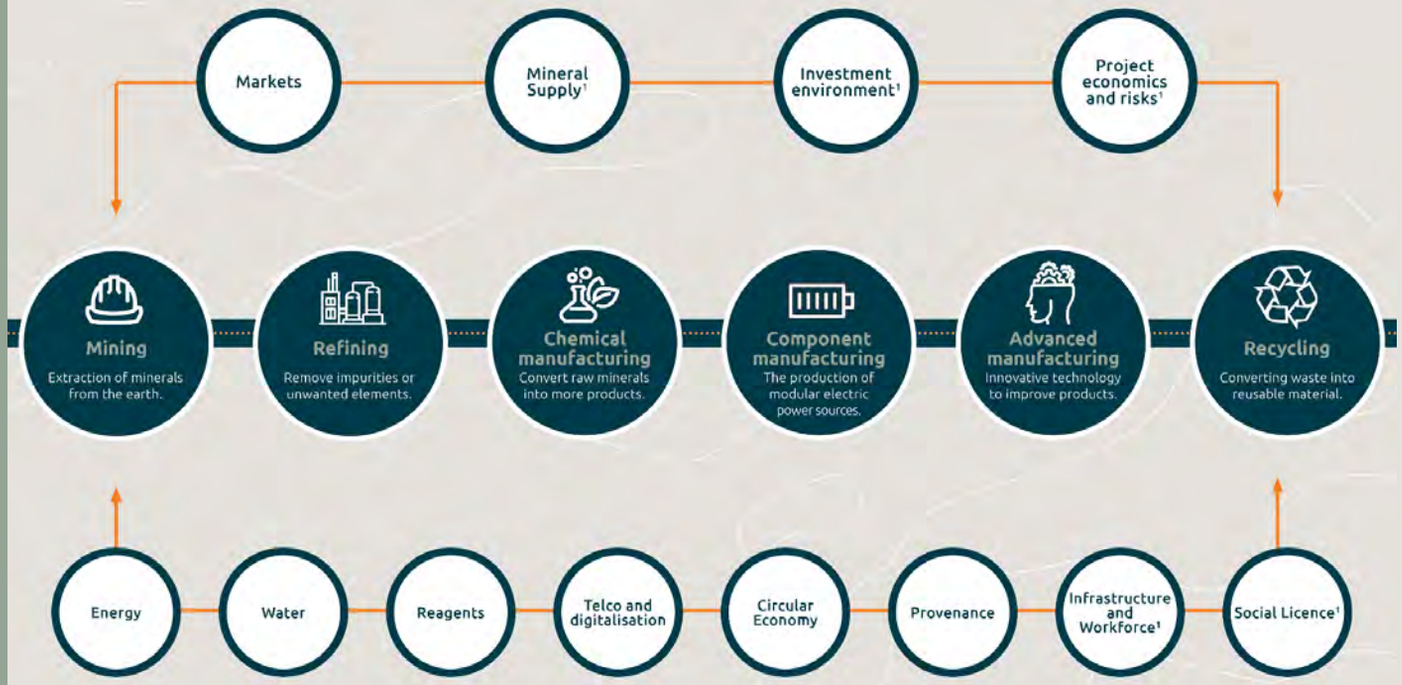
(b) Capitalising on the opportunities

Down stream mineral value-add opportunities will only be realised with explicit government commitment to and investment in securing key industry enablers.

- 3 Li — Lithium
- 14 Si — High-purity silica
- 23 V — Vanadium
- 59 Pr — Rare Earth elements
- 15 P — Phosphate
- 60 Nd — Rare Earth elements
- 25 Mn — Manganese

Note: More information is available at page 112.

Project influencers



Key enablers

All projects in the Territory share common key inputs for development regardless of mineral commodity type

[1] *Covered in more detail in other above.*

Strong demonstrated government commitment to increasing exploration activities, converting exploration activities into producing mines, and transitioning concentrates into value-added products is critical.

The Territory has globally significant deposits of the range of minerals vital to modern technology and industrial applications including lithium, rare earth elements, vanadium, manganese and phosphate. Supply is not the barrier to the economic realisation of the value and strategic significance of these minerals.

Sections 1 and 2 are focussed on initiatives that the taskforce considers will secure an investment-competitive environment to maximise exploration activities and the subsequent conversion of exploration into producing mines. These sections already address the investment environment, project economics and risks, and influencers for exploration and mining projects (including, enabling infrastructure, a skilled workforce, social licence and capital markets). These apply equally to downstream value-add opportunities and are therefore not repeated in section 3.

To achieve the Territory's ambitious target of a $40b economy by 2030, the Territory vision must extend beyond the production of bulk ore or a concentrate for export. While these processes are simpler and provide more immediate returns and cashflows to mining projects, real potential value for the Territory economy will only be achieved with greater levels of industry diversification. In the case of the mining industry, this is from the transitioning of concentrates into value-added products that can be direct inputs into advanced manufacturing and production processes. However, more detailed commodity-specific analysis is required to define what is economically and commercially realistic and sustainable, and the extent to which broader economy-wide benefits justify a level of government market intervention and support.

This focus on expanding mining from being just a primary to a secondary industry has the added benefit of supporting social licence messaging. It should realise the value proposition and make the best use of ore that is dug out the ground, which is currently perceived as having limited direct relevance to the lives and living standards of Territorians.

Government must, at a geopolitical level, identify, establish and nurture economic and business links with investment and export markets.

Demand drives supply and supply drives production. A step increase in Northern Territory exploration, mining and value-add production has the potential to turbocharge delivery of a $40b economy by 2030.

The Territory Government must consider a strategic and coordinated multi-pronged approach to marketing Northern Territory mineral potential – not to just promote the Territory as the preferred investment destination for mineral exploration, mining projects and downstream mineral manufacturing opportunities, but also as a critical supply partner for value-added mineral products, particularly the critical mineral products vital to economies of the future.

Evidence-based analysis of priority markets, clearly distinguishing between markets for investment capital and those for mining exports (concentrates and value-added products) will be critical to ensuring focus on activities that maximise tangible returns. Equally, an evidence-based articulation of the Territory's value proposition is vital to securing the credibility and credentials critical to capturing investor confidence.

The Territory must recognise that it has to be discerning in its focus, and informed decisions need to be made to secure targeted economic and strategic public policy outcomes. There is significant benefit and opportunity to align with and leverage off existing Austrade activities but with Territory bespoke tactical strategies which focus on the Northern Territory's specific context, strengths and offerings.

A directly related role for the Territory Government is matching product to market at a business-to-business level. The messaging and strategic value of this visible and direct government support cannot be underestimated.

Downstream processing of concentrate is energy intensive. Project economics will be directly influenced by the cost of power.

Downstream processing of rare earths, battery-grade phosphoric acid or silicon require large amounts of electricity during smelting and milling. Other processes such as fertiliser production (DAP and MAP), although not as energy intensive, still require access to cost-competitive energy.

With increasing global expectations of decarbonisation and the Territory's renewable energy targets of 50% by 2030 and net zero by 2050, low cost and low-emissions power will be a critical enabler of downstream value-add endeavours.

The Territory's regulated electricity systems already use less emissions-intense natural gas as the energy source. However, there remains a significant reliance on diesel as a fuel source for stand-alone power systems in remote areas.

Prospective regions of the Territory for mining activity are in remote areas which are not serviced by regulated electricity systems. Industry imperatives mean that ESG priorities will be front of mind and government facilitation of mining project-specific decarbonisation efforts will be critical.

The Territory's climate and geography is well-suited to low-cost solar, coupled with critical battery storage. There is a clear driver for new mines to be designed to rely on renewables-based power sources. This requires new approaches to mine and engineering infrastructure and flowsheet design, with cost and reliability being primary considerations.

Government can master plan and initiate investment in cost-competitive, reliable and accessible energy for mining and downstream value-add activities. Depending on location, shared infrastructure could reduce energy costs through scale economies.

If all 6 chemical manufacturing projects are established, the power needed would greatly exceed current capabilities.

***Note that the 208 GW in Central Australia is a combination of mining and manufacturing**

Access to water is critical and identified to be a potential barrier to greater levels of investment in downstream processing opportunities.

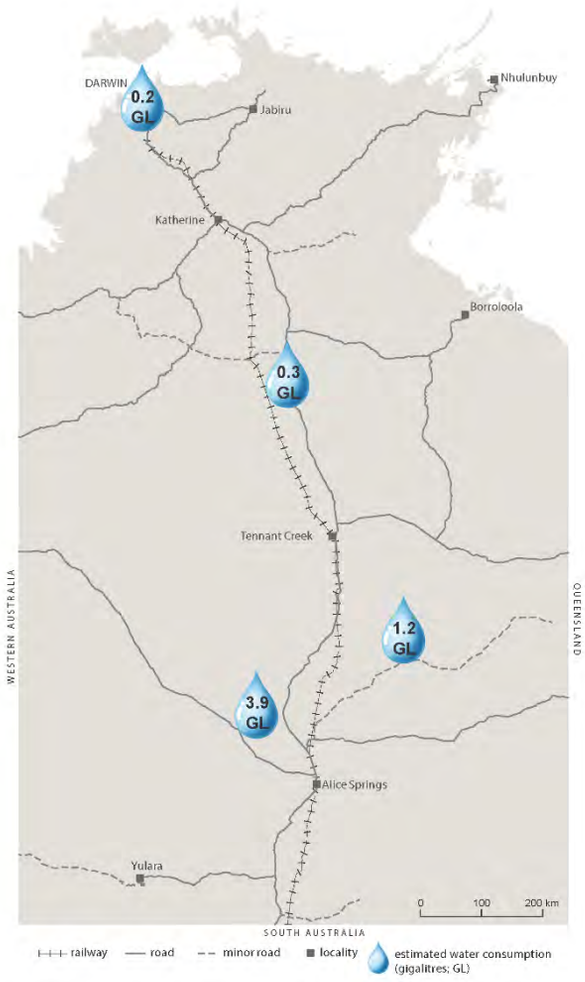
Water is generally viewed as a finite resource and recognised to be a sensitive social and community issue.

Mines and plants in Central Australia will primarily rely on groundwater. These activities will, at some point, conflict with competing uses such as cultural and environmental values in addition to other consumptive uses such as agriculture. Industry has already highlighted concerns with approval timeframes for groundwater extraction.

Industry also has a part to play in demonstrating commitment to sustainable mining and manufacturing processes focussed on water efficiency.

Innovative manufacturing practices that demonstrate recognition of sustainability in water consumption must be introduced; for example through water reclamation, recycling and reuse, dry stacking of tailings, greater innovation of beneficiation and manufacturing flowsheets, and onsite off-stream water capture and storage.

An estimated 5.6 Gigalitres of water across the Territory would be required if all 6 chemical manufacturing projects are established.



Different industries have significantly different water uses and requirements (e.g, not all industries require potable water for processing)

Suphuric acid (H_2SO_4) is used as a reagent for all downstream mineral processing methods analysed

Reactants in manufacturing lithium and manganese

Converted into phosphoric acid during processing of phosphate and rare earths

An electrolyte in vanadium redox flow batteries

Extraction of zinc, nickel and cobalt from ore

Used in the purification of silica sand and cleaning of silica ingots and wafers

There is an opportunity for the Territory to locally produce reagents.

Reagent prices dominate the cost stacks for many of the chemical processes analysed. Rising inflation and global supply chain challenges are negatively affecting costs.

With over 80% of the world's sulfur supply sourced as a by-product of fossil fuel, the transition to net zero is predicted to create a shortfall of sulphur of up to 320 Mt by 2040[28].

There is a need to identify new sources of low-cost sulphur; for example, through mining of evaporites or recycling of existing sulfidic tailings. The latter directly supports circular economy aspirations.

A high-level cost comparison between the Incitec Pivot facility and a hypothetical plant in the NT suggests that an NT plant is not currently cost competitive[28].

However, an analysis based on high-level costs alone does not recognise the strategic advantage and investor pull a local supply source could have to catalyse establishment of downstream value-add mineral processing in the Territory. There is also opportunity to develop linked activities in parallel.

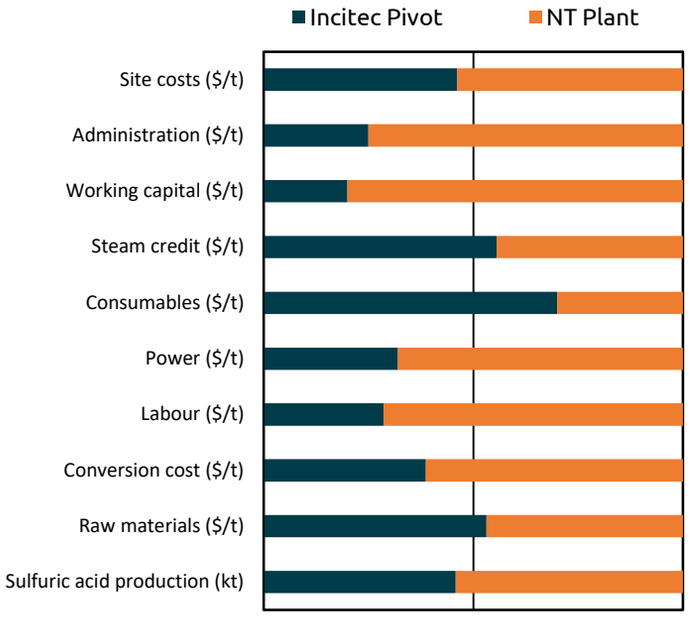
Industry snapshot: Incitec Pivot[47].

Mount Isa, Queensland

Reagent output
3700 tonnes H_2SO_4 a day

Jobs
Direct employment
40 FTE staff

Raw materials
Direct employment
50 FTE staff



Data: CRU

Fast and reliable telecommunications is influential in increasing economic efficiency and business productivity.

While slow to start, the mining industry globally is experiencing digital transformation at a rapid rate, increasingly integrating more advanced technologies into all aspects of business processes and capitalising on the benefits of innovation and automation.

Artificial intelligence and intelligent robotics in mining and mineral processing use data smarts and machine learning to improve mine productivity and safety, and increase manufacturing efficiency. Automation has reduced labour and maintenance costs and enabled continuous operations. GPS and GIS technologies have resulted in more precise three dimensional definitions of ore bodies and the surrounding geography, facilitating more effective, targeted and environmentally sympathetic activity. The use of technology innovations will continue to advance.

Inherently higher cost structures for inputs into mining, beneficiation and downstream processing processes point to the Territory needing to increase focus on innovation and technology as a potential differentiator. Embedding advances in technology into mining, beneficiation and downstream manufacturing processes relies almost exclusively on the availability of high speed and reliable telecommunications access.

The Territory must put in place the infrastructure that enables this, particularly in remote and regional areas. This has significantly broader economic and social benefits beyond the mining industry.

The taskforce, in section 1, highlights the need for the Territory to recognise that a new workforce paradigm is emerging for the mining industry, noting that the high-tech skills inherent in a digitalised environment are mobile, and a remote workforce during the operating phase of a mine must be accepted as a potential norm. However, the taskforce also noted the the establishment of an industry ecosystem centred around downstream manufacturing projects, could present the ‘pull’ that can partially reverse some of this remote workforce paradigm.

Due to strong alignment and for consistency, the TERC’s digital connection recommendations have, in the main, been adopted by the taskforce in this report.

Government must secure a telecommunications network that supports the new digital era for mining and downstream manufacturing such that fast reliable telecommunications access, established over the short-to medium term, becomes ubiquitous in remote and regional areas.

Circular economy principles must become the norm for mining and downstream manufacturing business process design and architecture.

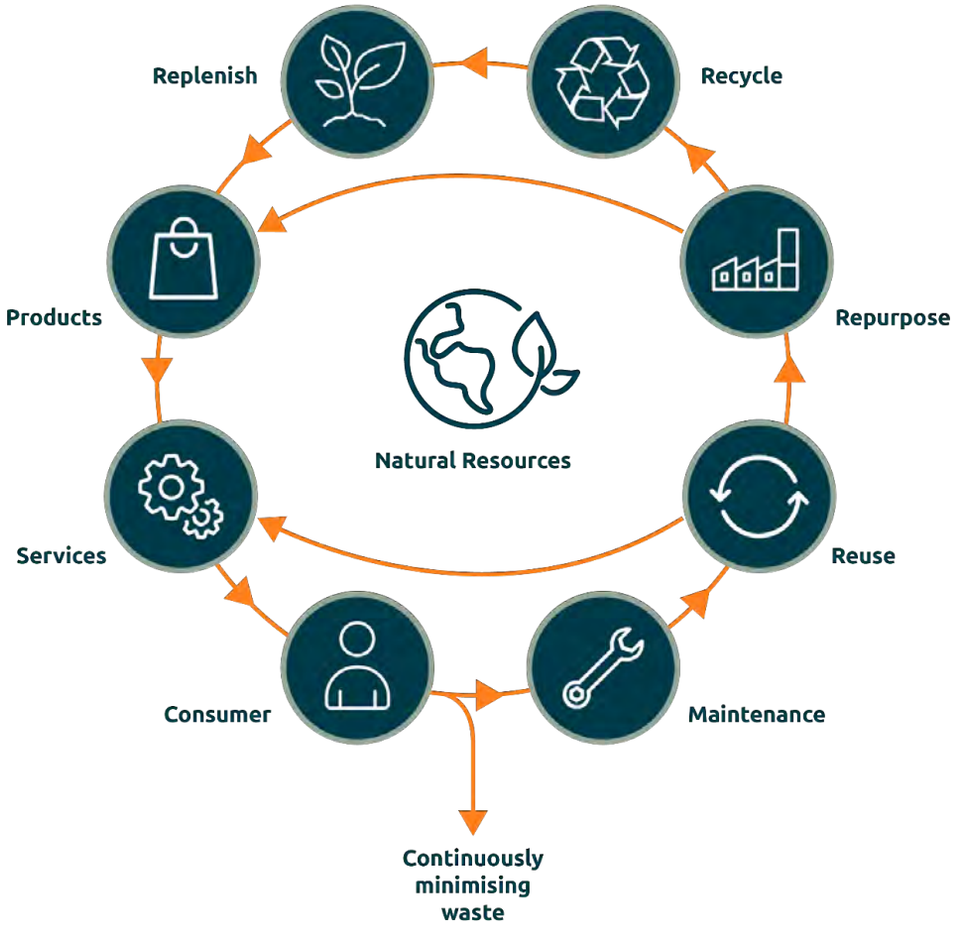
Global sustainability challenges have increased focus on the need for business structures and manufacturing processes to consider the lifecycle of products beyond linear consumption to extend the life and maximise the value of raw materials through recovery, reprocessing and/or reuse.

The high desirability of strong government effort to break the Territory's current primary mining pattern, will call into focus the need to consider how downstream manufacturing processes are undertaken and the potential future use of raw materials and value added products. This has direct links to ESG principles and social licence considerations, with most financiers already factoring these considerations into investment decisions.

Government has a role in encouraging and supporting circular economy principles and applications being embedded in business processes, and identifying and reducing barriers for industry in the transition to circular economies focussed on resource recovery, recycling and reuse outcomes.

Circular Economy

A circular economy is about designing products and systems to be reused, repaired or repurposed. Applying circular economy principles can enhance resource efficiency, reduce the extraction of new materials and prevent waste[48].



The growing global focus on raw material, service and process traceability, driven by ethical and sustainability considerations, needs to be managed to ensure the Territory is positioned to maintain or enhance industry competitiveness.

ESG principles and net zero emissions targets mean that there is growing need for materials, services and processes across end-to-end supply and value chains to be sustainably sourced and delivered, with immutable evidence to support sustainability claims.

Beyond securing resilient and sustainable supply chains for downstream manufacturing and value-add opportunities, there is growing focus on traceability for each element of the product supply and value chain. While provenance and traceability are not new concepts for the mining industry (e.g. diamonds), downstream manufacturers and consumers are increasingly demanding information on provenance and evidence of responsible production across a growing range of commodities[49].

The ability to track and trace chain of custody information electronically through digital certificates is becoming more important.

As a new and growing business imperative, the Territory Government needs to identify its role in product (ore, concentrate, value-added product) transparency and traceability . The early government investigations into supporting and facilitating block chain technology need to continue to be advanced.

Industry competitiveness is likely to increasingly be driven by a need to demonstrate clear links to ethical and sustainable practices through all stages of the product cycle. The Territory must be ready to capitalise on this.

What needs to be done?

Recommendation	Possible Specific Actions
3.1 **Prioritise advancing mining from a primary to secondary industry through securing sustained investment in downstream mineral processing and value-add**	• As a priority and to capitalise on Beetaloo timeframes, immediately identify and progress action to de-risk and secure local production of sand and related material to meet petroleum industry requirements. • Promulgate and implement government policies, strategies and frameworks that encourage mining projects to expand beyond the current primary mining pattern to downstream mineral processing and value-add. • Commission expert advice to develop a strategic plan to secure establishment of a Northern Territory downstream mineral processing and value-add industry, focussed on emerging industry trends, leveraging national and global opportunities and based on what is ambitiously achievable in the Northern Territory context. • Commit Territory Government funding and effort to policies, strategies and projects that will establish a downstream minerals processing and value-add industry.
3.2 **Identify, establish and nurture economic and business links with investment and export markets**	• Develop and articulate the Territory's value proposition for the mining industry and downstream minerals processing and value-add. • In collaboration with industry, create market development strategies for investment capital and exports that recognise and capitalise on the Territory's value proposition and are informed by evidence-based analysis of priority/target markets, to form the blueprint for industry and business engagement activities. • Develop a critical minerals prospectus to showcase Northern Territory minerals potential and opportunities
3.3 **Secure the availability of reliable and cost-competitive energy**	• Ensure electricity infrastructure and system planning and design recognise and cater for the energy required to underpin and attract new industry growth, with a focus on renewable energy. • Collaborate with industry to develop and implement strategies to encourage and support mine plant designs and engineering flowsheets to maximise the use of renewables power.

What needs to be done?

Recommendation	Possible Specific Actions
3.4 **Government takes further action to support sustainable water use for mining and downstream value-add activities**	• Develop and publish clear government policies on water availability for economic use, and processes and timeframes for resolving competing uses. • Collaborate with industry to secure industry commitment to sustainable practices that recognise efficient water use and maximise reuse and recycling, and publish performance against commitments.
3.5 **Investigate, and if viable, facilitate the establishment of a locally production of reagents**	• Undertake a detailed feasibility assessment of a Territory-based reagent (sulphuric acid) manufacturer. • If feasible, develop a business case, including an assessment of the necessity for, degree of necessary and optimal approach to government market intervention and support. • Depending on business case, facilitate the establishment of local production.
3.6 **Accelerate the development of telecommunications infrastructure and digital connectivity across regional and remote Northern Territory**	• Engage the Australian Government to develop and implement a digital connectivity solution for regional and remote areas of the Northern Territory. • Engage with the Australian Government to develop and implement a plan to ensure a minimum standard of reliable 4G broadband to all regional and remote areas of the Northern Territory. • Collaborate with telecommunications network service providers to increase network redundancy, strengthen network fault tolerance and establish high telecommunications availability levels across the Territory.

What needs to be done?

Recommendation	Possible specific actions
3.7 **Encourage and support circular economy principles and architecture being embedded in mining and downstream minerals manufacturing business process design and architecture**	• Collaborate with industry to secure commitment to embed circular economy practices and applications in mining and downstream processing business process design and architecture. • Investigate and establish government strategies to reduce barriers for industry in the transition to resource recovery, recycling and reuse outcomes.
3.8 **Ensure government policies and regulations support and enhance traceability in the extraction, processing and transport of minerals**	• Continue to monitor Australian and global mining, product and supply/value chain traceability developments and trends to ensure government is positioned to proactively lead or respond to industry and market opportunities and requirements. • Proactively engage with industry and markets to investigate the potential for traceability to be leveraged as a value proposition for the Northern Territory minerals industry.

Note: As outlined on page [103], other key enablers identified as being integral to securing downstream, value-add opportunities (enabling infrastructure, a skilled workforce and social licence) have been addressed in section 1 (refer pages [37] to [55]) and is duplicated in section 3.

What success look like

2 years

- Policy, legislative and/or regulatory institutional underpinnings focussed on transitioning the mining sector from a primary to a secondary industry operationalised
- Activities to secure key industry development enablers well progressed, with detailed plans and timeframes to advance actions associated with each enabler
- Mining manufacturing value-add strategic plan finalised with priorities/actions identified and funded by government
- Territory value proposition and market development strategies developed, with activities commenced to secure target markets
- Critical minerals prospectus completed
- Local production and supply of frac sand underpinning long-term contract arrangements for Beetaloo Sub-basin petroleum activities established.

5 years

- Key industry development enablers in place with clear evidence that projects are de-risked from an investor perspective
- Investor interest in targeted downstream value-add manufacturing opportunities secured and the first project commenced
- Pipeline of downstream value-add manufacturing projects identified, with action taking place to secure swift delivery
- Credibility of Northern Territory as reliable and competitive investment destination secured
- Northern Territory is a successful exporter of mining value-added products
- Position of the Northern Territory as a exporter of choice for mining value-added products secured
- Business-to-business relationships with market partners are mature
- Circular economy principles and practices entrenched and embedded in mining industry operations
- Product and supply/value chain fully traceable to identify provenance.

10 years

- Mining in the Territory has successfully integrated with secondary industry
- Northern Territory businesses are a partner of choice for domestic and international investment and export market participants
- Northern Territory ranked highly as a competitive mineral manufacturing investment destination.

Glossary of abbreviations and acronyms

Glossary

AAPA	Aboriginal Areas Protection Authority
ABA	Aboriginals Benefits Account
ABS	Australian Bureau of Statistics
AGES	Annual Geoscience Exploration Seminar
ALRA	*Aboriginal Land Rights (Northern Territory) Act 1976* (Cth)
$b	Billion dollars (Australian dollars used unless specified)
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CDU	Charles Darwin University
CO_2	Carbon dioxide
CSIRO	Commonwealth Science and Industrial Research Organisation
CY	Calendar year
DAP	Diammonium Phosphate, used as a fertiliser
DEPAWS	Department of Environment, Parks and Water Security
DSO	Direct Shipping Ore
ELs	ELs
EVs	Electric vehicles
ESCG	Environmental, Social, Cultural and Governance
Fe	Iron
FID	Final Investment Decision
FIFO	Fly-in-fly-out
FOB	Free on Board
FTE	Full time equivalent
GEMCO	Groote Eyelandt Mining Company Pty Ltd
GIS	Geographic Information System
GL	Gigalitre (1 GL = 1,000 megalitres, or 1 billion litres)

Glossary

GPS	Global Positioning System
GST	Goods and Services Tax
GW	Gigawatts (1 GW = 1,000 megawatts or 1 billion watts)
H_2SO_4	Sulphuric acid (or sulfuric acid, using spelling from the standard nomenclature of the international union of pure and applied chemistry; IUPAC)
HPMSM	High-purity Manganese Sulphate Monohydrate
JORC	Joint Ore Reserve Committee Code; the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves
JV	Joint Venture
Kg	Kilogram (1 Kg = 1,000 g)
Km	Kilometre (1 km = 1,000 meters)
Kt	Kiloton (1 kt = 1,000 tonnes)
Li	Lithium
LiOH	Lithium hydroxide
$LiFePO_4$	Lithium Iron Phosphate
LCD	Liquid crystal display (display technology)
LCE	Lithium carbonate equivalent
LJF	Local Jobs Fund
LMO	Lithium-ion Manganese Oxide
Ltd.	Limited
MAP	Mono-ammonium Phosphate, used as a fertiliser
$M	Million dollars (Australian dollars used unless specified)
MLs	Mineral Leases
Mn	Manganese
Mt	Megatonne (1 Mt = 1,000,000 tonnes)
MMP	Mine Management Plan
MRA	Mineral Royalty Act 1982 (NT)
MW	Megawatts (1 MW = 1,000,000 watts)

Glossary

N50SH	A grade of high strength permanent Neodymium magnet
NAIF	Northern Australia Infrastructure Facility
Nd	Neodymium
NdFeB	Neodymium Iron Boron (Neodymium magnet)
NdPr	Neodymium Praseodymium (a midstream chemically manufactured product separated from ore)
NT	Northern Territory
NTAIC	Northern Territory Aboriginal Investment Strategy
NTGS	Northern Territory Geological Survey
OPEX	Operating Expense
P	Phosphate
P2O5	phosphorous pentoxide, the chemical formula for phosphate rock or phosphate ore
R&D	Research and Development
REE	Rare Earth Elements
REMHART	Renewable Energy Microgrid for Applied Research and Training
REO	Rare Earth Oxide
RHS	Right hand side
Si	Silica
t	Tonne (1 t = 1,000 kg)
TERC	Territory Economic Reconstruction Commission
TPA	Tonnes per annum
TNG	TNG Limited
USA	United States of America
V	Vanadium
V_2O_5	Vanadium pentoxide (a midstream chemically manufactured product separated from ore)
WA	Western Australia

Reference list

Reference list

Reference number	Page number(s)	Reference
1	6, 91	Northern Territory Geological Survey (2022). Resourcing the Territory: Mineral Commodities https://resourcingtheterritory.nt.gov.au/minerals/mineral-commodities
2	6	Close, D. (2021). Resourcing the Territory initiative: precompetitive geoscience across the Territory. Northern Territory Geological Survey. Annual Geoscience Exploration Seminar (AGES) Proceedings, Alice Springs, Northern Territory 20-21 April 2021, p. 21 https://geoscience.nt.gov.au/gemis/ntgsjspui/handle/1/91397
3	6	Department of Industry, Tourism and Trade (2022). International Engagement Strategy 2022-26 https://industry.nt.gov.au/__data/assets/pdf_file/0008/1095497/international-engagement-strategy-2022-2026.pdf
4	6, 53	Infrastructure Northern Territory (2022). NT Infrastructure Plan and Pipeline 2022. Northern Territory Government https://dipl.nt.gov.au/__data/assets/pdf_file/0010/1115488/ntipp-2022-print-friendly-pdf.PDF
5	6	Office of Sustainable Energy (2022). Northern Territory Government. Northern Territory Roadmap to Renewables - 50% by 2030. Department of Industry, Tourism and Trade. https://roadmaptorenewables.nt.gov.au/?a=460760
6	22	Fraser Institure (2021). The Fraser Institute Annual Survey of Mining Companies 2021. https://www.fraserinstitute.org/sites/default/files/annual-survey-of-mining-companies-2021.pdf
7	28	Northern Territory major mines and developing projects https://resourcingtheterritory.nt.gov.au/__data/assets/pdf_file/0010/756559/A22-333d_RTT_MajorMinesDevProjects_withInsets_Oct2022.pdf
8	29	Australian Bureau of Statistics (2022) 8412.0 Mineral and Petroleum Exploration Table 3b expenditure by type of deposit. June 2022 https://www.abs.gov.au/statistics/industry/mining/mineral-and-petroleum-exploration-australia/jun-2022#data-downloads
9	31	WA quarterly licensing performance statistics, calculated using average business days from grant to source. https://www.dmp.wa.gov.au/Investors/Approvals-14055.aspx
10	36	Productivity Commission (2002). Pastoral Leases and Non-Pastoral Land Use, Commission Research Paper, AusInfo, Canberra https://www.pc.gov.au/research/completed/pastoral-leases/pastoralleases.pdf
11	36	Pepper R. (2018). The Scientific Inquiry into Hydraulic Fracturing in the Northern Territory. Report for the Northern Territory Government. https://frackinginquiry.nt.gov.au/__data/assets/pdf_file/0006/494286/Complete-Final-Report_Web.pdf

Reference list

Reference number	Page number(s)	Reference
12	45	Productivity Commission (2020). Resources Sector Regulation, Study Report, Australian Government, Canberra. Page 2. https://www.pc.gov.au/inquiries/completed/resources/report/resources.pdf
13	46	Regulation of mining activities environmental regulatory reform- feedback summary report. Department of Environment, Parks and Water Security (DEPWS) https://depws.nt.gov.au/__data/assets/pdf_file/0018/1070190/feedback-summary-report-regulation-mining-activities.pdf
14	48, 49	National Skills Commission (2022). Labour market update, June 2022 quarter. Australian Government, Canberra https://www.nationalskillscommission.gov.au/sites/default/files/2022-08/NSC%20Labour%20Market%20Quarterly%20June%202022.pdf
15	49	Australian Bureau of Statistics (2022). Modelling indicative state level industry jobs estimates from the Labour Account. Australian Government, Canberra. https://www.abs.gov.au/articles/modelling-indicative-state-level-industry-jobs-estimates-labour-account#northern-territory
16	58	World Economic Forum (2020). The global risks report- 2020. World Economic Forum, Switzerland https://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf
17	59	Moffat, K., Pert, P., McCrea, R., Boughen, N., Rodriguez, S., Lacey, J. (2018). Australian attitudes toward mining: Citizen Survey – 2017 Results. CSIRO Publishing https://doi.org/10.4225/08/5a8f0526f2ec8
18	67	Department of Treasury and Finance, Territory Revenue Office. Personal communication. TRM: DITT2022/05044-0004~0022
19	67	ACIL Allen (2022). Northern Territory Mineral Royalty Review. Final Report to the Northern Territory Mineral Development Taskforce.
20	68	Northern Territory Government (2022). Treasurer's Annual Financial Report 2021-22, Department of Treasury and Finance. page 19 https://treasury.nt.gov.au/__data/assets/pdf_file/0006/1168818/2021-22-TAFR-book.pdf
21	73	National Indigenous Australians Agency, Land Rights Funding and ABA Operations (2022). Personal communication. TRM: DITT2022/05044-0004~0018

Reference list

Reference number	Page number(s)	Reference
23	75	Northern Territory Government (2022). Budget 2021-2. Budget Paper 2, Budget Strategy and Outlook. https://budget.nt.gov.au/__data/assets/pdf_file/0011/1000172/2021-22-BP2-book.pdf
24	80, 81	The range of investment multipliers were provided from several sources including Taskforce members, project proponents, bankers and brokers. See Appendix D for a full list of stakeholders engaged.
25	84	Arafura Resources Limited (2021). Nolans project update. ASX Announcement, 11 May 2021. https://www.asx.com.au/asxpdf/20210511/pdf/44wcxb57wt49tx.pdf
26	84	Arafura Rare Earths Limited (2022). ANU Rare Earth Conference. ASX Announcement, 01 November, 2022. https://wcsecure.weblink.com.au/pdf/ARU/02592565.pdf
27	92	Future Smart Strategies (2018). Lithium Valley: Establishing the case for energy metals and battery manufacturing in Western Australia. Regional Development Australia, Perth. https://www.rdaperth.org/wp-content/uploads/2018/05/RDA4491-LITHIUM-REPORT-2018_LOWRES.pdf
28	94-117	CRU International Limited (2022). Minerals for Modern Sustainable Lifestyles. Prepared for the Department of the Chief Minister and Cabinet (DCMS).
29	94	Core Lithium (2022). ASX: CXO Announcement: Quarterly Activities Report for the Three Months Ended 30 September 2022. ASX Release, 27 July 2022. https://company-announcements.afr.com/asx/cxo/768352be-58a1-11ed-8f91-3a81468a9df3.pdf
30	97	Winchelsea Mining Pty. Ltd. (2020). Referral Document for Winchelsea Island Manganese Mine Project- Submission to the NT Environment Protection Authority, EPA. https://ntepa.nt.gov.au/__data/assets/pdf_file/0011/962561/Main-Report.PDF
31	99	Moore Australia (2022) . Element 25- Scoping Study Summary Report. ASX Announcement 18 January 2022. Available online: https://www.element25.com.au/site/PDF/634d3046-2a69-447e-a1ff-765e6b1a48f7/ScopingStudyHPMSMConversionPlantEconomics
32	100	Arafura Resources (2022). Nolans Project Update. ASX Announcement 11 November 2022. Available online: https://wcsecure.weblink.com.au/pdf/ARU/02597137.pdf
33	103	Business Insider (2022). Lithium iron phosphate battery global market report 2022. Report ID 5648156. https://www.researchandmarkets.com/reports/5648156/lithium-iron-phosphate-battery-global-market

Reference list

Reference number	Page number(s)	Reference
34	103	Xu, C., Dai, Q., Gaines, L., Hu, M., Tuikker, A., Steubing, B. (2020). Future material demand for automotive lithium-based batteries. Nature Communications Materials 1, 99. https://doi.org/10.1038/s43246-020-00095-x
35	103	Verdant Resources Ltd. (2017). Quarterly activities report, period ending 30 September 2017. ASX Release. Available online: https://www.asx.com.au/asxpdf/20171031/pdf/43nsjl2rq9s0st.pdf
36	103	Avenira Ltd. (2022). Avenira signs MOU with Aleees and NT Government to develop downstream manufacturing of LFP cathode material. ASX ANNOUNCEMENT AND MEDIA RELEASE 21 September 2022. Available online: https://www.listcorp.com/asx/aev/avenira-limited/news/mou-signed-to-develop-lfp-cathode-plant-2767342.html
37	106, 108	TNG Ltd. (2022). Annual Report 2022. Available online: https://www.tngltd.com.au/wp-content/uploads/2022/09/61112134-1.pdf
38	108	Alotto, P., Guarnieri, M., Moro, F. (2014) Redox flow batteries for the storage of renewable energy: A review. Renewable and Sustainable Energy Reviews, 29, 325-335. https://doi.org/10.1016/j.rser.2013.08.001.
39	109	Market Research Future, MRFR (2019). Silica Sand Market. Research Report. https://www.marketresearchfuture.com/reports/silica-sand-market-8216
40	109	Expert Market Research (2020). Global Frac Sand Market: By Type: White Sand, Brown Sand, Others; By Application: Oil Exploration, Natural Gas Exploration, Others; Regional Analysis; Historical Market and Forecast (2018-2028). Available online: https://www.expertmarketresearch.com/reports/frac-sand-market
41	109, 111	Doyle, N. (2022). The Carpentaria Basin of the NT - more sand than the Sahara. Annual Geoscience Exploration Seminar (AGES) Proceedings, Alice Springs, Northern Territory 5-6 April 2022. https://geoscience.nt.gov.au/gemis/ntgsjspui/handle/1/92077
42	109	CRU International Limited (2021). Why have silicon prices surged? CRU Knowledge and Insight report. https://www.crugroup.com/knowledge-and-insights/insights/2021/why-have-silicon-prices-surged/
43	111	Australian Trade and Investment Commission, Austrade (2021). Australia's critical minerals prospectus 2021. Commonwealth Government of Australia. https://www.austrade.gov.au/news/publications/australian-critical-minerals-prospectus-2021

Reference list

Reference number	Page number(s)	Reference
45	111	Aarnæs, T.S., Ringdalen, E. & Tangstad, M. Silicon carbide formation from methane and silicon monoxide. Nature Scientific Reports 10, 21831 (2020). https://doi.org/10.1038/s41598-020-79006-6
46	111	KPMG (2019). Analysis of Infrastructure and Logistics Requirements for the Development of an Onshore Oil and Gas Industry in the Northern Territory Department of Trade, Business and Innovation Final Report - December 2019. Report to the Northern Territory Government. https://cmc.nt.gov.au/__data/assets/pdf_file/0005/1052897/q19-0139-kpmg-final-report.pdf
47	117	Incitec Pivot. Mount Isa Acid Plant Factsheet https://www.incitecpivot.com.au/~/media/Files/IPL/Work%20with%20us/mt_isa_acid_plant_leaflet.pdf
48	119	Northern Territory Government (2022). Circular Economy Strategy 2022 – 2027. https://depws.nt.gov.au/__data/assets/pdf_file/0020/1100882/northern-territory-circular-economy-strategy-2022-2027.pdf
49	120	Júnior, C.A.R., Sanseverino, E.R., Gallo, P., Koch, D., Schweiger, H.G., Zanin, H. (2022). Blockchain review for battery supply chain monitoring and battery trading, Renewable and Sustainable Energy Reviews, 157, 112078. https://doi.org/10.1016/j.rser.2022.112078.
45	111	Aarnæs, T.S., Ringdalen, E. & Tangstad, M. Silicon carbide formation from methane and silicon monoxide. Nature Scientific Reports 10, 21831 (2020). https://doi.org/10.1038/s41598-020-79006-6
46	111	KPMG (2019). Analysis of Infrastructure and Logistics Requirements for the Development of an Onshore Oil and Gas Industry in the Northern Territory Department of Trade, Business and Innovation Final Report - December 2019. Report to the Northern Territory Government. https://cmc.nt.gov.au/__data/assets/pdf_file/0005/1052897/q19-0139-kpmg-final-report.pdf
47	117	Incitec Pivot. Mount Isa Acid Plant Factsheet https://www.incitecpivot.com.au/~/media/Files/IPL/Work%20with%20us/mt_isa_acid_plant_leaflet.pdf
48	119	Northern Territory Government (2022). Circular Economy Strategy 2022 – 2027. https://depws.nt.gov.au/__data/assets/pdf_file/0020/1100882/northern-territory-circular-economy-strategy-2022-2027.pdf
49	120	Júnior, C.A.R., Sanseverino, E.R., Gallo, P., Koch, D., Schweiger, H.G., Zanin, H. (2022). Blockchain review for battery supply chain monitoring and battery trading, Renewable and Sustainable Energy Reviews, 157, 112078. https://doi.org/10.1016/j.rser.2022.112078.

AMEC: Mine Lifecycle

Explanation of the Mine Cycle with emphasis on development points. Adapted from AMEC (2019).

A simplified and standardised representation of the evolution of an ASX listed company from start up to discover, develop, rehabilitate and relinquish a 1 million ounce gold mine in Western Australia based upon expert advice from AMEC member companies.

	Identification of Target Region	Reconnaissance exploration	Target Appraisal	Exploration Drilling	Economic Discovery Dependent on risk and reward profile of deposit and jurisdiction	Assessment Drilling	FINAL INVESTMENT DECISION TO MINE	Mine Planning & Development	Mining Production and progressive rehabilitation	Mine Closure & Relinquishment
Years	1-8 years			3-5 years		1-3 years		10-15	Mine life of 5 - 15 (average 7 - 10) Cumulative 14 - 40	Ongoing until relinquishment At least 20 years
Cash	$50,000 p.a. Accumulated - $200,000 - $400,000	$0.5 - 2 million p.a. Accumulated - $2M - $6M	$2 - 4 million p.a. Accumulated - $4 - $10m	$2 - 4 million p.a. Accumulated - $6 - $20m		Accumulated - $20 - $70m		Accumulated - > $250m	Revenue	> $250,000 - $1 million per annum
Company Type	Start-Up	Start-Up	Micro-Cap	Micro-Cap		Small-Cap		Small-Cap	Junior/Mid-Cap Miner	Junior/Mid-Cap Miner
Tenure/Activity approval	Tenure identification and application	Exploration licence/permit/ programme of works/Mine Management Plan/Resource Authority/activity assessment/ approval(s)	Exploration licence/permit/ programme of works/Mine Management Plan/Resource Authority/activity/assessment/ approval(s)	Exploration licence/permit/ programme of works/Mine Management Plan/Resource Authority/activity/assessment/ approval(s)		Exploration licence/permit/programme of works/Mine Management Plan/resource Authority/ activity assessment/approval(s) Application for a Mining Lease Possibly applying for other tenure		Mining Lease Appropriate exploration permit/ licence for ongoing drilling Mining Proposal Mine Management Plan	Mining Lease/Mine Management Plan	Relinquishment
Staff	1 - 15 staff + 5 - 20 contractors					5 - 15 staff + 5 - 20 contractors		>30	50 - 150 construction staff >50 Operations	10 - 20 (including contractos for monitoring, rehabilitation and remediation)
Investor Type	Individual or a group of friends/ enterpreneurs using personal savings to fund	Individual or a group of friends/ entrepreneurs using personal savings to fund. Some Retail investors and private equity.	Increasing professional sophisticated investor interest	Increasing professional sophisticated investor interest Increasing foreign investor interest		Increasing professional sophisticated investor interest Increasing foreign investor interest		Increasing professional sophisticated investor interest Increasing foreign investor interest	High proportion of Institutional Investors/ other mining companies/debt funding	Dependent on possibble repurposing of site
Financing	Seed Funding	The Private Equity investors Public Listing Initial Public Offering Private Equity (very rare) Junior Minerals Exploration Incentive (JMEI)	The company may return to the market to raise further funds, or complete a farm out agreement to expand or improve the detail of the drilling results potential sale of tenements to raise funds. Joint Venture/Farm In Junior Minerals Exploration Incentive (JMEI)	The company may return to he market to raise further funds to expand or improve the detail of the drilling results Potential sale of tenements to raise funds Joint Venture/Farm in Junior Minerals Exploration Incentive (JMEI)		Company likely go to the market for a capital raising or approach Institutional Investors to fund a feasibility study, and then wait until after the Environmental Approval to return for funding. Debit financing increasingly possible Potential sale of tenements to raise funds. Joint Venture/Farm In Junior Minerals Exploration Incentive (JMEI)		Go to the market to raise funds Seek debt finance Institutional Investors Potential sale of tenements to raise funds	Revenue from operations Additionall dept finance Equity raising through Institutional Investors	Company reserves and bonds
Revenue	No Mining Revenue							No Mining Revenue	Mining Revenue	No Mining Revenue
Reporting	ASX/JORC Code Exploration results Departmental Reports	ASX/JORC Code Exploration results Departmental Reports	ASX/JORC Code Exploration results Departmental Reports	ASX/JORC Code Indicated/Inferred Resource Departmental Reports		ASX/JORC Code Measured Mineral Resource Departmental Reports		ASX/JORC Code Departmental Reports Environmental Performance Reports	ASX/JORC Code Depatmetal Compliance Reporting Departmental Reports Environmental Performance Reports	Departmental Reports Environmental Performance Reports
Activity and Expenditure	Desktop studies Field Trips Utilisation of pre-competitive data and pre-existing reports Financial assurance/security bonds/MRF Native Title Consideration of environmental status of land (ie Conservation estate)	Secure tenements Remote sensing, regional geochemistry, airborne geophysics, preliminary drilling Field Exploration costs Heritage Surveys Tenement fees Land access/approval costs Co-funded Drilling Local Council rates (WA & NSW only) Chemical analysis costs Holding Costs (approx. $400,000 a quarter)*	Geochemistry, geophysics, mapping and drilling Field Exploration costs Heritage Surveys Drill core assessment Chemical analysis costs Tenement fees Land access/approvals costs Local Council rates (WA & NSW only) Drrill rig costs Holding Costs	Drilling Scoping/feasibility Studies Field Exploration costs Drill core assessment Chemical analysis costs tenement fees Land access/approvals costs Local Council rates (WA & NSW only) Drrill rig costs Holding Costs		Systematic drilling to 'drill out resource' and intensify size. Possible pilot metallurgical studies. Scoping/feasibility Studies Environmental Impact Studies Field Exploration costs Drill core assessment Chemical analysis costs Tenement fees Land access/approval costs Councilrates (WA & NSW only) Drill rig costs Holding costs		Construction costs Removal of overburden and construction of a decline Capital Costs Land access/approvals costs Local Council rates (WA & NSW only)	Production shaft, decline or overburden removal, drilling Brownfiels Exploration Operations, equipment, workforce Capital Costs Land access/approvals costs Local Council rates (WA & NSW only)	Rehabilitation and remediation Monitoring Surveys Revegetation Geotechnical stability Departmental Reports
Comments	Regional Selection, e.g. which country, which State, which part of the State, and which commodity 1 in 300 exploration programs result in success^	Consideration of costs and benefits of investing in regions, e.g. which country, which state, which commodity, mineral province	The speed of this process depends on a number of factors such as land access, financing and quality of precompetitive data	Exploration drilling is seasonal and it may take a number of years before the results of the drilling result in the declaration of a mineral resource		An exploration company will often have to rely on specialised consultants during this period		The company would be applying for, have received or be securing relevant regulatory approvals	Mining contingent on the commodity price, broader market fluctuations and the stability of public policy settings	Possible repurposing of site

* Holding cost figures were based on a survey of 52 ASX listed mineral exploration companies Appendix 5B forms. With the expenses identified as ""staff costs"" and ""admin and corporate costs"" in the Appendix combined. A mineral exploration company was defined as one that received no revenue from an operating mine.
^Victorian Mineral Investment Strategy 2018 -2023 p6 (link: https://earthresources.vic.gov.au/__data/assets/pdf_file/0008/453779/Mineral-Resources-Strategy-2018-2023.pdf)"