# GREATER WHITSUNDAY METS SECTOR

## A REVENUE DIVERSIFICATION STRATEGY

Unlocking the region's immense economic opportunity to diversify

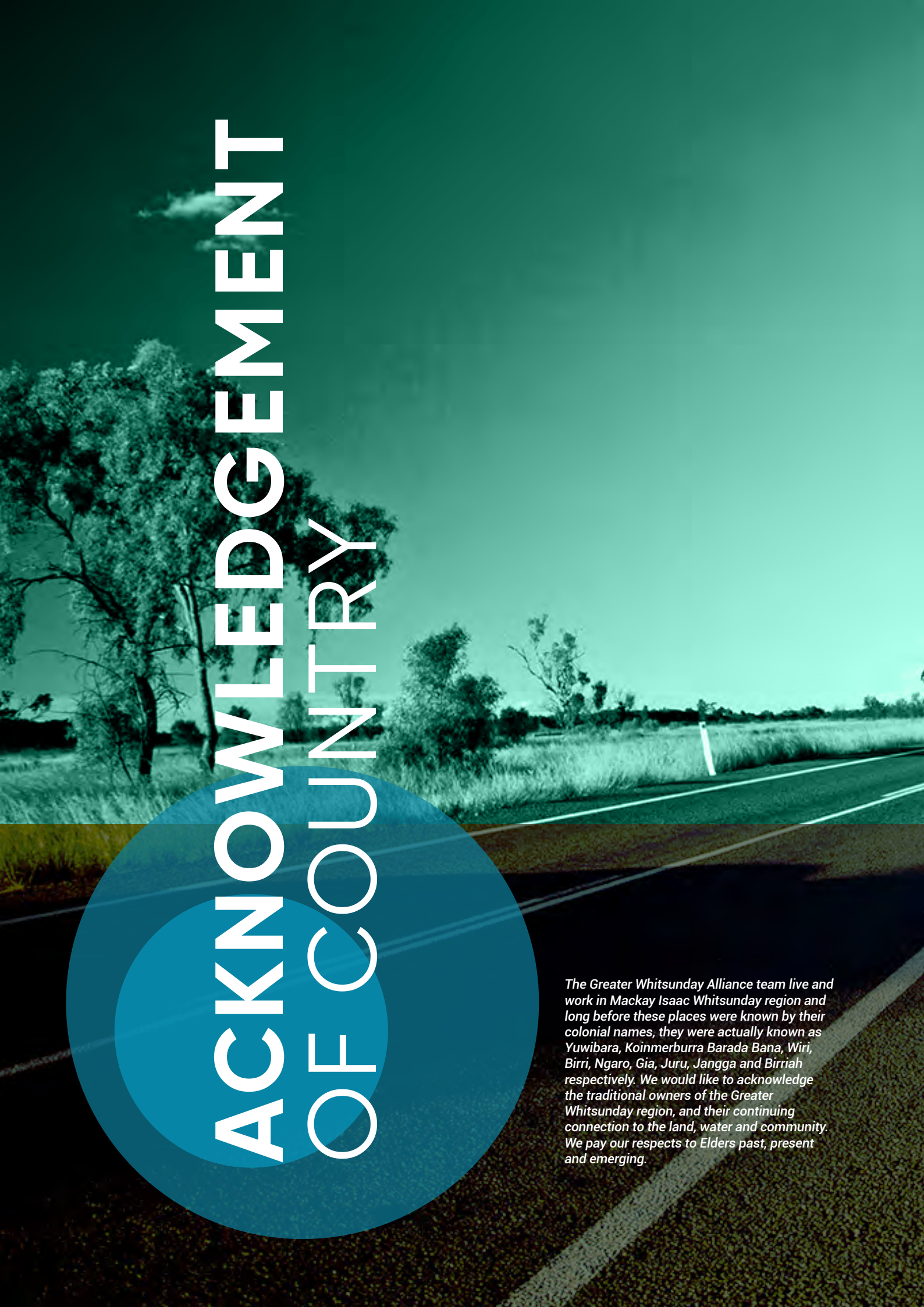
Create Advisory

GW3D GREATER WHITSUNDAY ALLIANCE MACKAY ▶ ISAAC ▶ WHITSUNDAY

RESOURCES CENTRE of EXCELLENCE

LOCAL BUYING FOUNDATION AN INITIATIVE OF THE LOCAL BUYING PROGRAM

Queensland Government



# ACKNOWLEDGEMENT OF COUNTRY

*The Greater Whitsunday Alliance team live and work in Mackay Isaac Whitsunday region and long before these places were known by their colonial names, they were actually known as Yuwibara, Koinmerburra Barada Bana, Wiri, Birri, Ngaro, Gia, Juru, Jangga and Birriah respectively. We would like to acknowledge the traditional owners of the Greater Whitsunday region, and their continuing connection to the land, water and community. We pay our respects to Elders past, present and emerging.*

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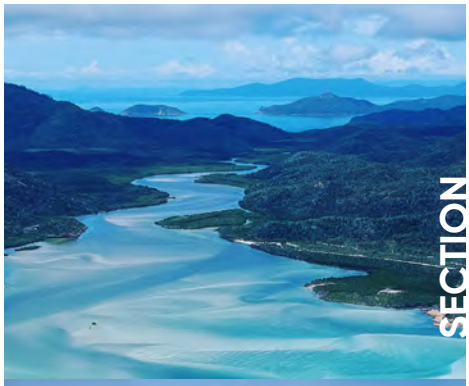






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This Report is based solely on the information provided to us as at 29 April 2024. We reserve the right to amend the contents of this Report (if necessary), should any further relevant information become available.


# ABOUT PROJECT PARTNERS

## GW3 and the RCOE are partnering to deliver the Decarbonisation Accelerated project of which this Strategy is a key component

Greater Whitsunday Alliance (GW3) is the peak independent, economic development organisation for the Mackay, Isaac, Whitsunday LGAs, collectively known as the Greater Whitsunday region. GW3 works with a range of industry and community stakeholders to ensure the region has the necessary strategies in place to meet the demand of existing and emerging industry needs.

The Resources Centre of Excellence is a world-class facility located in the Greater Whitsunday region that is driving cutting-edge research, technology, education, and industry collaboration to accelerate innovation and shape the industries of the future.

The Decarbonisation Accelerated project, and the delivery of the *Greater Whitsunday METS Sector – a Revenue Diversification Strategy*, were made possible through the significant contributions of the Local Buying Foundation and the Queensland Government.

"Few regions in the world can boast the vital inputs to support multiple billion-dollar industries like Greater Whitsunday. And it is vitally important that our region adapts to new opportunities to ensure a prosperous future."

GREATER WHITSUNDAY ALLIANCE
ANNUAL REPORT 2022-2023

# EXECUTIVE SUMMARY

# EXECUTIVE SUMMARY

The Greater Whitsunday region is exceptionally well-positioned to capitalise on emerging priority sectors through diversification that will contribute to future-proofing the region's economic landscape.

The *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* seeks to consider the economic opportunities that can be realised by consciously diversifying into adjacent sectors. Additionally, this Strategy identifies potential adjacent sectors for METS businesses to diversify into, with a focus on how existing skills and capabilities can be transferred into these sectors and what actions could be taken to support diversification.

## LEVERAGING REGIONAL CAPABILITY

The METS sector is a significant and unique contributor to the Greater Whitsunday economy. Stemming from the resources and mining presence in the region, a highly skilled and specialised array of supporting activities and businesses have emerged over time. It is estimated that there are more than 700 businesses providing innovative, specialised and unique goods and services, which directly employ and more broadly support thousands of jobs across the region. This has created a voluminous highly skilled and specialised workforce, which lends itself to transferrable skillsets across a range of diversification opportunities.

## REDUCING SINGLE SECTOR RELIANCE

The METS (mining equipment, technology, and services) sector within the Greater Whitsunday region plays a pivotal role in supporting the mining industry, which currently accounts for more than 60% of the region's economic output. This heavy reliance on a single sector exposes the region to the inherent risks of economic cycles in the resources industry. To enhance economic resilience and broaden the economic base, it is essential to diversify while continuing to provide robust support to our existing sectors. The *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* outlines pathways to new value streams that leverage the region's established skills and expertise within its METS sector. This approach ensures that while we enhance our economic portfolio, we maintain support for the mining industry, acknowledging its ongoing role in our economic landscape.

## PRIORITY SECTOR CONGRUENCE

This strategy explores a long list of sectors that present opportunity for diversification, identified through reviewing government policies and strategies around focus and investment. A multi-criteria analysis has been applied to this long list to help identify sectors with a high degree of adjacency to the skills and expertise of the region's METS sector, as well as those considered to be high growth in the future. Based on the multi-criteria analysis, seven priority sectors for METS Diversification have been identified. These sectors include Critical Minerals, Renewable Energy, Bioenergy, Biomanufacturing, Circular Economy, Space, and Post-mining Land Use.

## POSITIONING THE METS SECTOR TO SECURE DIVERSIFICATION OPPORTUNITIES

This strategy undertakes a detailed analysis of each of the seven priority sectors to understand the size of the opportunity, relevance to the region, and alignment to the METS sector. Gaps and challenges are also explored, and strategies and actions have been articulated to support the region's METS sector to progress opportunities. Actions fall into four key themes; supporting skills development/ transferability, facilitating partnerships across stakeholder groups, providing insights, information and raising awareness and advocating for regulatory and policy change.

## COMMITMENT TO THE FUTURE PROSPERITY OF THE REGION

The *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* represents a pivotal step towards ensuring the long-term prosperity of the Greater Whitsunday region by fostering sustainable economic growth, attracting investment, and creating high-value jobs across a diverse range of emerging industries. The strategy clearly identifies priority sectors that deliver significant growth opportunities and require the existing skills and expertise of the METS sector. By adopting a collaborative regional approach to overcome barriers to diversification and deliver key actions, the region will be well-positioned to secure new economic value streams while continuing to deliver services and support to existing industries, including the mining sector.

**Drawing on a strong evidence base and informed by extensive engagement with industry and regional stakeholders, the *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* guides the next steps in the region's proactive pursuit of opportunities in seven priority sectors.**

## DECARBONISATION ACCELERATED


This Strategy forms a key pillar of the broader Decarbonisation Accelerated project. The project offers a foundation for ongoing regional activity to secure traditional industries and power new opportunities.

The vision outlined is for the region to be more robust, diversified and produce less carbon by linking opportunities in priority sectors, and those driven by decarbonisation.

# STRATEGY & OPPORTUNITIES SNAPSHOT

## KEY HIGHLIGHTS

# STRATEGY SNAPSHOT

## STAKEHOLDER INSIGHTS

A series of **key themes** emerged during stakeholder consultation, which can be categorised under the three key opportunity areas.

More detailed information on this can be found in APPENDIX 2.

**1.** **Diversifying into new industries**

**2.** **Increasing motivation to diversify**

**3.** **Decarbonising business operations**

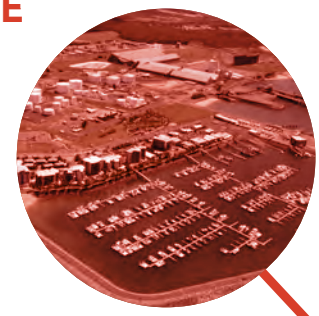
## STAKEHOLDER PROFILE

**40+**

**stakeholders engaged** to discuss perceptions on diversification and decarbonisation in Greater Whitsunday region.

**Stakeholder type:**

- State & Local Government
- METS SME Owner/Managers
- Adjacent Sector Organisations
- Growth Sector Organisations
- Resources Companies
- Industry Bodies & Committees
- Advisory Firms
- Tertiary Educational Institutions



## SECTOR DEFINITIONS

For the purpose of the *Greater Whitsunday METS Sector – a Revenue Diversification Strategy*, the following definitions have been applied to define **adjacent** and **growth** sectors.

### "Adjacent" Sector Diversification

An 'adjacent sector' is one where there is significant potential for METS businesses to service in the future given similarity in the required skills and nature of work already being undertaken.

### "Growth" Sector Diversification

A 'growth sector' is one in which there is significant investment occurring by both government and industry to realise significant sectoral growth. A growth sector is more likely to present a sustainable pipeline of work to a METS business and give greater certainty that servicing the industry will realise future growth.

**4x KEY ACTION THEMES IDENTIFIED**

### POWERING A WORKFORCE

Supporting skills development/ transferability

### EXPLORING OPPORTUNITIES

Providing insights/information and raising awareness

### FORGING RELATIONSHIPS

Facilitating partnerships across stakeholder groups

### CHAMPIONING CHANGE

Advocating for regulatory/ policy change

## APPLICATION OF MULTI-CRITERIA ANALYSIS

For the purpose of this *Greater Whitsunday METS Sector – a Revenue Diversification Strategy*, the following **5x criterias** have been used to **identify sectors** that most closely align to 'adjacent' and 'growth' definitions.

1. Government Priority
2. Size/scale of opportunity
3. Sector maturity and recent growth
4. Alignment with METS skills and capability
5. Stakeholder interest and understanding

## ESTABLISHED METS SECTOR A PLATFORM FOR SUCCESS

Research and **feedback suggests** the *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* boasts a number of influencing factors that point to many **compelling reasons to diversify**.

**Here's how it's been described:**

- "Competitive Advantage"
- "Broader Economic Strengths"
- "Highly Skilled"
- "Specialised Capability"

GREATER WHITSUNDAY METS SECTOR – A REVENUE DIVERSIFICATION STRATEGY

# OPPORTUNITIES SNAPSHOT

## METS DIVERSIFICATION OPPORTUNITY

**Unlocking the region's immense opportunity to diversify** through a diverse range of priority sectors, which require the existing skills and expertise of the METS sector, and deliver significant **growth** opportunities, attract **investment**, and create high-value **jobs**.

**7x**
Priority Sectors
**Opportunities Identified**

## 1. CRITICAL MINERALS

**Opportunity**

- leverage existing METS **capabilities in geological mapping and precision extraction downstream processing potential** aligns with government priorities and global ethical sourcing standards
- **substantial growth prospects** and **local business positioned at forefront of sustainable resource development**

**Future Skills Alignment:** Strong
**Government Priority:** State & Federal

## 2. RENEWABLE ENERGY

**Opportunity**

- leveraging **expertise in manufacturing and maintenance**
- **capitalising on synergies** to deliver operations and maintenance phases
- **expansion** into **component manufacturing and construction phases**
- **advance local economic growth**

**Future Skills Alignment:** Very strong
**Government Priority:** State & Federal

## 3. BIOENERGY

**Opportunity**

- leveraging existing service **capabilities and aligning with sustainable aviation fuel demand**
- **stable long-term workflow** potential
- applying **renowned innovative solutions to unlock bioenergy's full economic potential** in the region

**Future Skills Alignment:** Strong
**Government Priority:** State & Federal

## 4. BIOMANUFACTURING

**Opportunity**

- leveraging strong alignment in **manufacturing and fabrication capabilities**
- reduced seasonality presents an attractive prospect for **sustained operations**
- investment decisions by global companies underscore the region's potential to become a **hub for biomanufacturing,** driven by its **skilled workforce and supportive business environment**

**Future Skills Alignment:** Strong
**Government Priority:** State

GREATER WHITSUNDAY METS SECTOR – A REVENUE DIVERSIFICATION STRATEGY

## 5. CIRCULAR ECONOMY

**Opportunity**

- leveraging **existing strengths in rethinking, reusing,** and **recycling**
- METS **adoption** of **circular initiatives** highlights **readiness to offer sustainable products and services to the market**
- well-positioned to **drive value through sustainable material solutions** across mining value chains

**Future Skills Alignment:** Strong
**Government Priority:** State & Federal

## 6. SPACE

**Opportunity**

- promising future opportunity upon understanding how **existing capabilities link to sector-specific requirements**
- **applicability of METS businesses' manufacturing services** to the space sector is acknowledged
- businesses poised to **expand footprint in space-related manufacturing,** positioning themselves as **key contributors to the sector's growth**

**Future Skills Alignment:** Very strong
**Government Priority:** State & Federal

## 7. POST-MINING LAND USE

**Opportunity**

- leveraging **existing strengths in mine closure and remediation solutions**
- renowned **entrepreneurial spirit and problem-solving capabilities** making METS sector **pivotal in delivering optimal environmental outcomes**
- high standards in environmental regulation and compliance, businesses are **well-positioned to meet local demands and expand into international markets**

**Future Skills Alignment:** Very strong
**Government Priority:** State

# THE NEED TO DECARBONISE AND DIVERSIFY

# THE NEED TO DECARBONISE

## Governments and industry are fast tracking decarbonisation to achieve net zero targets

There has been a global push towards decarbonisation, with more than 140 countries representing over 88% of global emissions having set net zero targets.[1] Australia — and particularly Queensland — is on a journey to transform its energy system to deliver clean, reliable and affordable energy. This is especially evident in the Queensland's Energy and Jobs Plan, which was legislated with the passing of the Clean Economy Jobs Act 2024 and the Renewable Transformation Act 2024 and bringing into law the renewable energy targets of 70% by 2032, 80% by 2035 and commitments to net zero emissions by 2050.[2,3] At a federal level, the Climate Change Bill was introduced in 2022 which commits Australia to a 43% reduction in greenhouse gas emissions below 2005 levels by 2030.[4] $29.5bn has been committed federally towards climate-related spending to 2030.[5]

With more regulation, legislation, policy and funding coming to fast-track decarbonisation across industries, there is an opportunity for the Greater Whitsunday region to begin identifying, and more proactively consider the opportunities presented by decarbonisation. For the METS sector this offers a commercial opportunity to leverage its strong **entrepreneurial** and **problem-solving** capabilities to help move the resources sector and wider economy towards a cleaner future.

## STATE GOVERNMENT INITIATIVES


### CLEAN ECONOMY JOBS BILL 2024[3]

Sets out emissions targets of:

- 30% below 2005 levels by 2030
- 75% below 2005 levels by 2035
- Net zero by 2050


### QLD METS 10-YEAR ROADMAP & ACTION PLAN[7]

The plan aims to enable METS businesses to capitalise on emerging opportunities from the transformation of the resources sector.

There is a focus on supporting the commercialisation of products focused on decarbonisation.


### QLD RESOURCES INDUSTRY DEVELOPMENT PLAN[6]

The plan aims to grow and diversify industry through exploration, new economy minerals, maximising commercial opportunities of abandoned mines and supporting METS, renewable energy, batteries and advanced manufacturing.

# FEDERAL GOVERNMENT INITIATIVES


## CLIMATE CHANGE BILL 2022[4]

Sets out emissions targets of:

- 43% below 2005 levels by 2030
- Net zero by 2050


## CLIMATE-RELATED FINANCIAL DISCLOSURE (DRAFT)[8]

Legislation is being developed which would require corporations to report scope 1 and 2 and material scope 3 emissions.

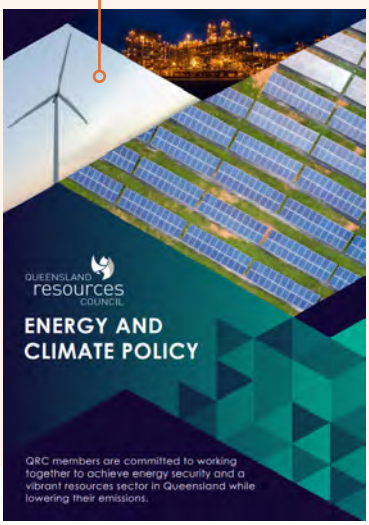
# RESOURCE SECTOR INITIATIVES

MINING2050 towards net zero

## MINING COUNCIL OF AUSTRALIA[9]

In October 2021, the Mining Council of Australia confirmed the industry's ambitions to achieve net zero emissions by 2050.

## QUEENSLAND RESOURCES COUNCIL[10]




The Queensland Resources Council supports the Mineral Council of Australia's 2050 targets with explicit support towards diversifying Queensland's energy mix.

# THE NEED TO DIVERSIFY

## The future for metallurgical coal and reliance on mining provides opportunities to support new economy industries

### MINING IN THE REGION IS CENTRED ON METALLURGICAL COAL

Much of the coal mined in the region is metallurgical coal. As this is a core input into steel production, as opposed to energy generation, the outlook and demand is likely to remain strong for the foreseeable future. For example, many new economy industries such as renewables will require vast quantities of steel to enable the energy transition.

### THE GREATER WHITSUNDAY REGION IS HEAVILY RELIANT ON MINING

During the past decade, the mining sector has accounted for between 12-20% of employment in the Greater Whitsunday region. This is between 5 and 8 times higher than for Queensland over the same period.

The high reliance on mining as a source of employment and economic growth is a key strength for the region. On the back of strong demand and high commodity prices mining has delivered significant economic benefits to the region, including higher wages.

### CYCLICAL NATURE OF THE MINING INDUSTRY

However, this reliance also creates risk. The mining sector output is highly correlated with commodity price cycles, which in turn produces a highly cyclical employment pattern (see Figure 4). The cyclical nature of the mining sector **impacts the entire related supply chain, typified by METS.**

METS businesses can manage the risk associated with a high reliance on the mining sector by **capitalising on the opportunity to diversify their operations into adjacent sectors**. This is particularly important as governments and markets increasingly prioritise decarbonisation agendas and related business activities.

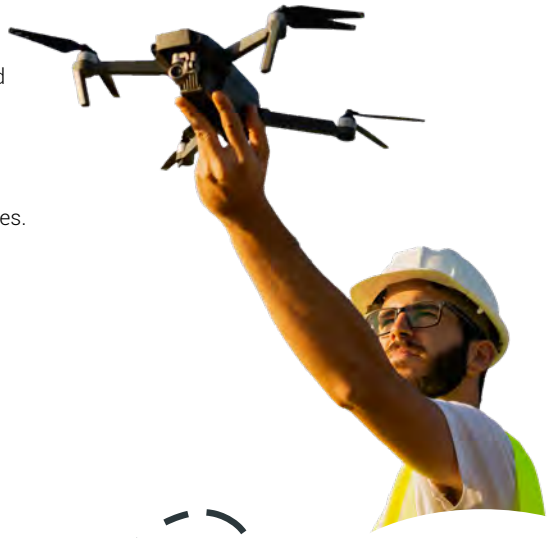
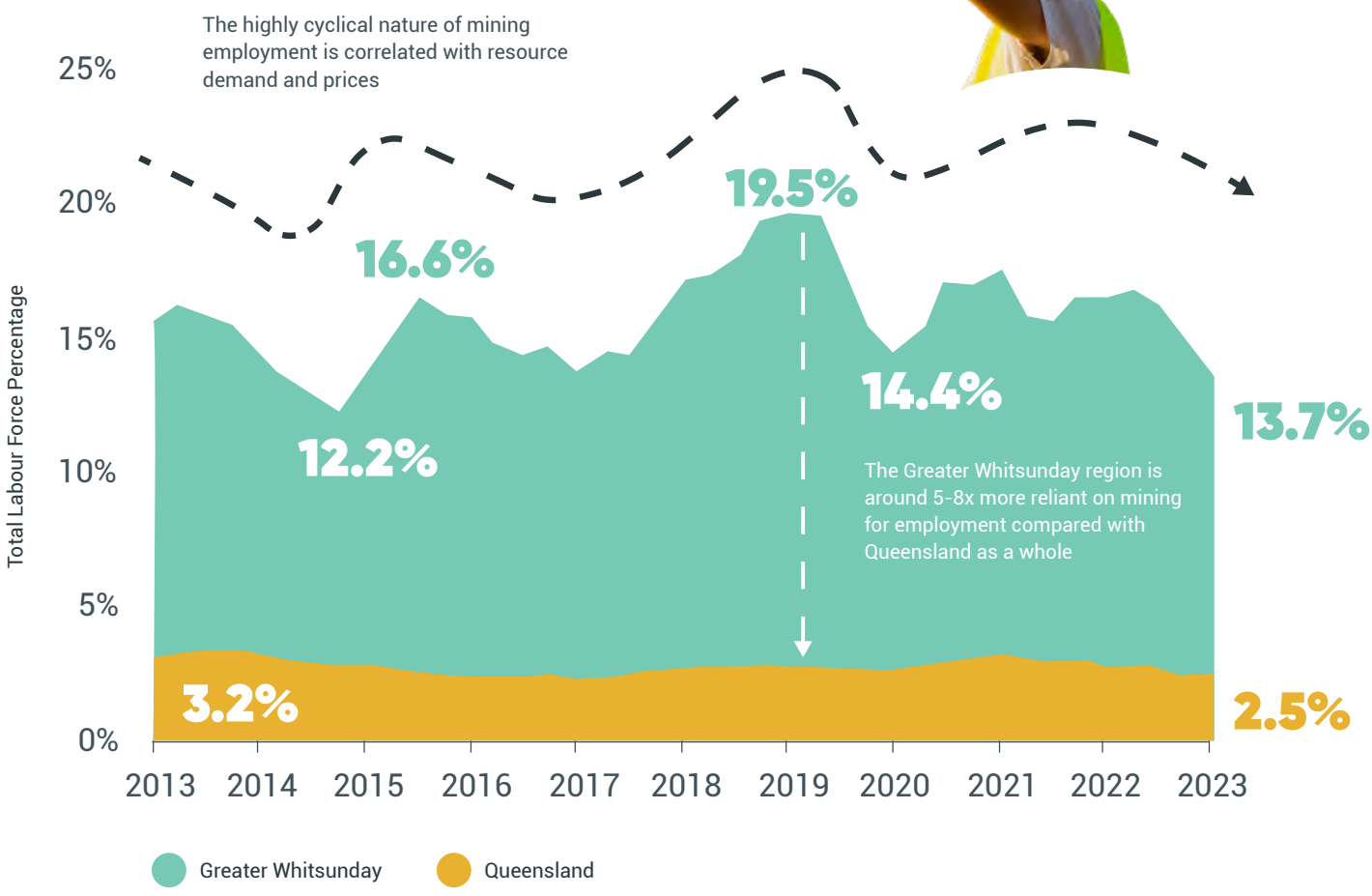


Figure 4: Mining employment as a proportion of Greater Whitsunday and Queensland total labour force (%)[1]



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CURRENT STATE:

# GREATER WHITSUNDAY METS SECTOR

# GREATER WHITSUNDAY REGION

## The Greater Whitsunday region's competitive advantage in resources is complemented by broader economic strengths

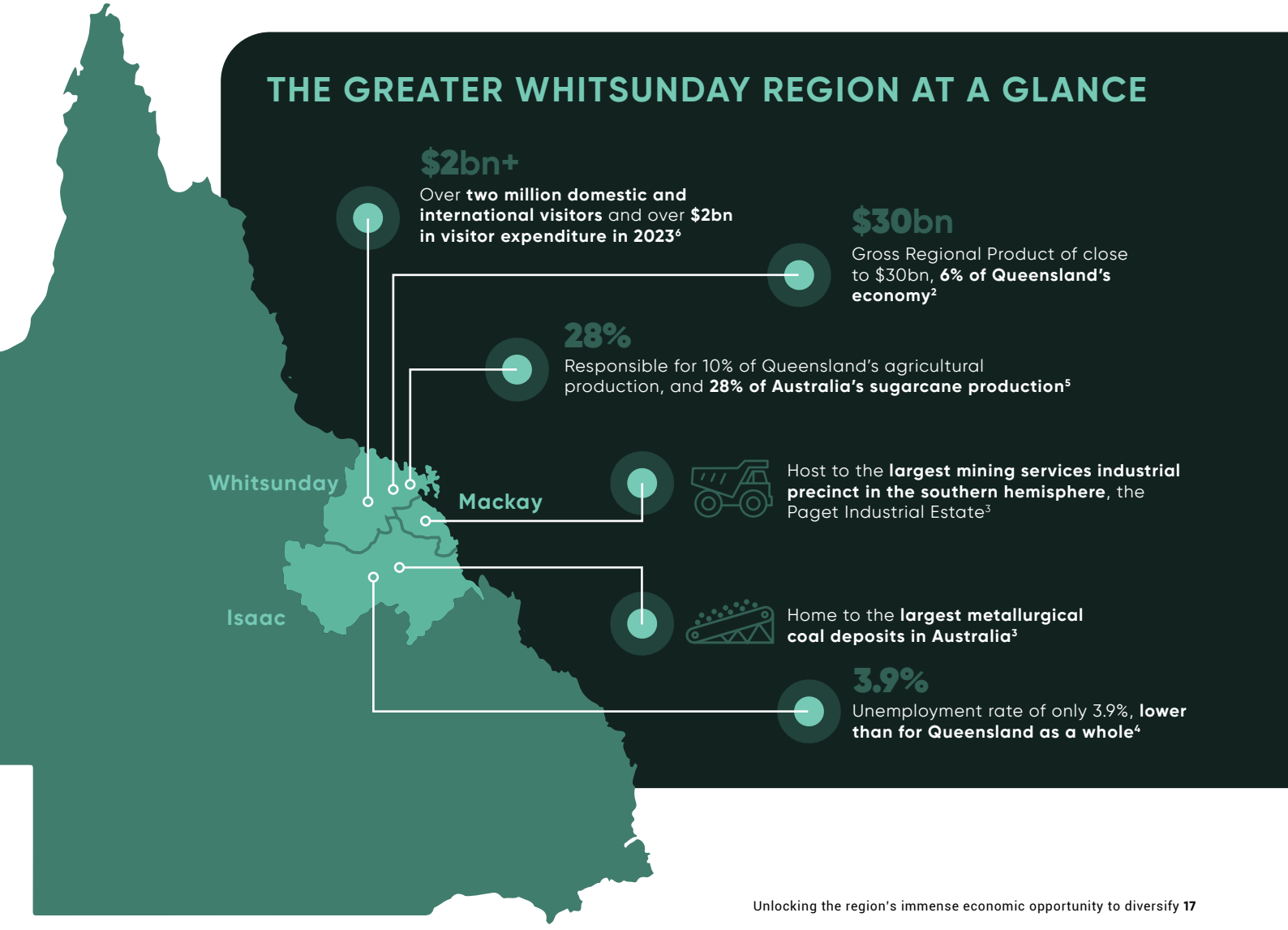
The Greater Whitsunday region is well known for its long-held strengths in mining and resources. The sector accounts from anywhere between 12-20% of the region's total workforce at a given time (with the variance stemming from the cyclical nature of mining), well above the Queensland average of 2.5-3.0%.[1]

Mining and resources are major factors influencing the region's outsized contribution to the Queensland economy. Despite only accounting for around 3.5% of Queensland's total population, the Greater Whitsunday region accounts for close to 6% of Queensland's total gross state product.[2]

The mining sector is supported by broader contributors to the regional economy, including a diverse agriculture sector (comprising sugar cane production, horticulture, beef cattle and aquaculture amongst others) as well as emerging industries such as Biomanufacturing and advanced manufacturing.[3]

In line with government priorities to transition to a zero-carbon economy, the region has a major role to play in helping realise Queensland's renewable energy ambitions. A number of major renewable energy projects are under construction, with many more in the pipeline, spanning solar, wind, hydro, hydrogen, bagasse and waste coal mine gas.[3]

A significant and unique contributor to the Greater Whitsunday economy is its Mining Equipment, Technology and Services (METS) sector. Stemming from the significant resources and mining presence in the region, a highly skilled and specialised array of supporting activities and businesses have emerged over time, which now contribute significantly to regional and state economic growth.



# GREATER WHITSUNDAY METS SECTOR

METS businesses that are innovative, specialised or unique in their activities are primed to diversify into adjacent sectors

## THE 'METS' SECTOR

Austmine (the peak body for Australia's METS sector) **introduced the term "METS" in 2009**, to increase recognition of the high-value upstream goods and services provided by many businesses to the mining sector.[1] The METS sector is uniquely defined by its primary customer—the mining industry—as opposed to the key activities undertaken and outputs produced by its businesses.

This makes it **difficult to develop a clear and consistent definition of METS**, particularly in the Greater Whitsunday region where most businesses will have some degree of involvement with the resources sector.

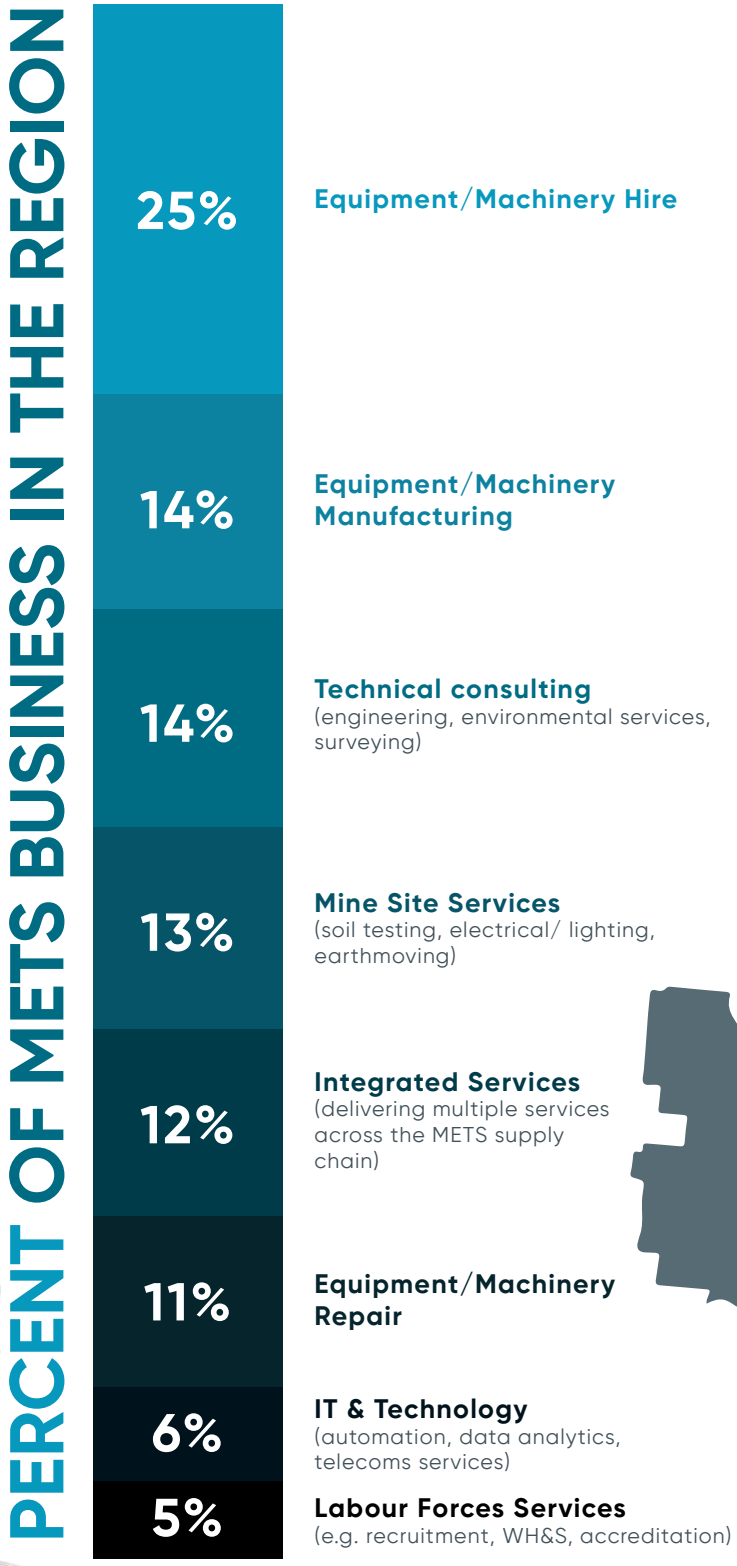
## THE METS SECTOR IN THE GREATER WHITSUNDAY REGION

As the scope of this strategy centres on diversification, a focus has been placed on METS companies providing goods and services that are **innovative, specialised or unique in their use by the mining industry**. An overview of some of these core activities is shown in Figure [1].

In the Greater Whitsunday region, it is estimated that there are over 700 businesses providing innovative, specialised and unique goods and services, which directly employ and more broadly support thousands of jobs across the region.[2]

Further, it is acknowledged there are many additional businesses across the region that also participate in the mining supply chain (albeit less substantively than those described in Figure 1), and whilst critical to the region's economy and future growth prospects, have not been captured in the focus of this strategy.

Figure 1: Profile of METS sector businesses that conduct the following activities[3]



# METS BUSINESS CLUSTERS

## There are noticeable clusters of METS businesses around Paget, Moranbah and Mackay

Nearly two-thirds of all identified METS businesses in the region are located in these three localities, with smaller centres including Mackay Harbour, North Mackay, Slade Point and Bowen.

The types of businesses located within each of the three key clusters differs noticeably, as described below.

### MACKAY CITY

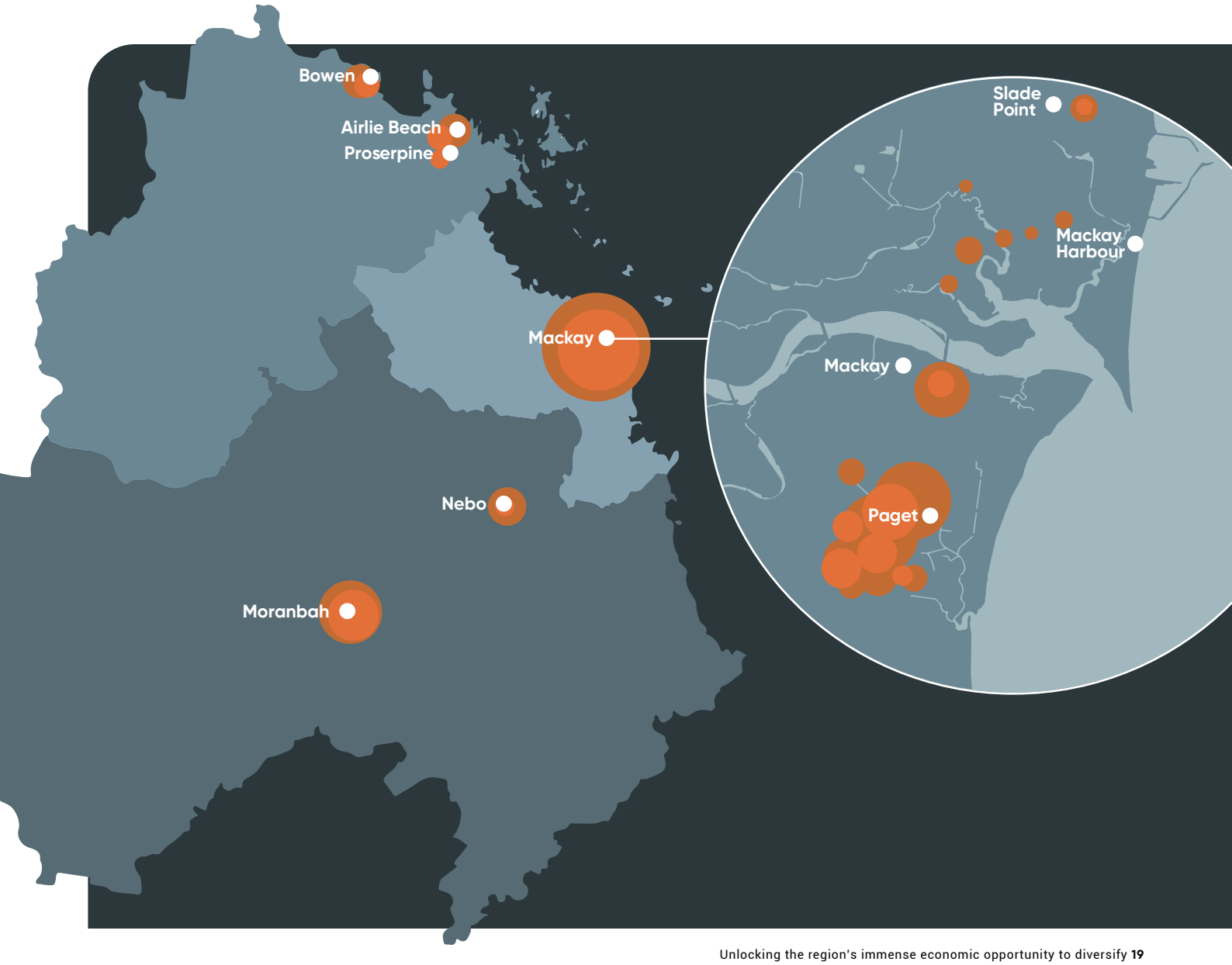
Approximately 12% of all METS businesses in the region are based in Mackay City. Unsurprisingly, a high proportion of business in the CBD provide technical consulting services (around 40% of total METS businesses in the cluster).

### PAGET

Home to 40% of all METS businesses in the region. There are a relatively diverse range of businesses in Paget, with major categories including equipment hire (26%), equipment manufacturing (19%) and integrated businesses (15%).

### MORANBAH

Accounts for 13% of total METS businesses in the region. Businesses in this cluster largely undertake activities that benefit from proximity to mine sites, including equipment hire (33%) and mine site services (20%).



# PAGET IN FOCUS

## The cluster of METS businesses in Paget alongside the robust infrastructure provide a key enabler in supporting diversification

**The Paget Industrial Estate is the Southern Hemisphere's leading METS industrial precinct.** METS businesses based in Paget (and the Greater Whitsunday region more broadly) have a global reputation for developing high quality products and services that increase client productivity and assist in solving complex operational challenges across a range of industries.[1]

The clustering of METS companies in Paget creates unique synergies across businesses operating along different elements of the mining value chain. This concentration of expertise in a collaborative setting has f**ostered a culture of innovation, research and development**.[2]

The success of METS businesses in Paget is further supported by the physical infrastructure within the estate. As shown in Figure 2, infrastructure in Paget meets the requirements of a wide range of industries, presenting a key potential enabler in the future diversification journey of METS businesses into adjacent sectors.

## CASE STUDY.

### Resources Centre of Excellence, Paget

The Paget-based Resources Centre of Excellence which opened in 2020 was developed to drive job creation through the region for the resources and other sectors. It hosts an underground coal mine simulator to assist with training, research, product innovation and demonstration. Currently, Stage 2 of the Resources Centre of Excellence, the Future Industries Hub is being developed with $5.7m in Queensland Government funding with a focus on incubating new industries such as critical minerals processing.[3]

The Resources Centre of Excellence operates under a sector agnostic philosophy with a key focus on ensuring a wide range of sectors can leverage the facilities, especially as the METS sector explores diversification opportunities into sectors such as critical minerals, renewables and biofutures[4]


Figure 2: Paget's infrastructure can facilitate multiple industries

### Land Footprint

Paget has over 415 hectares of high impact land suitable for heavy industry, with 23% vacant as of 2020. As per the 2020 Mackay Industrial Land Study, there is ample space in the adjacent Boundary Road East and Paget South precincts to facilitate further growth. [5,6] This is further supported by the recent declaration of the Mackay State Development Area, with the Rosella area within the SDA zoned to support significant industry.[7]

### Industrial Capacity

Paget possesses ample workshop size with substantial lifting capability for many industrial processes. Furthermore, the hardstand areas offer robust surfaces for heavy machinery and equipment.[8,9]

### Logistics Infrastructure

Adjacent port, rail and air infrastructure can enable rapid access to national and international markets.[8] The Port of Mackay can also facilitate diverse breakbulk cargo such as wind turbines.[10]

### Road Access

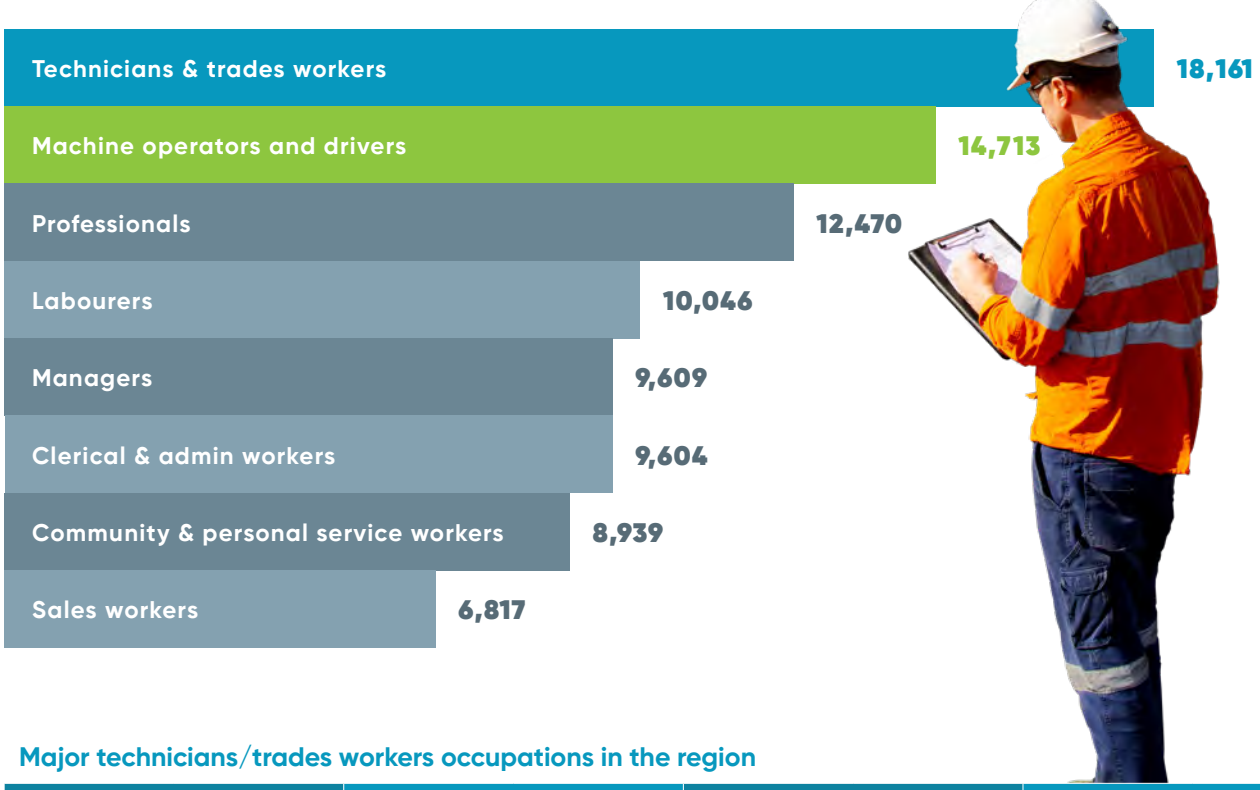
Paget is at the crossroads of the major north-south route (the Bruce Highway) and the major east-west route to the mines (the Peak Downs Highway). The roads are sufficiently load-bearing and wide to facilitate heavy equipment and connect to key logistics hubs such as the Port of Mackay.[11]

# METS SKILLS PROFILE

## The region is highly specialised in technicians, trades workers, machine operators and drivers

**Within these high-level categories there are many occupations with a mix of both a critical mass of employed persons, and a significant degree of specialisation relative to Queensland as a whole**, which is evident in Figure 3. The clear standout is station plant operators (i.e. miners), which account for over 7,000 jobs and is more than seven times more prevalent in the Greater Whitsunday region compared to Queensland. Other examples aligned to METS activities include mechanical engineering trades (4,700 employed persons / 4.4x more prevalent in Greater Whitsunday region compared to Queensland), building and engineering technicians (2,300 / 2.0x), electricians (2,150 / 1.9x) and fabrication engineering workers (1,500 / 2.3x).

Figure 3: Greater Whitsunday employment by occupation[1]




### Major technicians/trades workers occupations in the region

| Mechanical engineering trades workers | | Building and engineering technicians | | Electricians | | Fabrication engineering trades workers | |
|---|---|---|---|---|---|---|---|
| **4,700** | **4.4x** | **2,300** | **2.0x** | **2,150** | **1.9x** | **1,500** | **2.3x** |
| employed persons | greater share than QLD | employed persons | greater share than QLD | employed persons | greater share than QLD | employed persons | greater share than QLD |

### Major machinery operator/driver occupations in the region

| Station plant operators (i.e. miners) | | Truck drivers | | Mobile plant operators | | Automobile, bus and rail drivers | |
|---|---|---|---|---|---|---|---|
| **7,100** | **7.1x** | **2,700** | **2.0x** | **1,400** | **1.5x** | **1,200** | **1.75x** |
| employed persons | greater share than QLD | employed persons | greater share than QLD | employed persons | greater share than QLD | employed persons | greater share than QLD |

# 03

# IDENTIFYING METS DIVERSIFICATION OPPORTUNITIES

# BACKGROUND

METS businesses in the Greater Whitsunday region are ideally placed to diversify into adjacent and growth sectors.

## OVERVIEW

The Greater Whitsunday region is a globally-recognised hub for mining, mining innovation and resources sector activity, particularly in relation to metallurgical coal (an essential input into the steel making process). With the outlook for this resource remaining strong for decades to come, the sector will continue to be a major driver of growth in the region.

As the size and economic contribution of the mining sector has grown in the region over many decades, so too have a range of supporting capabilities that provide key inputs into the industry. These supporting activities have collectively become known as the Mining Equipment, Technology and Services (METS) sector. METS encompasses a diverse range of business capabilities and is a significant contributor to growth in the region.

As the scope of this strategy centres on diversification, a focus has been placed on METS companies that are providing goods and services that are innovative, specialised or unique in their use by the mining industry. In the Greater Whitsunday region, there are a significant number of businesses with strong talent that are prime targets for diversification into adjacent sectors.

Given the METS sector's primary focus on supporting the mining industry, it is highly exposed to the cyclical nature of this industry. As such, there is a strong case for promoting and facilitating diversification, particularly at a time when the global decarbonisation agenda is driving unprecedented new sector opportunities that align well to the skills and expertise that exist within the METS sector.

Greater Whitsunday Alliance (GW3) and Resources Centre of Excellence are proactively supporting transformational change for this thriving regional economy, through the Decarbonisation Accelerated project.

Decarbonisation Accelerated is an action-focused project to support the Greater Whitsunday supply chain on the journey towards net zero. It is delivering a range of initiatives and activities in the Greater Whitsunday region to secure its traditional industries and power new opportunities. The *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* is one of these important initiatives.

## THE OPPORTUNITY TO DIVERSIFY BASED ON SKILLS AND EXPERTISE

This *Greater Whitsunday METS Sector – a Revenue Diversification Strategy* seeks to consider the opportunities that can be realised by consciously diversifying business into adjacent sectors. Through stakeholder engagement in the region, we know that many METS businesses acknowledge the importance of diversification. However, the strong demand for metallurgical coal has increased the demand for products and services of METS businesses by the coal mining sector. This has made it difficult for these businesses to devote the necessary resources and investment into pursuing diversification.

However, with the mining industry contributing more than 60% of the economic output of the region, there is a significant reliance on one industry.[1] Local businesses have an opportunity to be more resilient and mitigate potential business risks by being aware of and understanding how adjacent sectors and industries can benefit from the existing strengths, capabilities, equipment and skills.

With the current macro environment and heavy influence of government policy and ambition set around decarbonisation, now is the time to be laying the foundations to remove any barriers and support industry to diversify their operations in future growth sectors.

This strategy identifies potential adjacent sectors for METS businesses to diversify into with a focus on how existing skills and capabilities can be transferred into these sectors and what actions could be taken to support diversification into new sectors.

# STRENGTHS & SKILLS

There are numerous opportunities to capitalise on existing strengths and skills in adjacent sectors

## PRIORITY AND ADJACENT SECTORS

Based initially on State and Federal strategies that identify future new industries and sector focuses based on competitive advantages, a multi-criteria analysis was developed to determine the potential priority and adjacent sectors for the region. Using a five-point Likert scale, each criteria was given a rating from 0-5 with supporting evidence and rationale.

The criteria used included:

- Government priority
- Size/scale of opportunity
- Sector maturity and recent growth
- Alignment with METS skills and capabilities
- Stakeholder interest and understanding

Weighting these criteria determined a clustering of higher priority sectors for METS to consider diversifying into.

These include:

- Critical minerals
- Renewables
- Bioenergy
- Biomanufacturing
- Circular economy
- Space
- Post-mining land use

## THE OPPORTUNITY FOR METS

A key piece of stakeholder feedback from METS businesses was regarding the lack of knowledge and information about how the sector could support and grow into new industries and explore other opportunities.

For each priority sector identified above, this report articulates:

- The potential size and scale of the sector globally, nationally and across Queensland to persuade industry of the merits and opportunity of expanding into new industries
- The relevance of the sector to the Greater Whitsunday region
- Alignment to the key skills and capabilities required in these sectors
- Potential barriers to overcome
- Case studies regarding recent diversification

## KEY ACTIONS AND ROADMAP

With gaps and challenges for diversifying into each priority sector identified based on stakeholder engagement and existing sectoral reports and strategies, we have identified a range of actions to overcome industry challenges grouped by the following themes:

- Supporting skills development/transferability
- Facilitating partnerships across stakeholder groups
- Providing insights/information and raising awareness
- Advocating for regulator/policy change

# IDENTIFYING POTENTIAL SECTORS FOR DIVERSIFICATION

There are a range of established and future growth sectors that present opportunities for METS revenue diversification

## GOVERNMENT POLICIES AND STRATEGIES PROVIDE A USEFUL LENS THROUGH WHICH TO IDENTIFY A RANGE OF POTENTIAL SECTORS FOR DIVERSIFICATION

The Queensland and Australian Governments have clear objectives to realise regional, industry and economic development outcomes across the State and nation. To do this, policies and strategies have been developed to define economic development priorities and help guide future investment. Examples include:

- **Queensland New Industry Development Strategy**[1] identifies emerging industries with the most potential to drive the economy forward and take advantage of global efforts to decarbonise.
- **Trade and Investment Queensland 2022 - 2032 Strategy**[2] identifies priority industries for the next decade that indicate significant export potential.
- **Australian Government List of Critical Technologies in the National Interest**[3] identifies technologies that can benefit the national interest by improving economic prosperity, national security and social cohesion.

These documents provide a useful starting point for identifying sectors that may present opportunities for METS diversification. The initial 'long list' is presented in Figure 5.

## HOWEVER NOT ALL SECTORS WILL BE RELEVANT TO GREATER WHITSUNDAY'S METS

In reviewing the industries identified in these policies and strategies, it is clear that not all will be relevant to the region's METS sector in terms of presenting a significant future diversification opportunity.

A structured approach is required to help identify sectors with a high degree of **adjacency** as well as those which will be high **growth** in future:

An **'adjacent sector'** is one where there is significant potential for METS businesses to service in future given similarity in the required skills and nature of work already being undertaken.

A **'growth sector'** is one in which there is significant investment occurring by both government and industry to realise significant sectoral growth. A growth sector is more likely to present a sustainable pipeline of work to a METS business and give greater certainty that servicing the industry will realise future growth.

Figure 5: Potential diversification sectors


*NB: Mining and METS are priorities for Government but have been removed as the focus of this work is to diversify *from* the METS sector.

# PRIORITISING ADJACENT & GROWTH SECTOR OPPORTUNITIES

## A multi-criteria analysis has been implemented to prioritise adjacent and growth sectors for METS diversification

### WHY USE A MULTI-CRITERIA ANALYSIS APPROACH?

A multi-criteria analysis provides a structured approach by which to evaluate a long list of options, and prioritise these according to a transparent set of criteria. In this instance, a multi-criteria analysis has been used to identify sectors that most closely align to the overarching principles of 'adjacency' and 'growth' described on the previous page. Sectors that can best meet each of these principles will be more likely to provide a sizeable and sustainable revenue diversification opportunity for METS businesses in years to come.

To support this evaluation process, the following criteria have been used:

| | | |
|---|---|---|
| 1. | GOVERNMENT PRIORITY | To ascertain the level of Government importance, policies, funding commitments, strategies and blueprints were reviewed. Sectors with the support of multiple levels of government, advanced plans and commitments were rated higher. |
| 2. | SIZE/SCALE OF OPPORTUNITY | To quantify the economic opportunity presented by each sector, quantitative forecasts from multiple organisation were cross-referenced. Research reviewed includes Australian governmental projections and forecasts from reputable international bodies including, but not limited to the UN, World Bank, OECD, IEA and professional services companies. |
| 3. | SECTOR MATURITY AND RECENT GROWTH | The current commercial position of each sector was considered because of the significant capability METS businesses have in providing products and services to mature industries (e.g. mining). Data was reviewed from Australian and Queensland Government publications and complemented by analysis from independent research bodies. |
| 4. | ALIGNMENT WITH METS SKILLS AND CAPABILITY | The alignment with the products and services provided by METS businesses was considered through consultation with subject matter experts from adjacent and growth sectors. This was complemented by consulting the capability and supply chain requirements published by adjacent sector organisations and other relevant bodies. |
| 5. | STAKEHOLDER INTEREST AND UNDERSTANDING | The interest and comprehension of the opportunities for METS businesses to diversify into the adjacent and growth sectors was determined during stakeholder interviews. Further detail regarding insights gained during stakeholder engagement are provided in Appendix 1. |

# EVALUATING POTENTIAL DIVERSIFICATION OPPORTUNITIES

Applying scores against each criteria, sectors have been prioritised by the level of opportunity they provide for diversification

| Potential diversification sector | Government priority | Size/scale of opportunity | Sector maturity and recent growth | Alignment with METS skills and capabilities | Stakeholder interest and understanding | Total |
|---|---|---|---|---|---|---|
| Critical minerals | 5 | 5 | 4 | 5 | 5 | 24 |
| Renewable energy | 5 | 5 | 4 | 5 | 4 | 23 |
| Bioeconomy | 5 | 5 | 3 | 5 | 5 | 23 |
| Circular economy | 5 | 5 | 2 | 5 | 4 | 21 |
| Aerospace | 4 | 4 | 3 | 4 | 3 | 18 |
| Post-mining land use | 4 | 4 | 2 | 4 | 3 | 17 |
| Advanced manufacturing | 4 | 3 | 4 | 4 | 1 | 16 |
| Defence | 3 | 3 | 4 | 3 | 2 | 15 |
| Green hydrogen | 4 | 4 | 2 | 4 | 1 | 15 |
| Food and agribusiness | 3 | 3 | 3 | 2 | 1 | 12 |
| Enabling and innovative technology | 2 | 2 | 2 | 2 | 2 | 10 |
| Biomedical including life sciences and health | 2 | 2 | 3 | 2 | 0 | 9 |
| Professional services | 1 | 1 | 1 | 1 | 0 | 4 |
| International education and training | 1 | 1 | 1 | 0 | 0 | 3 |

NB: Further rationale for ratings can be provided upon request.

# IDENTIFIED PRIORITY SECTOR OPPORTUNITIES

## Based on the multi-criteria analysis, seven priority sectors for METS diversification have been identified

The multi-criteria analysis provides a structured approach through which seven priority sectors for METS diversification have been identified for more in-depth analysis. It is important to note that due to the diverse nature of METS businesses there will be different levels of alignment to each priority sector. Care was taken to ensure that priority sectors aligned to a wide cross-section of METS businesses.

Each priority sector was evaluated by considering the size of the opportunity, relevance to the Greater Whitsunday region, and the degree of alignment with the METS sector (including skills alignment). Finally, gaps and challenges for METS businesses to diversify into the sector were identified with practical actions put forward to overcome gaps and challenges. In moving from the 'long list' to 'short list' of priority sectors, a number of additional steps were taken, which are summarised below.

### SEPARATING BIOECONOMY INTO BIOENERGY AND BIOMANUFACTURING

The Queensland Government in their consideration of 'biofutures' delineates the industries between bioenergy and biomanufacturing.[1] Bioenergy applications have been present in the Greater Whitsunday region for decades, with significant ethanol production from sugarcane being a key success story for the region. More recently, the Queensland Government has undertaken significant investment to help create a biomanufacturing hub in the Greater Whitsunday region, with a focus on future foods. By delineating between these two sectors, consideration can be given to relevant applications at a more granular/discreet level.

### INCLUSION OF CIRCULAR ECONOMY AND POST-MINING LAND USE AS SECTORS

Whilst circular economy and post-mining land use are not technically 'sectors', they have been treated as such for the purposes of this strategy to give weight to the tangible opportunities they present for the METS sector.

### NARROWING THE FOCUS FROM AEROSPACE TO SPACE

The focus on aerospace was refined to concentrate specifically on the space industry. This stems from the region's significant emphasis on outer space activities, exemplified by the substantial federal, state and private investment into the Bowen Orbital Spaceport. This is a unique opportunity for the region as the Spaceport is one of only three dedicated orbital launch sites globally.[2] A broader focus on aviation was reserved for the bioenergy sector where the potential for developing sustainable aviation fuels is explored.

### SECTORS TO CONTINUE TO MONITOR FOR FUTURE DIVERSIFICATION OPPORTUNITIES

Defence, green hydrogen, biomedical, professional services and international education sectors have not been explored in significant detail. This does not diminish their significance or potential as sectors for METS diversification, but rather reflects a strategic focus on sectors with the broadest appeal and most compelling growth opportunities. It is imperative that these sectors are closely monitored, and the region responds quickly to facilitate and capitalise on diversification opportunities as they emerge.

### INTEGRATION OF ENABLING SKILLS

Additionally, certain areas such as advanced manufacturing, food and agribusiness, and enabling and innovative technology are viewed as having application across many of the seven priority sectors. As such they are discussed within each priority sector as relevant.

# PRIORITY
# DIVERSIFICATION SECTORS

# 04.

# PRIORITY SECTOR OPPORTUNITIES AND ACTIONS

# OPPORTUNITIES SNAPSHOT

## CRITICAL MINERALS

Critical Minerals present a strategic economic opportunity for Greater Whitsunday, **leveraging existing METS capabilities in geological mapping and precision extraction**.

The potential for downstream processing aligns with government priorities and global ethical sourcing standards, offering substantial potential contribution to future regional economic growth and positioning local businesses at the forefront of sustainable resource development.

**SIZE OF THE OPPORTUNITY:**

**$2.5trillion+** of critical minerals required by 2050, globally.

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | **STRONG** | VERY STRONG

**STRENGTHS & GAPS:**

- Skills and capabilities have a high degree of alignment.
- Gaps exist in the need to reskill/upskill the workforce in the battery production value chain, robotics, and automation.

## RENEWABLE ENERGY

Renewable Energy offers a significant diversification opportunity for METS businesses, **leveraging their expertise in manufacturing and maintenance**.

While initial opportunities lie in operations and maintenance phases, the region's METS sector is poised to expand into component manufacturing and construction phases, capitalising on synergies with renewable energy projects and advancing local economic growth.

**SIZE OF THE OPPORTUNITY:**

**$12trillion+** Global investment in renewable energy deployment required between 2023 – 2030.

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | STRONG | **VERY STRONG**

**STRENGTHS & GAPS:**

- High degree of transferability given the broad range of skills in the region's METS sector.
- Gaps exist in the need to train/upskill electrical trades workforce in lreation to commissioning and substation isolation and installation, as well as installing and maintaining grid-scale energy storage systems.

## BIOENERGY

Bioenergy represents a strategic opportunity for METS businesses, **leveraging existing service capabilities and aligning with sustainable aviation fuel demand**.

While initial investments in specific equipment may be limited by current demand, the sector offers stable long-term workflow potential.

Addressing feedstock challenges through innovative solutions will be crucial to unlocking bioenergy's full economic potential in the region.

**SIZE OF THE OPPORTUNITY:**

**$726billion** Forecast value of the global bioenergy market in 2050 under net zero scenario[1].

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | **STRONG** | VERY STRONG

**STRENGTHS & GAPS:**

- Highly transferable skills when it comes to construction of new bioenergy facilities including ongoing operations, maintenance, and repairs.
- A degree of re-skilling likely required to understand and work in bioenergy. Sector requires more niche skills specific to bioenergy including microbiology and biochemistry, agricultural science and biomass production/management, which are currently not widely held within METS businesses.

## BIOMANUFACTURING

Biomanufacturing offers a compelling opportunity for METS sector, **leveraging strong alignment in manufacturing and fabrication capabilities**.

The sector's reduced seasonality, compared to agriculture, presents an attractive prospect for sustained operations.

Investment decisions by entities like Cauldron Ferm underscore the region's potential to become a hub for biomanufacturing, driven by its skilled workforce and supportive business environment.

**SIZE OF THE OPPORTUNITY:**

**$700billion**

Forecast size of global biomanufacturing market in 2040[1].

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | **STRONG** | VERY STRONG

**STRENGTHS & GAPS:**

- Immense scope for METS to apply skills and capability in manufacturing, fabrication and maintenance.
- Certification (not widely in the METS remit) required for food safe practices and upskilling in microbiology, biochemistry, bioprocess engineering, fermentation processes and operating in controlled environments.

## CIRCULAR ECONOMY

Circular Economy presents a strategic opportunity for the METS sector, **leveraging existing strengths in rethinking, reusing, and recycling**. METS businesses' proactive adoption of circular initiatives internally highlights their readiness to offer sustainable products and services to the market.

With a strong focus on durability and innovation in technology integration, the sector is well-positioned to drive value through sustainable material solutions across mining value chains, fostering economic resilience and environmental stewardship.

**SIZE OF THE OPPORTUNITY:**

**$6.5trillion+**

Of value could be unlocked by 2030 through circular economy approach[1].

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | **STRONG** | VERY STRONG

**STRENGTHS & GAPS:**

- Entrepreneurial strengths and deep technical experience, combined with capabilities align to key success factors in implementing circular economy principles and business models.
- Gaps exist in lifecycle thinking skills, along with limited site access, distance and logistical challenges that constrain METS businesses to pursue.

## SPACE

Space represents a promising future opportunity for the Greater Whitsunday's METS sector, despite current challenges in linking existing capabilities to sector-specific requirements. The applicability of METS businesses' manufacturing services to the space sector is acknowledged, albeit at a smaller scale compared to mining.

**With quality standards being a high priority, the region's METS businesses are poised to expand their footprint in space-related manufacturing, positioning themselves as key contributors to the sector's growth.**

**SIZE OF THE OPPORTUNITY:**

**$2.6trillion+**

Is the estimated value of the global space economy by 2035[1].

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | STRONG | **VERY STRONG**

**STRENGTHS & GAPS:**

- Notable synergy exists between current METS skills and those demanded by the space industry, especially in space operations.
- The biggest gap in engaging in the space sector will be the mandatory adherence to regulatory standards including ISO standards.

## POST-MINING LAND USE

Post-mining land use represents a significant opportunity for the METS sector, leveraging existing strengths in mine closure and remediation solutions. The region's METS businesses are recognised for their entrepreneurial spirit and problem-solving capabilities, making them pivotal in delivering optimal environmental outcomes.

With high standards in environmental regulation and compliance, these businesses are well-positioned not only to meet local demands but also to expand into international markets, driving sustainable development and economic growth in the region.

**SIZE OF THE OPPORTUNITY:**

**$4–8billion**

Annual expenditure in mine closure activities by 2030[1].

**STATUS OF FUTURE SKILLS ALIGNMENT:**

POTENTIAL | DEVELOPING | **STRONG** | VERY STRONG

**STRENGTHS & GAPS:**

- Given their renowned entrepreneurial spirit and problem-solving capabilities, subject matter experts suggest METS will play a pivotal role in facilitating post-mining land use.
- Gaps exist in clarity of the opportunity which could potentially turn into missed opportunities.

# FOUR KEY ACTION THEMES IDENTIFIED

Though a broad range of actions have been identified, these can be categorised across four key themes

## POWERING A WORKFORCE

### Supporting skills development/transferability

A common challenge associated with achieving diversification is a degree of misalignment between the existing skills held by an individual/business/industry and those required by a priority sector. To overcome this, a degree of reskilling/ upskilling may be required to ensure the needs of the target sector can be effectively met.

## FORGING RELATIONSHIPS

### Facilitating partnerships across stakeholder groups

There are a range of organisations within the Greater Whitsunday region (and beyond) that will have a role to play in supporting METS businesses to diversify into priority sectors. The ability to realise tangible/ meaningful diversification outcomes will be enhanced where organisations partner together to leverage their strengths. There is a role to play in bringing these stakeholders together to identify areas of common interest and opportunities to work together.

## EXPLORING OPPORTUNITIES

### Providing insights/information and raising awareness

In many instances, the limited involvement of METS businesses in supplying goods and services to a priority sector will come down to limited awareness and understanding of the needs of the sector, as well as the scope and scale of future opportunities. Improving the provision of information and insights can provide this understanding and increase awareness amongst the METS sector.

## CHAMPIONING CHANGE

### Advocating for regulatory/ policy change

In some instances, there will be regulatory and policy barriers in place preventing the realisation of certain priority sector opportunities, and in turn constraining the ability of METS businesses to diversify into these sectors. This will require advocacy to relevant areas of Government to affect the required regulatory and/or policy changes and overcome barriers to diversification.

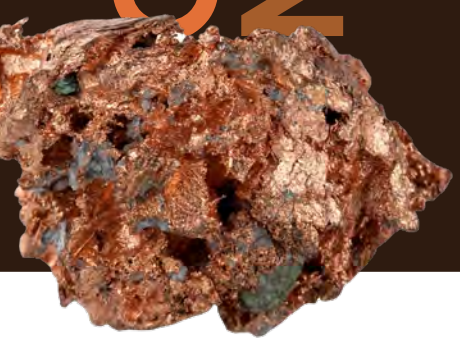
# CRITICAL MINERALS

Queensland has an abundance of critical minerals deposits including copper, vanadium and tungsten, particularly in the North West Minerals Province (NWMP).

These minerals will be a key enabler of a decarbonised economy, forming key inputs into the development of solar panels, wind turbines and batteries.

They also form a major component of modern technologies with wide applications in areas such as advanced electronics, manufacturing and defence.

Queensland's decades-long expertise in base metals and certain critical minerals mining provides an additional layer of confidence in its ability to establish sustainable supply chains for newer critical minerals.



**$2.5tn+**

**of critical minerals required by 2050[1]**

**$500bn**

**of deposits in North West Mineral Province alone[2]**

## SIZE OF THE OPPORTUNITY

- Globally, the market size of the critical minerals sector has increased rapidly in recent years as the pace of the energy transition picks up, with its size doubling over the past five years to reach approximately $400bn as of 2022[3].
- The rapid growth of the sector is expected to continue with over $2.5tn of critical minerals required by 2050.[1] The International Energy Agency is forecasting global demand to increase by between 100% and 300% between 2020 and 2040.[4] Certain critical minerals are expected to see even stronger growth, with lithium demand forecast to be 40 times higher in 2040 compared to 2020, while cobalt and graphite demand is forecast to be 20 times higher over the same period.
- Australia's outlook for critical minerals is also strong, with projects in the pipeline valued at between $30bn and $42bn as of December 2022. This represents a small fraction of the future opportunity, given vast swathes of the country (up to 80%) remain underexplored in the context of critical minerals.[5]
- There has been substantial investment undertaken by the Queensland Government to unlock future critical minerals opportunities, with $5bn allocated to the Copperstring 2.0 transmission project, which will connect the NWMP to renewable energy zones (and the National Electricity Market) on the east coast.[6]
- The demand for battery storage (which is highly reliant on critical minerals as an input) is estimated to increase tenfold by 2030, with the potential to generate up to $1.3bn of economic activity in Queensland.[7]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- Queensland's ability to capitalise on the critical mineral opportunity has been identified by stakeholders as reliant on the expertise of the Greater Whitsunday METS sector which generates geographic diversification opportunities in addition to sectoral ones.
- Current exploration surveys indicate critical minerals in Queensland are concentrated largely in the NWMP which has an estimated $500bn in deposits, with some smaller deposits located within the Greater Whitsunday region.[2]

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- There are opportunities across the entire critical minerals value chain for METS businesses, with upstream exploration and extraction providing the closest alignment with existing service offerings of the sector (e.g. well-integrated geological mapping and precision extraction capabilities).[8]
- Over the longer-term, the more significant revenue opportunity (aligned with government priorities) is downstream processing and manufacturing of new economy products, with forecasts estimating that downstream refining and processing could generate an additional $140bn in GDP between 2022 and 2040.[9]
- As investors globally apply more stringent requirements around ethical sourcing and supply chains, Greater Whitsunday businesses (with their robust safety and quality records) are well placed to take advantage.[10]

## Future skills requirements for the sector

There will be a broad range of skills required to support the development of the critical minerals sector, which will differ across sub-components of the industry described below.

### UPSTREAM EXPLORATION AND EXTRACTION

Despite exploration expenditure on critical minerals in Australia growing by over 60% in 2022, up to 80% of the continent remains underexplored.[1] Upstream proponents in the critical minerals space are largely junior miners with smaller operating capacity and are therefore reliant on the services of specialised companies (e.g. those operating in the METS sector) to efficiently identify and extract the minerals through integrated technological solutions.[2,3] The specific skills and occupational requirements depend on a range of factors including the regional geology and site scale.

### DOWNSTREAM PROCESSING AND MANUFACTURING

Globally, the critical minerals supply chain is constrained at the processing and manufacturing stages, where markets are highly concentrated (a small number of countries dominant in the market).[4] The abundance of critical minerals across Queensland presents an opportunity to co-locate processing and manufacturing activities for outputs, including batteries, solar cells, wind turbine components and semiconductors.

### DOWNSTREAM BATTERY PROCESSING

The demand for battery storage is forecast to increase tenfold by 2030, with the potential to annually generate up to $1.3bn of economic activity in Queensland.[5] While Queensland already mines battery minerals, significant opportunities exist in cell manufacturing, battery pack assembly, deployment and recycling.[6] The skills requirements for each stage of the battery value chain vary by each activity. Considering battery manufacturing in Australia is a nascent industry, a clear understanding of which part(s) of the value chain to focus on (and the skill requirements) are still being developed.

## Alignment of future skills requirements to the METS sector[7,8,9]

| Skill | Rating |
|---|---|
| Geological mapping and surveying, remote sensing | ● |
| Drilling and blasting | ● |
| Mine planning and design | ● |
| Safety and environmental compliance | ● |
| Mineral processing | ● |
| Metallurgical processes and techniques | ● |
| Laboratory analysis (chemicals and materials) | ● |
| Electrical trades | ● |
| Electrochemistry and chemical engineering | ● |
| Quality control and assurance | ● |
| Manufacturing and heavy equipment maintenance | ● |
| Robotics and automation | ● |

KEY ● High alignment to METS ● Moderate alignment to METS ● Limited alignment to METS

> OTHER MINING LOCATIONS WILL NEED THE SKILLS AND SERVICES FROM OUR REGION.

## Summary of regional skills strengths and gaps

The skills and capabilities held by those working in the METS sector have a high degree of alignment to requirements for the critical minerals sector. As new exploration and mine development activities accelerate in response to the expected opening up of the NWMP (a key state and federal government priority), associated skills will become increasingly in demand. In terms of gaps, the metallurgical and chemical production processes underpinning the processing and manufacturing opportunities in critical minerals will likely require reskilling/upskilling of the workforce, particularly in relation to the battery production value chain (processing, manufacturing) and robotics and automation.

# THE ACTION PLAN

| PLAN | THEME | ACTIONS |
|---|---|---|
| **GAP / CHALLENGES:** The critical minerals sector is perceived by businesses to be more relevant to the North-West Minerals Province (NWMP).<br>**DESCRIPTION:** A lack of connection is being made between the local skills, equipment and services provided by the METS sector and the current and future needs of mining companies in the NWMP, with its distance from the Greater Whitsunday region being viewed as a particularly significant constraint.<br>**STRATEGY:** Articulate the alignment between the needs of the emerging critical minerals sector and the capabilities of the Greater Whitsunday METS sector. |  | Promote current and future critical minerals opportunities (particularly early stage exploration/planning services in the first instance) within the Greater Whitsunday region to local METS businesses.<br>Connect the opportunities for regional diversification to better utilise the skills, equipment and technology in region to maximise development in the NWMP. |
| **GAP / CHALLENGES:** Mineral processing facilities are expensive to develop, requiring additional skills, and investment and coordination across multiple parties.<br>**DESCRIPTION:** Capital and resource constraints limit the extent to which individual METS businesses can invest in R&D activities for the potential provision of goods and services to the critical minerals sector. In particular, businesses perceive significant opportunity costs associated with diverting scarce capital and labour from the currently strong pipeline of work servicing the coal sector, to developing more uncertain/ speculative future service lines.<br>**STRATEGY:** Secure support and foster collaboration to enable METS businesses to develop and scale solutions for the critical minerals sector. |  | Progress opportunities to develop common user infrastructure for critical minerals processing, including identifying opportunities to establish partnerships to pilot, expand and relocate processing infrastructure across the region as required. |
| **GAP / CHALLENGES:** There are challenges associated with scaling up processing/ manufacturing businesses from pilot stage.<br>**DESCRIPTION:** Once the viability of a product or service has been established through a pilot program, significant additional investment (which is often difficult to source) is required to scale and commercialise the service/product.<br>**STRATEGY:** Secure support and foster collaboration to enable METS businesses to develop and scale solutions for the critical minerals sector. |  | Progress opportunities to develop common user infrastructure for critical minerals processing, including identifying opportunities to establish partnerships to pilot, expand and relocate processing infrastructure across the region as required. |
| **GAP / CHALLENGES:** There are difficulties in attracting talent to service the critical minerals sector as it is closely associated with the mining industry more broadly.<br>**DESCRIPTION:** Stakeholders noted that many school leavers and recent graduates associate the critical minerals sector with the mining sector more broadly. As mining can attract negative connotations regarding the transition to a zero-carbon economy, graduates are increasingly being drawn to other industries where they see a stronger connection or correlation to a net-zero future.<br>**STRATEGY:** Attract new talent to the sector by highlighting the critical minerals sector's vital role in the energy transition and positioning METS as a sector that is essential for supporting decarbonisation. |  | Deliver structured marketing and communication campaigns within schools, TAFE and universities to articulate the vital importance of the critical minerals sector to underpin the energy transition, and at the same time reposition METS as a sector that is needed to support decarbonisation.<br>Continue to deliver strategies to attract and prepare workforces, including the attraction of overseas talent where necessary, to support the development of the critical minerals sector. |
| **GAP / CHALLENGES:** The application of skills required for downstream processing and manufacturing requires greater understanding and upskilling.<br>**DESCRIPTION:** Critical minerals processing and manufacturing will require work in controlled environments with specific knowledge of the nuances and differences between each mineral. In particular, safety will need to be a big focus.<br>**STRATEGY:** Enhance the alignment and applicability of existing METS capabilities to emerging opportunities in the critical minerals sector. |  | Map specific skills gaps and explore micro credentialling and transferable skills pathways with key stakeholders including TAFE and universities. |

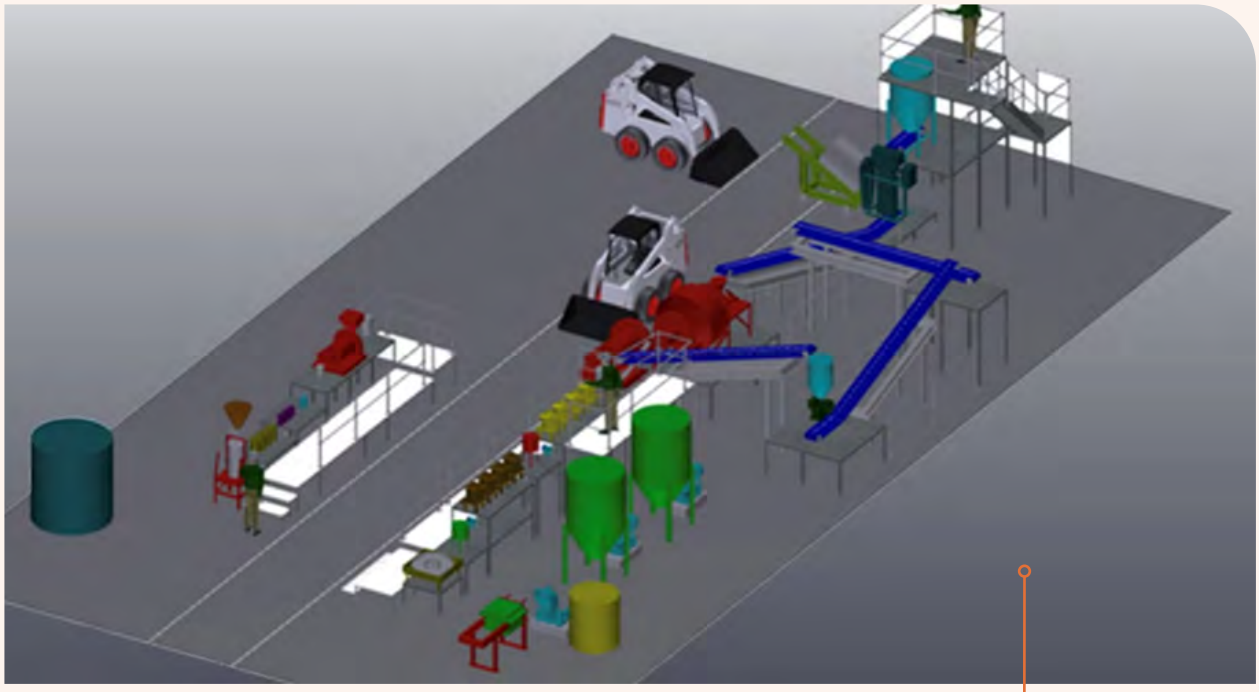
Legend

 Powering a Workforce

 Forging Relationships

 Exploring Opportunities

 Championing Change



## CASE STUDY.

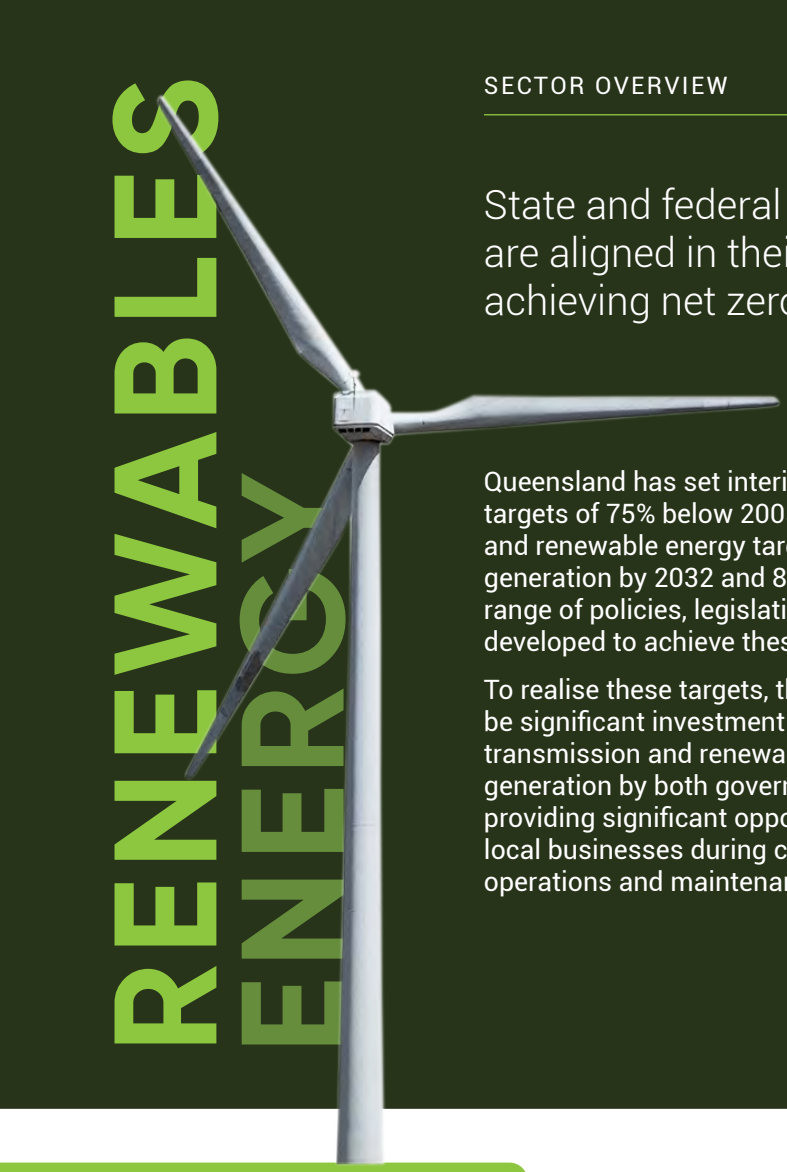
### Resources Centre of Excellence FlexiLab — Critical minerals pilot processing plant

With the critical minerals industry being made up of many smaller-scale businesses with tight capital constraints, there is a view in the industry that the growth potential will be greatly enabled by shared infrastructure, especially in processing.

This is exemplified by the Resources Centre of Excellence FlexiLab critical minerals processing plant being developed in Paget, which will become one of Australia's first commercial common-user facilities supporting activities around critical minerals, reprocessing of tailings and other precious metals.

The facility is supported by $5.7m in funding from the Queensland Government as part of the Queensland Resources Industry Development Plan. Whilst still in construction phase, there have been high levels of interest from companies in using the services of the FlexiLab which has capabilities to be taken onto mine sites.[1]

# RENEWABLES ENERGY





State and federal governments are aligned in their goals of achieving net zero by 2050.

Queensland has set interim emissions targets of 75% below 2005 levels by 2035 and renewable energy targets of 70% of total generation by 2032 and 80% by 2035, with a range of policies, legislation and roadmaps developed to achieve these targets.

To realise these targets, there will be significant investment required in transmission and renewable energy generation by both government and industry, providing significant opportunities for local businesses during construction and operations and maintenance of new assets.

**$12tn+***

**Global investment in renewable energy deployment required between 2023 and 2030[1]**

**$162bn**

**In Queensland's renewables pipeline to generate 80 GW of renewable energy[2]**

* USD currency figures converted using average 3-year exchange rate from May 2021 to April 2024 (source: Reserve Bank of Australia exchange rates historical data).

## SIZE OF THE OPPORTUNITY

- Global investment in the energy transition continues to grow rapidly, with the International Energy Agency estimating clean energy investment of $2.5tn in 2023, with over one-third ($960bn) associated with renewable power.*[3]
- Looking forward, an estimated $12tn needs to be invested in renewable energy deployment globally between 2023 and 2030 to align with a net-zero by 2050 trajectory.*[1]
- In Queensland, the Energy and Jobs Plan estimates total capital investment of $62bn to 2035 across government and private sector to transition the power system towards renewable generation.[5]
- This investment will help realise the development of approximately $162bn worth of renewable energy projects currently in the pipeline across solar, wind and battery storage.[2]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- Investment in the renewable energy sector will be a major driver of economic growth and opportunities in the Greater Whitsunday region in coming years.
- The industry is well-established, with an estimated $1bn in total investment in over 500 megawatts of large-scale renewable energy projects since 2015.[5] Looking forward, the Queensland Government estimates close to $8bn in further investment in the Greater Whitsunday region out to 2040.[6]
- Major renewable projects slated for the region include the Pioneer-Burdekin pumped hydro energy storage (PHES) and Capricornia Energy Hub projects, with detailed technical studies underway to inform an investment decision by government. If the PHES project does proceed, it will support an estimated 3,000 jobs in the region during construction.[7,8]
- Beyond this, a further 30 solar, wind and battery projects are proposed in the region, with collective generation capacity in excess of 9 GW.[9]

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- METS businesses in the region identify similarities between many of the components they currently manufacture and repair for mines, and those that will be used as part of renewable assets such as wind turbines.
- This presents a substantial opportunity for METS businesses within the region to diversify operations, though METS businesses tend to consider major opportunities will be limited to the operations and maintenance phase of the renewable projects (i.e. limited opportunities in the short to medium term as projects are constructed).
- Renewable companies view there to be substantial opportunities for more involvement in component manufacturing by local businesses.
- There are also opportunities during the construction phase of projects, with a high degree of transferability between METS sector skills and the requirements of pumped hydro during construction.

## Future skills requirements for the sector

Given the diversity of activities and services that will be undertaken in the renewable energy sector in future, there will be a broad range of skills and occupations required to realise the transition to a net-zero economy. The speed and scale with which investment is occurring to meet targets means there is a critical need for relevant skills in the short term, which will persist over longer timeframes as projects are developed and commence operations.

### GENERAL SKILLS REQUIREMENTS

The *Queensland Government's Future Energy Jobs Guide*[1] outlines a range of occupations that will be required to deliver the energy transition. In particular:

- A series of electrical trades, construction roles (including machinery operators and mechanical/fabrication trades) and technicians (including field, civil and science technicians)
- Engineers (spanning a range of specialisations, though particularly electrical and civil)
- Science and technology professionals (covering data and systems analysis and environmental scientists)
- A broad range of corporate functions including strategy and planning, stakeholder engagement and workplace health and safety.

### CRITICAL SKILLS NEEDS AND GAPS

A skills gap analysis for the renewable energy sector in Queensland identified specific competencies/skills that will be required in future years where gaps currently exist in Queensland.[2] Key skills included:

- Electrical commissioning and substation isolation and installation (critical for extending the transmission network)
- Skills to deliver pumped hydro energy storage (with limited skill available in Australia)
- Installing and maintaining grid-scale energy storage systems (not currently prevalent in Australia).

## Alignment of future skills requirements to the METS sector[1,2]

| Skill | Rating |
|---|---|
| Electrical trades | ● |
| Machinery operations | ● |
| Mechanical and fabrication skills (welders, boilermakers, fitters) | ● |
| Field, civil and science technicians | ● |
| Engineering (electrical, civil, mechanical, chemical, software) | ● |
| Data analysis / IT administrator and analyst | ● |
| Environmental science | ● |
| Soft skills (strategy and planning, community engagement) | ● |
| Workplace health and safety | ● |
| Commercial/financial analysis | ● |
| Pumped hydro development and operations | ● |

**KEY** ● High alignment to METS ● Moderate alignment to METS ● Limited alignment to METS

> THERE ARE LOTS OF PROPONENTS IN THE RENEWABLES SPACE – WE NEED GREATER COLLABORATION.

## Summary of regional skills strengths and gaps

Given the scope, scale, and diversity of the renewables energy sector, there are a broad range of skills required going forward. METS businesses (themselves extremely diverse) possess a range of these skills, meaning there is likely a high degree of transferability to the renewable energy sector. Potential gaps include specific services and skills within the electrical trades that may require further training/upskilling amongst the existing electrical trades workforce, including in relation to the electrical commissioning and substation isolation and installation, as well as installing and maintaining grid-scale energy storage systems. If the Pioneer-Burdekin PHES proceeds, this will require specialist skills/experience not currently widely available in the region.

# THE ACTION PLAN

| PLAN | THEME | ACTIONS |
|---|---|---|
| **GAP / CHALLENGES:** METS businesses tend to view their potential involvement in the renewable sector as being limited to the operations and maintenance phase of projects.<br>**DESCRIPTION:** METS businesses are waiting for a critical mass of operational renewable assets before engaging with the sector in any meaningful way. Given the long lead times for feasibility, design and construction activities, significant involvement in this sector is not viewed as a priority in the short term.<br>**STRATEGY:** Raise awareness of the broad array of opportunities available to METS businesses across the renewables value chain in coming years. |  | Collate and articulate the pipeline of renewable projects across the State, particularly those in close proximity to the Greater Whitsunday region, including identifying skills and expertise requirements relevant to METS businesses. Develop mechanisms for communicating this data to the METS sector. |
| **GAP / CHALLENGES:** METS businesses have limited awareness of opportunities available in the construction phase of major hydro and transmission projects.<br>**DESCRIPTION:** Transmission and pumped hydro projects will require substantial earthmoving and related services (e.g. tunneling, fabrication), with many of these opportunities not currently well understood by METS businesses. In addition to public projects such as Copperstring 2.0, there will be requirements for extensive transmission infrastructure for privately developed renewable projects that require connection to the grid. In addition, there are potentially sizeable opportunities associated with the Pioneer-Burdekin PHES (noting this project is still in early investigation stages).<br>**STRATEGY:** Provide METS businesses with a clear understanding of skills requirements for transmission and pumped hydro projects. |  | Identify and define the skills requirements and gaps for pumped hydro and transmission projects in Queensland, implement actions to prepare the Greater Whitsunday region and METS businesses more specifically for opportunities associated with these projects. |
| **GAP / CHALLENGES:** The renewable energy sector will require specialised electrical trades skills and services not currently widely available.<br>**DESCRIPTION:** While the Greater Whitsunday region has a high degree of specialisation in electrical trades, the renewables sector will require specialised services such as electrical commissioning and substation isolation and installation and installing and maintaining grid-scale energy storage systems. These specialist skills are not currently widely available.<br>**STRATEGY:** Equip METS businesses to meet the skills demands of the renewables sector. |  | Work with relevant stakeholders to identify and articulate specific skills gap requirement that need to be actioned for the renewables sector, specifically in relation to electrical services, and explore options for the future provision of these skills.<br>Encourage METS businesses to take up reskilling/upskilling opportunities for their workforces to better position them to provide services to the renewables sector. |
| **GAP / CHALLENGES:** Opportunities to domestically manufacture components for renewable assets are not currently being explored in detail<br>**DESCRIPTION:** Renewable energy project proponents engaged with as part of the strategy consider there to be significant opportunities available to METS businesses to use their skills and capabilities to manufacture and supply components (e.g. wind towers, nacelles and blades, and solar PV modules and racks). However, establishing and scaling up local manufacturing capability to supply these components presents a broad array of challenges, particularly in relation to high costs relative to other countries with established capability and a lack of certainty around the extent to which project proponents will procure locally from newer/less established businesses rather than established international supply chains. | **STRATEGY:** Broaden supply opportunities for METS businesses through procurement processes. |  | Engage with renewable proponents to advocate for the establishment of procurement processes that provide opportunities for local (particularly smaller) businesses (e.g. breaking down contract packages into smaller components that allows local/ small businesses to tender). Concurrently advocate for changes to Government local procurement policies to more heavily favour local manufacturing. |
| | **STRATEGY:** Support broader regional and Government ambitions to grow advanced manufacturing capability. |  | Support initiatives that ensure the continued support for manufacturers to transition to advanced manufacturing and progress opportunities to connect big data and analytics with robotics and automation, improving productivity, profitability and operations. |

**Legend**

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## CASE STUDY.

### Pumped hydro in the Greater Whitsunday region

The Greater Whitsunday region is receiving billions in investment to develop pumped hydro energy storage (PHES) projects over the next decade. The two major projects that are currently in the planning stage are completing work to map and understand the skills needed in the region and how adjacent industries like METS may be able to support the development of clean energy.

These projects are summarised below.

#### CAPRICORNIA ENERGY HUB (CEH)

Copenhagen Infrastructure Partner's 1,400 megawatt (MW) CEH project, located 80km west of Mackay near the existing Eungella Dam comprises of PHES, wind and solar assets. The $2.5bn PHES project features a 750MW pump/generation facility which is expected to commence construction after 2025. The project is envisaged to create approximately 600 jobs during construction and 65 regional jobs during operations.[1]

#### PIONEER-BURDEKIN PUMPED HYDRO

Queensland Hydro's proposed 5,000MW Pioneer-Burdekin PHES project 75km west of Mackay in the Pioneer Valley would, if developed be the largest project of its kind in the world. The project will support over 3,000 jobs with delivery planned by 2035.[2] In February 2024, the Queensland Government estimated that the project costs will be higher than the initial forecasts of $12bn.[3]

## CASE STUDY.

### Linked Group Services diversification journey

Linked Group Services in Paget started in 2010 as a company providing electrical contractors to mining companies across Australia. Linked Group Services has successfully diversified into providing commercial solar energy solutions across Australia with a focus on mining, agriculture, industrial, commercial and government sectors.

Linked Group Services locally manufactures a range of products including solar carport solutions, portable solar generators, portable buildings and pipeline monitoring systems. The EcoG3N and EcoSkid portable solar generators which offer a cost-effective alternative to diesel generators are assisting the mining sector to decarbonise.[4]

# BIOENERGY

Global demand for alternative energy sources has been accelerated by joint government and industry initiatives to decarbonise and leverage renewable resources.

Queensland has been producing bioenergy for decades, with significant projects already underway in the Greater Whitsunday region.

This history means the region is well-positioned to take advantage of the new wave of growth in emerging industries such as sustainable aviation fuel and renewable diesel production.

**$726bn***

**Forecast value of the global bioenergy market in 2050 under net zero scenario[1]**

**$10bn**

**Potential GDP contribution of the bioenergy sector to Australia's economy by the 2030s[2]**

* USD currency figures converted using average 3-year exchange rate from May 2021 to April 2024 (source: Reserve Bank of Australia exchange rates historical data)

## SIZE OF THE OPPORTUNITY

- The global bioenergy market is forecast to grow significantly in coming years, with market size forecast to increase from $63bn to $181bn by 2050 under a base case scenario, and as high as $726bn under a net zero scenario.*[1]
- The growth opportunity in bioenergy lies in the electrification for heavy industry. While electrification (combined with battery storage) will help to decarbonise a range of existing industries and activities, sectors such as aviation and shipping have stringent performance requirements that can't be met by batteries.[1]
- In Australia, significant growth in the sector is forecast, with the potential for additional GDP contribution of $10 billion per year and 26,200 new jobs by the early 2030s.[2]
- In particular, the Sustainable Aviation Fuels (SAF) sector presents significant opportunities for Australia and Queensland more specifically. The Queensland Government notes that an Australian SAF industry could be worth $3 billion annually and create up to 15,600 jobs nationwide by 2050.[3]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- Since the release of Queensland Government's *Biofutures 10-Year Roadmap and Action Plan 2016 – 2026* the State has repeatedly committed to the Greater Whitsunday region as being key to unleashing Queensland's biofutures potential.[4,5]
- The 907-hectare Mackay State Development Area (SDA) was declared in February 2024 across the Racecourse Mill and Rosella sites. It was established by the Queensland Government to provide a unique opportunity to diversify economy-boosting industrial development in the Mackay region, including renewable energy and becoming *"Queensland's home of an emerging biocommodity industry."* [6]
- The bioenergy sector is well-established in the Greater Whitsunday region (particular bioethanol production) given its close proximity to a range of feedstock sources, including waste and byproducts from the sugar manufacturing process as well as grains, oil seeds, tallow, aquaculture waste and algae.
- As further explained in the case studies on the following pages, there are a range of established facilities and service providers based in the region including the Wilmar Biorefinery (which is the largest sugarcane-to-ethanol producer in Australia[7] and the Mackay Renewable Biocommodities Pilot Plant which is going through a $16m upgrade courtesy of co-investment from the State and Federal Governments.[8,9]

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- Many METS businesses already service the bioenergy sector. Stakeholders engaged as part of the diversification strategy development noted that they currently service the sugar sector to some degree, however there was perceived to be inadequate demand currently to justify investments in new equipment or technology specific to bioenergy.
- The increasing demand for products such as sustainable aviation fuel offers a stable long-term workflow, although feedstock could become a barrier as volume increases along with land availability.

## Future skills requirements for the sector

Given the broad nature of activities undertaken in the bioenergy sector, there will be similarly extensive requirements for the underlying workforce needed to build the industry.

Unlike traditional energy production sectors, bioenergy is not limited to energy production. As the industry requires biomass feedstocks, and produces a range of byproducts with potential uses, a range of different jobs will exist along the value chain, with vastly differing skills requirements.[1]

### GENERAL BIOENERGY SECTOR SKILL REQUIREMENTS

An analysis of future workforce requirements for the sector noted a broad range of occupations and skills are required across the sector, spanning a range of roles and skill levels.

This includes requirements across initial project development, construction and commissioning, biomass production and operations and maintenance. Specific skills requirements include those possessed by scientists (across a range of sub-disciplines), engineers, technicians, construction trades and electrical trades.

### SUSTAINABLE AVIATION FUELS SKILL REQUIREMENTS

The SAF industry (a sub-sector off the broader bioenergy sector), being relatively early on in its development, has immediate skills requirements focused around project planning and construction activities. These include construction and electrical trades, metal workers and assemblers and engineers.

As the sector moves into the operations and maintenance phase, the required skills will change, moving more towards processing and handling of inputs, machinery maintenance and repair (e.g. industrial machinery and mobile equipment mechanics) and production occupations (e.g. welders, boilermakers, plant operators etc).

## Alignment of future skills requirements to the METS sector[1,2,3]

| Skill | Rating |
|---|---|
| Microbiology and biochemistry | 🔴 |
| Agricultural and chemical science | 🔴 |
| Mechanical and fabrication skills (welders, boilermakers, fitters) | 🟢 |
| Electrical trades | 🟢 |
| Engineering (chemical, mechanical, biological, electrical) | 🟡 |
| Manufacturing and laboratory technicians | 🟡 |
| Transportation and logistics | 🟡 |
| Biomass production and management | 🔴 |
| Maintenance/repair of machinery and equipment | 🟢 |

**KEY** 🟢 High alignment to METS 🟡 Moderate alignment to METS 🔴 Limited alignment to METS

> THROUGH BIOENERGY WE HAVE BEEN PRODUCING RENEWABLE ENERGY OVER MANY DECADES

## Summary of regional skills strengths and gaps

The ability of METS businesses to provide services into the bioenergy sector is varied, reflecting the highly varied nature of services required by the industry itself. Opportunities are likely to centre on skills related to the construction of new bioenergy facilities (e.g. mechanical and fabrication skills and electrical trades) as well as the ongoing operations, maintenance and repairs of facilities, as this is where METS businesses have existing strengths that are highly transferrable to the sector.

While METS businesses have key strengths in science/technician/engineering services, they are more narrowly focused on servicing the mining sector, with a degree of re-skilling likely required to transfer skills and experience into bioenergy. Skills that are more niche and specific to bioenergy such as microbiology and biochemistry, agricultural science and biomass production/management are not currently widely held by METS businesses, requiring a degree of reskilling if these opportunities were to be pursued.

# THE ACTION PLAN

| PLAN | THEME | ACTIONS |
|---|---|---|
| **GAP / CHALLENGES:** METS stakeholders viewed bioenergy through the lens of competition with agriculture for feedstock.<br>**DESCRIPTION:** To the extent that METS businesses were aware of the bioenergy sector and potential future opportunities, this was focused on traditional sources of biomass for energy production, particularly sugar. Stakeholders perceived that growth in the bioenergy sector would result in increased competition with agriculture for feedstock. This pointed to a limited awareness of more contemporary bioenergy projects/processes that use by-products of food production/processing and don't result in competition with the agriculture sector.<br>**STRATEGY:** Enhance awareness and understanding amongst METS businesses of contemporary bioenergy opportunities. |  | Develop tools and strategies to deliver key information around bioenergy opportunities to METS businesses. |
| **GAP / CHALLENGES:** METS stakeholders generally have limited understanding of future demand for biofuels and recent trends/ developments in the sector.<br>**DESCRIPTION:** While METS stakeholders had a strong understanding of traditional bioenergy activities, particularly regarding the use of sugar for ethanol production, insight and understanding regarding more recent developments in the industry were much less mature. Major drivers that are likely to underpin future demand for biofuels (particularly for heavy industry activities such as aviation and shipping where electrification will be highly challenging) were not well understood, nor the associated opportunities (e.g. commitments to increase SAF capabilities/demand by Government and airlines).<br>**STRATEGY:** Facilitate engagement between METS businesses and Sustainable Aviation Fuel (SAF) and biofuels proponents to address needs and foster partnerships. |  | Work with key stakeholders to understand the needs and demands for SAF and other biofuels and articulate these to METS businesses. |
| **GAP / CHALLENGES:** Bioenergy tends to be associated with the agriculture sector, which is not currently perceived by the METS sector to be a source of profitability.<br>**DESCRIPTION:** The close association that METS businesses make between bioenergy and agriculture (particularly given the long-standing use of sugar to produce ethanol in the region) creates a perception issue around the expected profitability of servicing the sector in future (given the profitability of agriculture tends to be seen as limited).<br>**STRATEGY:** Promote the commercial viability of bioenergy opportunities. |  | Identify and promote successful local case studies demonstrating the commercial viability of bioenergy opportunities that can be built on in the future. |
| **GAP / CHALLENGES:** The skills requirements for the bioenergy sector are broad, spanning a range of services activities, with METS businesses only aligned to some of these.<br>**DESCRIPTION:** Given the broad nature of skills requirements in the bioenergy sector (spanning project development, construction and commissioning, biomass production/management and operations and maintenance), METS businesses will likely only be involved in certain parts of the value chain (particularly construction and O&M).<br>**STRATEGY:** Communicate bioenergy sector opportunities to METS businesses, adapting to emerging trends and changes in the value chain. |  | Continue to monitor and communicate bioenergy sector opportunities across the value chain to METS businesses as they emerge and evolve. |

Legend


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## CASE STUDY.

### Wilmar Sugar integrated biorefinery precinct in Sarina

Wilmar Sugar through their Sarina Distillery is Australia's leading producer of ethanol from sugarcane sources. It produces approximately 60 million litres of ethanol annually, the majority of which is used as vehicle fuel. The remainder is further refined interstate for application across a range of uses including cosmetics, industrial chemicals, medical products, food and beverages, paint and surface coatings.[3]

Photo courtesy of Wilmar Sugar and Renewables

## CASE STUDY.

### Mackay QUT Renewable Biocommodities Pilot Plant and Racecourse Cogeneration Plant at Racecourse Mill

The Mackay Queensland University of Technology (QUT) Renewable Biocommodities Pilot Plant located at Nordzucker Mackay Sugar Limited's Racecourse Mill, is a unique research and development facility that converts biomass into biofuels, green chemicals and other bioproducts. The plant can develop and demonstrate a wide range of technologies at pilot scale and is available for use by industry and research partners. For example, the plant is currently being used for the Mercurius Rising Pilot Project to use its patented REACH™ technology to convert a range of feedstocks into renewable drop-in fuels and chemicals for industrial plastics.[1]

The Racecourse Mill also hosts the Racecourse Cogeneration Plant which produces enough renewable energy to power approximately 30 per cent of Mackay through the use of the sugar milling biproduct bagasse as fuel.[2]

# BIO MANUFACTURING

Biomanufacturing refers to the use of precision fermentation, synthetic biology and industrial biotechnology to produce a diverse range of products including food ingredients, chemicals, pharmaceuticals and alternative proteins.

Precision fermentation is of particular interest in the Greater Whitsunday region currently, with investigations underway to explore the feasibility of scaling this technology commercially (similar processes have been used globally for several decades to make products such as insulin and rennet).

**$700bn**

**Forecast size of global biomanufacturing market in 2040[1]**

**$30bn**

**Potential annual Australian revenue opportunity by 2040[2]**

## SIZE OF THE OPPORTUNITY

- The global biomanufacturing market is forecast to grow from $11.8bn in 2021 to over $700bn by 2040.[1]
- Between 2021 and 2023 Australia attracted over $363m in private capital for biomanufacturing companies, with 80% of these investments going towards agriculture and food companies.[2]
- Looking to the future, Australia's biomanufacturing sector has the potential to generate significant value for Australia's economy, with forecast revenue of $29bn annually and 50,000 new jobs by 2040.[2]
- The Queensland Government considers the State to be ideally placed to become the Asia-Pacific hub for the biomanufacturing of future foods and bioproducts, forecasting that the sector could contribute over $4bn to gross state product by 2035.[3]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- The State has committed over $1m in funding to support the development of a business case to attract organisations to co-develop a $300m Future Food Biohub in the Mackay SDA.[4] The industry-led Biohub will provide the anchor infrastructure to catalyse a commercial-scale industry that uses advanced biomanufacturing to produce innovative food products.
- The $16m expansion of the QUT Mackay Renewable Biocommodities Pilot Plant (planned for completion in late 2024) is supported by the Queensland Government's Industry Partnership Program, the Australian Government, the Food and Beverage Accelerator, and QUT.[5,6] The upgrades will make the Pilot Plant Australia's only facility capable of demonstrating synthetic biology processes at full scale, providing a hub for innovation and fast-tracking food and beverage development.
- The Greater Whitsunday region's investment attraction for biomanufacturing companies is enhanced by the opportunity to co-locate with the region's abundant and diverse feedstock profile, led largely by the sugar industry.

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- Biomanufacturing stakeholders engaged as part of the diversification strategy development suggested the industry offers strong alignment with the capabilities of the METS sector, especially in manufacturing and fabrication. The seasonality associated with the agriculture sector (which has historically been a deterrent for METS businesses) is less pronounced in biomanufacturing.
- Cauldron Ferm, which is developing a large-scale fermentation facility in Mackay as part of the Future Food Biohub project, have publicly stated that the strong alignment of skills in the mining and METS sector were a large factor in its decision to consider investment in a facility in Mackay.[7]

## Future skills requirements for the sector

There are multiple applications of biomanufacturing to produce products which include food, pharmaceuticals, chemicals, enzymes and alternative proteins. Biomanufacturing processes can also be applied to repurpose industrial waste streams. Considering Mackay is the proposed site for a $300m Future Foods BioHub and Cauldron Ferm's plant[1] the skills requirements in region will likely centre around food and related products.

### GENERAL SKILL REQUIREMENTS

Considering the emerging nature of the industry on a commercial scale in Australia, particularly in relation to food applications, work is continuing to understand future skills requirements in detail. Based on input from subject matter experts engaged as part of the strategy development, and in reviewing relevant literature, there a range of skills that will likely be required for the biomanufacturing sector to achieve scale and commerciality in the Greater Whitsunday region, including:

- Microbiology, food science and chemistry skills to optimise the feedstock for production
- Bioprocessing engineering applied to biological systems
- Engineering, design and fabrication of the fermentation vessels and general plant
- Operations and maintenance of the fermenting machinery and equipment with a particular focus on predictive maintenance
- Understanding of overseas markets and demand for products
- Services to monitor the operations and output of the manufacturing process including quality control, product testing and compositional sensing
- The complex nature of the manufacturing process also lends itself to robotics and automation technologies.

## Alignment of future skills requirements to the METS sector[2,3,4]

| Skill | Rating |
|---|---|
| Microbiology and biochemistry | 🔴 |
| Bioprocess engineering and fermenting technology | 🔴 |
| Moisture and compositional sensing technology | 🟢 |
| Food safety and regulatory compliance | 🟡 |
| Lab technicians and process operators | 🟡 |
| Predictive maintenance | 🟢 |
| Manufacture of fermentation vessels | 🟢 |
| Maintenance/repair of machinery and equipment | 🟢 |
| Quality control and product testing | 🟡 |
| Industrial cleaning | 🟢 |
| Robotics and automation | 🔴 |

KEY 🟢 High alignment to METS 🟡 Moderate alignment to METS 🔴 Limited alignment to METS

> THE SAME SKILL SETS ARE REQUIRED FOR TANKS FOR MINING AND BREWING [FERMENTATION]

## Summary of regional skills strengths and gaps

There is immense scope for the METS sector to utilise and apply existing experience, knowledge and skills related to manufacturing, fabrication and maintenance to the biomanufacturing sector in future.

The strong history of METS businesses servicing agriculture and ethanol production also provides a head start in terms of the capabilities required. To best capitalise on the opportunity, there is a need for food safe practices to be implemented by METS businesses, as well as upskilling around microbiology, biochemistry, bioprocess engineering, fermentation processes and operating in controlled environments.

# THE ACTION PLAN

| PLAN | THEME | ACTIONS |
|---|---|---|
| **GAP / CHALLENGES:** METS companies do not yet have food grade certification and equipment.<br>**DESCRIPTION:** Many METS companies don't yet have the food grade certifications required to operate within the sector. Although the capability requirements are similar (e.g. fabrication), the equipment used to service mining products in most cases cannot be used for food applications until the requisite certifications are obtained.<br>**STRATEGY:** Support METS businesses to attain food grade certifications required to supply sector. |  | Identify food grade skills requirements and work with key stakeholders to activate avenues to streamline and address skills gaps. |
| **GAP / CHALLENGES:** There is limited technical understanding of biomanufacturing processes.<br>**DESCRIPTION:** The biomanufacturing sector, particularly for food applications, is in its infancy in Australia. This suggests a generally limited level of understanding around the related technical concepts such as microbiology, biochemistry, bioprocess engineering and precision fermentation beyond those directly involved in the sector. This in turn limits the ability to understand where opportunities lie to provide products and services in future.<br>**STRATEGY:** Provide METS businesses with detailed understanding of the skills requirements of and existing skills alignment with the biomanufacturing sector. |  | Map specific skills needs and gaps and explore skilling solutions including micro credentialling and transferable skills pathways with key stakeholders including TAFE and universities.<br><br>Leverage expertise and specialised knowledge of industry, universities and TAFE to develop customised training modules tailored to the needs of METS businesses aiming to diversify into the biomanufacturing sector. |
| **GAP / CHALLENGES:** There is a knowledge gap in biomanufacturing specific process operations skills.<br>**DESCRIPTION:** Although the industry is knowledge-intensive and requires advanced scientific skills, subject matter experts have noted that the number of employees required in process operations will outnumber scientists by several times. METS businesses have strong capabilities in optimising mining operations, but there is a gap in knowledge as to how these capabilities can be transferred to the biomanufacturing context.<br>**STRATEGY:** Improve METS sector awareness and understanding of opportunities to supply biomanufacturing projects. |  | Facilitate opportunities to increase METS understanding of biomanufacturing processes and alignment to the sector. |

**Legend**

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## CASE STUDY.

### Cauldron and Queensland Government's partnership to build the Future Foods Biohub

Cauldron plans to build the Asia-Pacific region's largest network of precision fermentation facilities.

In Mackay it has partnered with the Queensland Government which has contributed $528,000 towards the development a business case for the construction of a $300m world-leading Future Foods Biohub. This facility will catalyse a commercial-scale biomanufacturing industry in the region and support the growth of Mackay's sugar industry.[1]

A key factor in Cauldron's decision to invest in Mackay was the strong mining and METS capability in the region which was identified as particularly advantageous for biomanufacturing applications.[2] Cauldron is currently mapping the skills and service requirements their future operations with a focus on understanding how regional strengths can be optimally leveraged.

# CIRCULAR ECONOMY

The need to reduce the volume of waste destined for landfill has increasingly become an important community expectation in recent years.

This has spurred a change in the approach towards waste management, from a linear take-make-waste model to a circular model. This model aims to circulate products and materials at their highest value for the maximal time, with an end goal of designing waste out of the system. The Queensland Government has ambitions for the State to become a zero-waste society, where waste is avoided, reused and recycled to the greatest possible extent.

**$6.5tn+***

**of value could be unlocked by 2030 through a circular economy approach[1]**

**$700bn+**

**in economic benefits by 2040 for Qld if circular models are implemented[2]**

* USD currency figures converted using average 3-year exchange rate from May 2021 to April 2024 (source: Reserve Bank of Australia exchange rates historical data)

## SIZE OF THE OPPORTUNITY

- The global revenue from circular economy transactions in 2022 was estimated at over $490bn.*[3]
- Looking ahead, a circular economy could unlock $6.5tn of value globally by 2030, surging to $36tn by 2050.*[1]
- If circular economy models are adopted, it is estimated that over two decades, $1.8tn in direct economic benefits could accrue to Australia, with over $700bn to Queensland. It could also save over 165 million tonnes of CO2 per year by 2040.[2]
- Australia's circularity rate has increased slightly from 3.5% in 2015 to 4% in 2023, which is at half the global average, suggesting Australia has significant untapped potential.[4]
- A key circular practice applicable to mining which involves the reprocessing of mining tailings is estimated to be extremely valuable representing a $4.9tn opportunity globally.*[5]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- The Greater Whitsunday region features broad and integrated value chains for key industries such as mining and agriculture. The likelihood of commercial success when implementing circular solutions is linked to the ability to understand the entire lifecycle of a product, as well as to understand the circular transition needs of large businesses.
- The implementation in the Greater Whitsunday region of the $4m Queensland Circular Economy (Industry-Research) Program (through the Resources Centre of Excellence) seeks to support the development of business solutions using circular economy principles. This demonstrates the Government's commitment to realising regional growth in the circular economy.[6]
- There are substantial opportunities in the Greater Whitsunday region for rethinking how waste products can be eliminated or recovered and retained in use within the mining sector. For example, the Greater Whitsunday region is one of the highest off-road tyre generating regions in the country. This presents opportunities to provide new service offerings to extend their useful life or develop new uses for discarded tyres.[7,8]

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- Currently, METS businesses are proactively engaging in initiatives to rethink, reuse, repair, repurpose and recycle.[9] Many METS businesses are adopting circular initiatives internally for cost savings or efficiency gains, indicating significant opportunity for the METS sector to offer circular products and services to the market.
- METS businesses in the region take great pride in providing products that are manufactured to be repaired and refurbished, with a particular strength in preventative maintenance. Some businesses have innovated further to integrate technology, creating robust solutions.
- The METS sector has a broad perspective across mining value chains and can leverage this knowledge and capability to add value through repurposing or replacing materials with more sustainable options.

## Future skills requirements for the sector

Circular economy principles can be applied across a broad array of products and services. The successful commercialisation of circular economy ideas is contingent on a deep understanding of the industry, market demand and cost factors. Due to the breadth of circular economy opportunities in product and business model design, the following evaluation is limited to applications with alignment to the METS sector.

### PRODUCTS AS A SERVICE (PAAS)

PaaS is a model where products are offered as part of a subscription model, accompanied by services aimed at maximising the useful life of the product and incentivising product repurposing. PaaS can be implemented in a variety of ways including guaranteeing certain outcomes, or directly specifying the maintenance schedule for a product. METS businesses already specialise in providing services such as proactive and predictive maintenance to the sector that ensures equipment runs optimally and product life is extended.[1]

### DESIGNING OUT WASTE

Analysis of data in a project led by the Resources Centre of Excellence indicates that 80% of a product's environmental impact is locked in during the initial design and manufacturing stages.[2] The opportunity to design out waste from the outset through circular product design[3] (design for disassembly/modularity) can be leveraged through the METS sector's advanced manufacturing capabilities and high degree of understanding of product componentry.

### REPURPOSING AND REFURBISHMENT OF WASTE PRODUCTS

Waste is produced in substantial quantities from various activities in the Greater Whitsunday region, which presents an opportunity for value creation through repurposing into high value products. In the mining and METS context there are opportunities to repurpose waste such as tailings, metal waste, plastic, chemicals, tyres and packaging. To leverage these opportunities a comprehensive understanding of the potential applications of the recovered materials in new products will be required, including skills in waste conversion assessment and material analysis.

## Alignment of future skills requirements to the METS sector[4,5]

| Skill | Rating |
|---|---|
| Lifecycle thinking skills | ● |
| Materials analysis | ● |
| Waste conversion assessment | ● |
| Waste/circularity regulation and compliance | ● |
| Repair/maintenance technicians | ● |
| Design for recovery and multiple use cycles | ● |
| Product manufacturing | ● |
| Business innovation and entrepreneurship | ● |
| Environmental engineering | ● |
| Supply chain and logistics management | ● |
| Value chain collaboration | ● |

KEY ● High alignment to METS ● Moderate alignment to METS ● Limited alignment to METS

> METS IS THE SECTOR THAT CAN CATALYSE THE CIRCULAR ECONOMY

## Summary of regional skills strengths and gaps

METS businesses possess entrepreneurial strengths and deep technical expertise in the industries they service, with a substantial interest in better understanding opportunities along the broader value chain. In combination, these capabilities align to key success factors in implementing of circular economy design principles and business models (i.e. circular products and services).

There are gaps in lifecycle thinking skills, which provide a more in depth understanding of the opportunities to eliminate waste and to keep products and materials in circulation at a high value. Limited site access, distance and logistical challenges also constrain the ability of METS businesses to identify opportunities to implement circular solutions in mines.

# THE ACTION PLAN

| PLAN | THEME | ACTIONS |
|---|---|---|
| **GAP / CHALLENGES:** There is a lack of circular system thinking skills within METS businesses, with many businesses focused on the bottom rungs of the 'R ladder' (recycle).<br>**DESCRIPTION:** The circular economy requires a holistic consideration of the lifecycle of products and materials. Whilst METS businesses possess a high degree of specialisation across various activities in the mining supply chain, applying circular economy principles will require different thinking that takes a broader view of the value chain across mining and broader industries.<br>**STRATEGY:** Support METS businesses to enhance their own skills and understanding regarding circular systems thinking and how their processes can be reimagined to their benefit. |  | Highlight regional findings around circular economy, communicate these with METS businesses and identify opportunities to increase lifecycle and circular thinking skills among METS businesses. |
| **GAP / CHALLENGES:** There is a limited understanding about downstream customer interest and demand for products as a service models and the value of circularity more broadly.<br>**DESCRIPTION:** Whilst METS businesses clearly have the capability to implement circular business models such as product as a service, greater user certainty is required around optimal implementation. While most businesses apply 'circularity' principles internally, however don't understand the broader value of providing this as an offering to the market.<br>**STRATEGY:** Raise awareness amongst METS businesses of opportunities associated with circular economy services/products. |  | Work with key stakeholders to identify demand for alternative business models aligned to circular economy principles, and connect METS businesses with avenues to further explore these opportunities for their business. |
| **GAP / CHALLENGES:** Stringent mine site control practices restrict some waste from mine sites being re-used and repurposed.<br>**DESCRIPTION:** METS businesses have indicated that their efforts to 'design out' waste from mine sites have encountered a number of operational and regulatory obstacles. This stems from stringent waste compliance standards that place tight restrictions on suppliers regarding intervening on site, and the returning of materials back to suppliers (e.g. pallets, protective film).<br>**STRATEGY:** Advocate for opportunities to adapt waste management regulations to allow for repurposing of waste. |  | Collaborate with key stakeholders to advocate for opportunities to adapt waste management regulations to enable the implementation of innovative repurposing strategies while upholding stringent environmental standards. |
| **GAP / CHALLENGES:** There are knowledge gaps about the potential uses of waste materials into alternative products.<br>**DESCRIPTION:** METS businesses have a limited understanding of the outputs/end uses that can be produced from waste materials, nor the value of diversifying into circular product and service offerings. Many METS businesses do not understand the regulation and compliance around waste management in the context of reuse and repurposing.<br>**STRATEGY:** Enhance understanding of potential uses of waste materials to create alternative products. |  | Partner with key stakeholders to link METS businesses with information about potential uses of waste materials to create alternative products through mechanisms such as case studies, reports and information sessions. |

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## CASE STUDY.

### Resources Centre of Excellence and BHP Mitsubishi Pit to Port program

The Resources Centre of Excellence has launched a pilot program with BHP Mitsubishi Alliance to understand the scope for integrating circular principles across the entire value chain.

This project is one of the first of its kind nationally and includes a comprehensive material flow analysis of all mining waste to identify impact hotspots and catalytic circular opportunities to drive positive environmental and commercial outcomes.

The qualitative and quantitative analysis conducted across the project will provide a robust framework for future actions including an overview of the scalable opportunities. Businesses will be supported in the following phase of the program to implement the recommendations.[1]

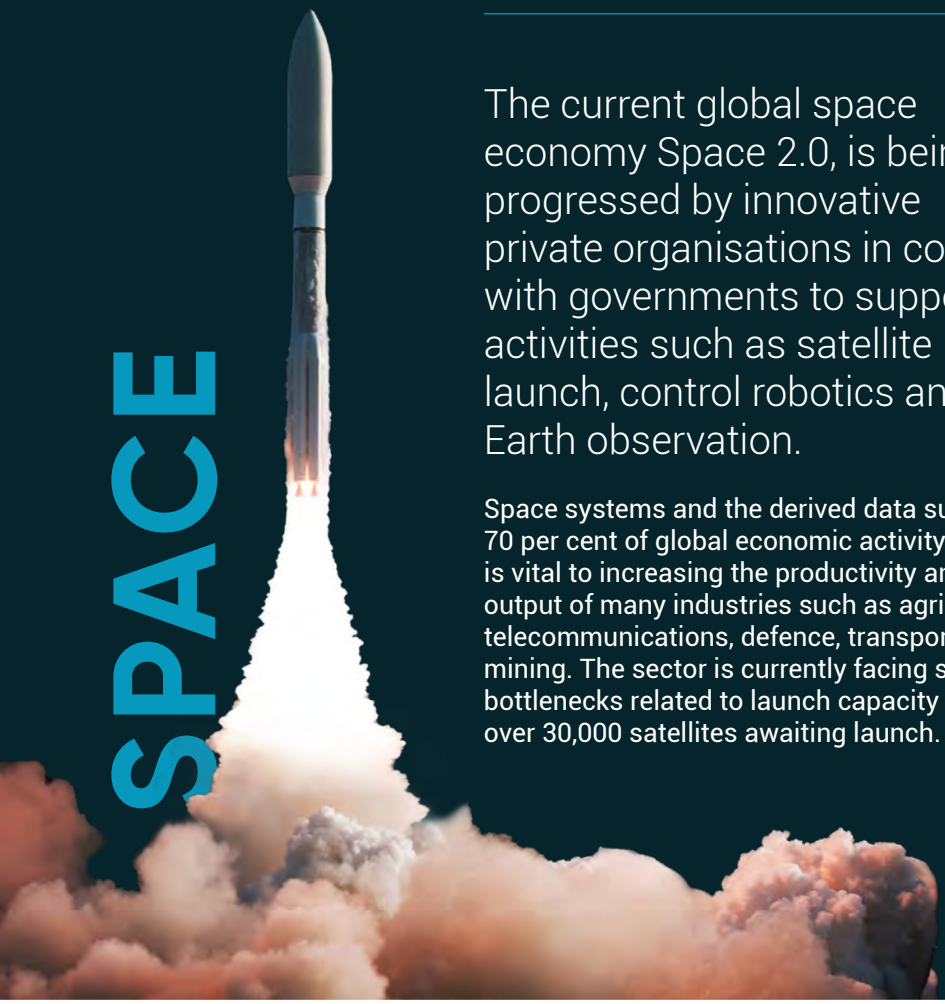
## CASE STUDY.

### Consolidated Engineering Plastics Products diversification journey

Consolidated Engineering Plastics Products was originally established in 1988 as a company that operated with a focus on providing high quality plastic, rubber and epoxy products.

The company has gradually broadened their offering to a range of services across fabrication, machining and material processing which are complemented by on-site services. Circular economy thinking has been implemented by the company in their approach towards repurposing offcuts from conveyor guards into a range of saleable products.[2]

# SPACE



The current global space economy Space 2.0, is being progressed by innovative private organisations in concert with governments to support activities such as satellite launch, control robotics and Earth observation.

Space systems and the derived data supports 70 per cent of global economic activity and is vital to increasing the productivity and output of many industries such as agriculture, telecommunications, defence, transport and mining. The sector is currently facing severe bottlenecks related to launch capacity with over 30,000 satellites awaiting launch.

**$2.6tn***

**is the estimated value of the global space economy by 2035[1]**

**50%**

**of the world's top 10 aerospace companies have a presence in Queensland[2]**

## SIZE OF THE OPPORTUNITY

- It is estimated that the global space economy will be worth $2.6tn by 2035, up from $915bn in 2023.*[1]
- In 2021, Australia's space industry generated $4.5bn in revenue. The Earth Observation sector directly contributed around A$2.5bn to the wider Australian economy in 2020 and Australia's satellite communications market is worth A$1.6bn a year.[3]
- There is approximately A$8bn in satellite programs currently planned for Australia.[3]
- The Australian Space Agency (ASA), established in July 2018, has an ambitious target to triple the size of Australia's space economy to $12bn per annum and create up to 20,000 additional jobs by 2030.[4]
- Queensland's space industry is estimated to have the potential to add between $3.5bn and $6bn annually to the State economy by 2036.[2]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- The Greater Whitsunday region's desirable location and renowned technical capability is attracting investment from space organisations.
- The Bowen area has been identified by the Queensland Government as being ideally suited for the space industry as per a series of technical and environmental criteria including:[5]
  - Location – close to the equator with the capability to launch multiple orbits
  - Population – area of lower population density
  - Activity – minimal activity on the ocean within close proximity to the launch site which prevents launch delays due to range encroachment
  - Existing infrastructure – deep sea port, long runway, proximity to a major hospital, and road and rail network
- The Bowen Orbital Spaceport which has been co-funded by the Australian and Queensland Governments and Gilmour Space was granted a launch facility licence in March 2024.[6] This makes it one of only three dedicated orbital launch sites globally.[7]

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- Many METS businesses expressed interest in the space sector as a future opportunity, however could not make a clear link between their existing capabilities and future requirements for the sector.
- A local space business noted that many products and skills associated with the METS sector are applicable to the sector, with the manufacturing services of some METS businesses already being procured. Currently, the sector is much smaller in scale (relative to mining) in the Greater Whitsunday region and carried high demands in terms of quality.

## Future skills requirements for the sector

The space sector is a strategic focus of the Federal Government. The ASA was established in 2018 to support the development of the industry. In its Civil Space Strategy it identified the need to build a future workforce as a key strategic pillar in developing this nascent industry.[1] The need to nurture STEM skills to align to the needs of the industry was identified as part of this strategy. The ASA also publishes the job roles, skills, knowledge and experience required in the space sector.[2]

Space sector stakeholders interviewed as part of the strategy development identified relevant transferable skills already available in the region, especially related to plant operations, filling systems and broader maintenance requirements.

The SmartSat Co-operative Research Centre released an analysis of the skills that would need to be developed to meet the expected demand for skills in the sector. This report identified that there are 319 skills that are required in the space industry and 310 of these were identified to be in shortage.[3] The report further identified three core categories of skills required in the Space industry manufacturing and core inputs, space operations and space applications.

### SPACE INDUSTRY MANUFACTURING

Space manufacturing compromises the building and integration of ground-based facilities and equipment that perform space-related activities. It also includes maintenance of these assets.

### SPACE OPERATIONS

This sector includes the management of objects in space and activities associated with using and managing satellites in space.

### SPACE APPLICATIONS

This skill category includes the use of space derived resources and services to value add to other areas of the economy. The report further identified the skills with a current and future "high intensity" shortage of skilled workers. This has informed the assessment of the alignment of METS skills to future aerospace needs.

## Alignment of future skills requirements to the METS sector[2,3,4]

| Skill | Rating |
|---|---|
| Manufacturing and heavy equipment maintenance | ● |
| Electrical trades | ● |
| Mechanical and fabrication skills (welders, boilermakers, fitters) | ● |
| Engineering (aerospace, avionics, mechatronics, electrical) | ● |
| Plant operations | ● |
| Data analysis / IT administrator and analyst | ● |
| Robotics and automation | ● |
| Transportation and logistics | ● |
| Assembly, production test technicians | ● |
| Space craft mechanism design (tribology, pyrotechnic, other) | ● |
| Crew habitation structures, meteoroid and debris shield design | ● |

KEY ● High alignment to METS ● Moderate alignment to METS ● Limited alignment to METS

> WE [THE SPACE SECTOR] WANT THE REGION TO GROW WITH US

## Summary of regional skills strengths and gaps

There exists notable synergy between current METS skills and those demanded by the space industry, especially within the realm of space operations. Skills such as spacecraft mechanism design, crew habitation structure, and debris shield design correlate well with various safety design tasks in the mining sector. A crucial aspect for METS businesses aiming to engage in this sector will be the enhancement of regulatory standards, including adherence to ISO standards.

# THE ACTION PLAN

| PLAN | THEME | ACTIONS |
|---|---|---|
| **GAP / CHALLENGES:** The space industry is seen as having limited demand for METS goods/ services in the short-term.<br>**DESCRIPTION:** Many METS businesses do not have a clear line of sight around how their capabilities could be utilised by the space sector, particularly in large-scale fabrication. METS businesses consider the current size of the market opportunity to be limited due to the relatively small number of launches planned in the short-term. There is a limited understanding of the supporting infrastructure and services required to maximise the potential of the Bowen Orbital Spaceport.<br>**STRATEGY:** Help METS businesses understand the array of opportunities associated with the region's space sector. |  | Develop stakeholder engagement plans and make tools available to connect local METS businesses to opportunities in the space sector. |
| **GAP / CHALLENGES:** Greater understanding is required of how METS specific competencies can be leveraged by the space sector.<br>**DESCRIPTION:** STEM skills and some safety design competencies in the mining sector have been identified as applicable to the needs of the space sector. Further understanding of the requirements to transition these skills effectively is needed.<br>**STRATEGY:** Improve METS businesses' understanding of up-skilling requirements to effectively service the space sector. |  | Identify the skills and qualifications necessary for enhancing existing METS sector capabilities to transfer these skills to effectively services the growing space sector, with particular attention to enhancing existing fabrication, STEM and safety capabilities. |
| **GAP / CHALLENGES:** There are gaps in certification and compliance.<br>**DESCRIPTION:** The higher regulatory standards and quality requirements of the space sector mean that METS businesses would have to complete resource-intensive international accreditations (e.g. ISO), which many METS businesses perceive as a barrier to enter this industry.<br>**STRATEGY:** Provide guidance to navigate procurement processes and accreditation pathways. |  | Enhance and promote the procurement requirements and opportunities to work in space sector.<br><br>Work with key stakeholders to map out a pathway for accreditation into the space industry modelled on the processes used to enter the defence supply chain. |

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## CASE STUDY.

### Valmar Engineering supplying Gilmour Space

Gilmour Space Technologies (Gilmour Space) is the largest Australian space launch vehicle manufacturer, and is the operator of the Bowen Orbital Spaceport.[1]

Valmar Engineering is a Greater Whitsunday-based company established in 2013 with significant experience in servicing the sugar production and mining sectors with piping and steel fabrication, installation services and fixed plant mechanical services.[2]

Since September 2023, Valmar has been engaged by Gilmour Space to fabricate the transport erector and associated components that will take the 30-tonne rocket from its horizontal position in the vehicle assembly workshop to a vertical position ready for launch pad at the Bowen Orbital Spaceport.[3]

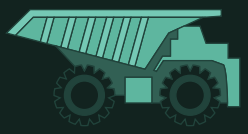
# POST-MINING LAND USE



Post-mining land use refers to the ways that previously mined sites can be repurposed after operations cease.

Examples of mine repurposing are diverse and include agriculture, industrial precincts and recreation.

Many of Queensland's operating mines are approaching the end of their productive life in the coming decades. Mine closure regulation in Queensland has historically focused on mine site rehabilitation and not incentivised the development of alternate land uses.



**$4-8bn**

**annual expenditure in mine closure activities by 2030[1]**

**2040**

**Peak Bowen Basin mine closure period[2]**

## SIZE OF THE OPPORTUNITY

- Worldwide, approximately 1,000 mines are expected to close over the decade to 2032.[3]
- Estimates of annual expenditure on mine closure and remediation activities in Australia between 2023 and 2040 range from $4bn to $8bn.[1]
- Peak mine closure periods in the Bowen Basin are expected to occur in 2040 and 2070.[2]
- The Australian market for environmental remediation technologies and services for mining, a subset of all mine rehabilitation solutions, was worth $800m in 2020 and is estimated to grow to $3bn by 2040.[4]

## RELEVANCE TO THE GREATER WHITSUNDAY REGION

- As decades-old mines close across the state (e.g. 2023 closure of Glencore's Newlands Coal mine near Glenden), there will be significant opportunities to transition to post-mining land uses that realise both commercially and environmentally beneficial outcomes.[5]
- The Queensland Government's Office of the Mine Rehabilitation Commissioner has completed a series of technical studies related to post-mining land use, largely concentrated on opportunities in the Bowen Basin.[6]
- In Queensland, grazing and native ecosystems are the most commonly identified post-mining land uses, though a range of broader alternative options are being identified that more closely align to region-specific contexts such as renewable energy and intensive agriculture.[7,8]
- Current best practice to ensure successful post-mining land use outcomes emphasises proactive action. This includes progressive rehabilitation, regular monitoring, and planning services during the mine's operational period. This highlights the opportunity in the Greater Whitsunday region to action post-mining land use planning while mines are still in operation.[9]

## DEGREE OF INDUSTRY ALIGNMENT WITH THE METS SECTOR

- Australia-wide, a quarter of METS business are already offering mine closure and remediation solutions, with many of these businesses located in the Greater Whitsunday region.[10]
- The METS sector is identified across a number of analyses and by subject matter experts as being central to enabling post-mining land use solutions due to the strong entrepreneurial and problem-solving capabilities of the sector.[11,12]
- Australian METS's businesses have high standards of environmental regulation and compliance, meaning they are well placed to deliver optimal mine closure outcomes not only locally, but also in international markets.[13]
- The 2023 Enviromets Queensland survey of post-mining land use stakeholders found that the three challenges considered the easiest to address were "lack of access to a skilled & capable workforce," "capabilities in environmental rehabilitation" and "available technical knowledge" – all areas of strengths for METS businesses.[12]

## Future skills requirements for the sector

Assessing future skills requirements for post-mining land use is difficult given the heterogeneity of potential future uses that can be considered following mine closure. Regulation in Queensland has historically mandated mine site rehabilitation approaches that offer limited incentives to explore and implement alternate land uses beyond grazing and native vegetation, meaning an understanding of skills requirements is largely informed by academic literature and broader national and international experience where more innovative approaches have been adopted.[1]


### GENERAL SKILLS REQUIREMENTS

The key skill requirements at the initial stages of mine closure involves analysis to determine the ideal alternative land use(s). This includes skills such as geological mapping, site assessment, soil analysis, as well as environmental and water management.

### ALTERNATE POST-MINING LAND USES

A list of alternate post-mining land uses that have potential for regional implementation have been showcased across various reports to illustrate the diverse range of applications and associated skills:[2,3,4]

- Agriculture and agroforestry
- Recreation and tourism
- Aquaculture and dams
- Renewable energy and storage
- Industrial parks and science precincts
- Regenerative cropping
- Protected horticulture
- Intensive livestock
- Waste processing/bioreactor
- Manufacturing

## Alignment of future skills requirements to the METS sector[5,6]

| Skill | Rating |
|---|---|
| Geological mapping and surveying, remote sensing | ● |
| Site assessment | ● |
| Safety and environmental compliance | ● |
| Ecological restoration and biodiversity conservation | ● |
| Soil analysis and amelioration | ● |
| Hydrology and water management | ● |
| Business innovation skills | ● |
| Environmental compliance and regulation | ● |
| Earthmoving | ● |
| Erosion and sediment control | ● |
| Assessment of alternate land use | ● |

KEY ● High alignment to METS ● Moderate alignment to METS ● Limited alignment to METS

> A KEY STRENGTH OF METS BUSINESSES [IN TERMS OF POST-MINING LAND USE] IS THEY CAN SEE PAST BARRIERS AND PROBLEM SOLVE

## Summary of regional skills strengths and gaps

Multiple reports and subject matter experts have consistently highlighted the pivotal role of the METS sector in facilitating post-mining land use solutions, attributing this to the sector's robust entrepreneurial spirit and adept problem-solving capabilities. Beyond the existing providers of mine closure solutions, it's crucial to ensure that the wider METS sector is informed about the prospects for innovation in the post-mining land use domain, especially through enhanced access to mine sites.

# THE ACTION PLAN

| PLAN | | THEME | ACTIONS |
|---|---|---|---|
| **GAP / CHALLENGES:** There is a lack of clarity amongst stakeholders regarding options and opportunities to use land following mine closure.<br>**DESCRIPTION:** There is a reluctance amongst stakeholders to explore potential post-mining land use projects beyond simply rehabilitating land back to its previous state. A contributing factor cited repeatedly by stakeholders related to a lack of clarity about which party (or parties) will carry the ongoing risk associated with post-mining uses. This acts as a key barrier for METS businesses seeking to develop and innovative post-mining land use solutions. | **STRATEGY:** Support regulatory arrangements that facilitate appropriate and beneficial land uses. |  | Continue to advocate for clear regulations that support economic diversification opportunities in post-mining land use. |
| | **STRATEGY:** Ensure METS businesses are aware of current post-mining land use opportunities. |  | Connect METS businesses to information that enables them to understand opportunities presented in new economic models for post-mining land-use and any relevant legislative compliance requirements. |
| **GAP / CHALLENGES:** There is a knowledge gap across most stakeholders in understanding the limitations and expectations when transitioning former mine sites.<br>**DESCRIPTION:** For METS businesses to be able to determine and realise the optimal post-mining land use for a given site, there must first be a clear understanding of the constraints that dictate the feasibility of the potential solutions. This requires technical input across multiple spheres including environmental, social and community stakeholders.<br>**STRATEGY:** Identify partnership opportunities to enhance the scale and scope of post-mining land use opportunities. | |  | Develop, in collaboration with Indigenous, community, research, government, investment and industry stakeholders, a regional strategic planning framework to guide potential post-mining land use-based activities in the region. This should identify potential scalable multi-site and site-specific post-mining land use options to provide direction to current mine operators when developing mine rehabilitation plans. |
| **GAP / CHALLENGES:** There is a challenge regarding scaling post-mining land uses efficiently and effectively to achieve commerciality.<br>**DESCRIPTION:** Stakeholders have noted the large scale of mine sites and the importance of being able to scale pilot processes/approaches in such a way that achieves commerciality. International experience indicates profit margins at the outset can be minimal, often requiring significant government support to expand, achieve scale, and drive down costs.<br>**STRATEGY:** Identify opportunities for government to support more innovative and beneficial post-mining solutions. | |  | Collaborate with stakeholders to propose options for targeted government incentive schemes to encourage innovative post-mining land use outcomes that take advantage of strategic assets created by mining activities. |

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## CASE STUDY.

### Veolia's Woodlawn Eco Precinct NSW

Veolia's 6,000 hectare Woodlawn Eco Precinct located east of Lake George, near Canberra comprises a range of renewable energy, industrial and agricultural operations on the site of the former Woodlawn zinc and copper mine.

The Eco Precinct includes a bioenergy plant which recovers clean energy from the landfill, a 48.3 MW windfarm, a 2.5 MW solar farm, along with agriculture, aquaculture and horticulture operations.[1]

# 05

# APPENDICES

# APPENDIX 1
# STAKEHOLDERS CONSULTED

## Almost 40 stakeholders were engaged to discuss their perceptions on diversification and decarbonisation in the Greater Whitsunday region.

Through a mix of individual interviews and group workshops, almost 40 stakeholders were consulted to discuss their perceptions on the barriers, enablers and skills required to diversify and decarbonise the METS sector.

### STATE AND LOCAL GOVERNMENT

- Queensland Government – Department of State Development and Infrastructure
- Queensland Government – Mackay Manufacturing Hub
- Mackay Regional Council
- Isaac Regional Council
- Whitsunday Regional Council

### METS BUSINESSES

- Real Time Instruments
- Forge Engineering
- DGH Engineering
- Quality Coating and Consultants
- Linked Group Services
- SC Group
- Bryan Industries
- SGG Enterprises
- 2Censor
- JCV Services
- JET Group
  - M2E Services
    - JPR Welding
      - Field Mining Services Group
        - TS Global

### ADJACENT SECTOR ORGANISATIONS

- Gilmour Space
- Sedgman
- Queensland Hydro
- North Queensland Bulk Ports Corporation
- Wilmar Sugar
- Cauldron
- enviroMETS Queensland
- Copenhagen Infrastructure Partners

### RESOURCES ORGANISATIONS

- Resources Centre of Excellence
- Mining3
- BHP
- C-Res

### INDUSTRY-LEVEL BODIES AND COMMITTEES

- Resource Industry Network
- Queensland Canegrowers Organisation
- Regional Development Australia
- Austmine
- Greater Whitsunday Biofutures Leaders Group
- Greater Whitsunday Decarbonisation Leaders Group

### ADVISORY FIRMS

- Coreo
- Aurecon

### EDUCATIONAL INSTITUTIONS

- Queensland University of Technology
- CQ University

# APPENDIX 2
# STAKEHOLDER INSIGHTS

A series of key themes emerged during stakeholder consultation, which can be categorised under the three key opportunity areas.

## OVERVIEW

In developing this strategy, a significant engagement exercise was undertaken with a range of stakeholders across government, industry bodies, METS sector participants, researchers and industry leaders in adjacent sectors. Through this engagement, a series of common themes emerged. These are described below under the three key opportunity areas for diversification that have been used to frame the strategy.

### 1 DIVERSIFYING INTO NEW INDUSTRIES

**1.1** Awareness and knowledge of diversification opportunities in adjacent sectors is low

**1.2** Attraction of talent is difficult, although many skills are applicable across sectors

### 2 INCREASING MOTIVATION TO DIVERSIFY

**2.1** Mining's future in the region is strong, making the case to diversify into emerging sectors difficult

**2.2** Transport and logistics are expensive and carbon-intensive

### 3 DECARBONISING BUSINESS OPERATIONS

**3.1** Many METS companies are decarbonising, although they are early in their journey to reduce scoped emissions

# 1.1 AWARENESS & KNOWLEDGE OF DIVERSIFICATION OPPORTUNITIES IN ADJACENT SECTORS IS LOW

- Most stakeholders don't understand potential new opportunities in adjacent industries and expect greater government incentivisation.
- When prompted, METS can see the opportunity to diversify but are constrained by limited capacity and capability in some areas.
- For those stakeholders that have experience in diversifying their operations, they have mostly been through necessity or reactive.
- Stakeholders from adjacent and growth sectors do see strong alignment with the skills, equipment and capabilities held by the METS sector. However, it was identified that there is a lack of initiatives to connect these adjacent and growth sectors with METS suppliers.
- Companies felt that the region has a strong reputation for quality products, entrepreneurship and problem-solving that can be readily applied to other industries.

> WE NEED TO FUTURE PROOF OURSELVES

> THE KNOWLEDGE BASE IS HERE, BUT THE IMPLEMENTATION SKILLS MIGHT NOT BE IN THE REGION YET

> THERE ARE LOTS OF TECHNICAL PEOPLE HERE – WE JUST NEED SOME CLEAR FOCUS ON OUR OBJECTIVE

> WE DON'T KNOW WHERE WE FIT IN

Photo courtesy of ANGLO AMERICAN MNM-Underground

# 1.2

# ATTRACTION OF TALENT IS DIFFICULT, ALTHOUGH MANY SKILLS ARE APPLICABLE ACROSS SECTORS

- Many METS businesses identified that they had the skills (TAFE and tertiary) needed in adjacent sectors but there was not enough talent available. It is noted that this is not unique to the region, but across the country.
- Many stakeholders reflected on the high wages paid by the mining sector, making it difficult to attract or retain talent in other sectors.
- Many stakeholders identified that many tasks in their business don't require skilled labour or apprentices and that greater on-site upskilling and training can be offered, particularly regarding standardised work processes.
- Automation and robotics are most appropriate in fabrication, although equipment is expensive with many companies having applied for or received government grants to take advantage of the opportunity. Most stakeholders also felt that the return on investment would take a long time to realise.
- When discussing automation (specifically in relation to automated welding), stakeholders noted that technology is developing faster than the government regulation and standards can keep pace with, making safety a key consideration and potential challenge.
- Some companies mentioned that technology is often proprietary, making standardised training across companies or systems a challenge.
- Common user infrastructure was referenced to overcome some of the cost barriers to new opportunities.

> OUR GROWTH IS LIMITED BY HOW MANY PEOPLE WE CAN HIRE

> PEOPLE ARE A LIMITING FACTOR FOR GROWTH

> WE NEED INCENTIVES TO GET PEOPLE ON THE JOURNEY AS COMPANIES DON'T SEE THE ADVANTAGE YET

> WE ARE IN A LABOUR DRAIN

# 2.1

# MINING'S FUTURE IN THE REGION IS STRONG, MAKING THE CASE TO DIVERSIFY INTO EMERGING INDUSTRIES DIFFICULT

- Almost all stakeholders reflected that the mining sector is thriving and that the workflow volume in other sectors is not perceived to be there to warrant diversification.
- Many companies are more likely to diversify if they have lived experience of mining cycles.
- With the requisite skills, many stakeholders reflected on diversifying their businesses into other regions, particularly to explore greater critical minerals exploration and processing.
- There is a view by some stakeholders that the large mining companies will lead METS decarbonisation efforts by mandating certain environmental requirements in their procurement processes. However, there is a concern from stakeholders that this approach may stymy innovation and become more a compliance exercise than a competitive advantage.
- Most METS businesses indicated they implemented decarbonisation initiatives only after they could clearly identify a direct financial benefit (e.g. minimising energy costs).

> DON'T KNOW ANY OTHER INDUSTRY WITH THE SAME DEMAND AS MINING

> A LOT OF BUSINESSES COULD TRANSITION OUT OF COAL BUT THE WORKFLOW IT GENERATES MAKES IT HARDER TO STEP AWAY FROM IT

> WE NEED INCENTIVES TO GET PEOPLE ON THE JOURNEY AS COMPANIES DON'T SEE THE ADVANTAGE YET

> MINING IS NEEDED TO DECARBONISE

# 2.2 TRANSPORT AND LOGISTICS ARE EXPENSIVE AND CARBON INTENSIVE

- Most companies freight materials by road (typically from Brisbane or Perth) due to cost savings and quicker timeframes.
- Many stakeholders reflected that they would be interested in shipping materials by sea but the timeframes are too long or they don't have adequate volume to make it financially viable.
- Currently, there is inadequate containerised shipping infrastructure or lay down facilities to service future growth and expansion in adjacent industries. However, it is acknowledged that planning is underway by North Queensland Bulk Ports to accommodate for increased containerisation and lay down facilities.
- There is a strong need and interest in electric vehicles (EVs), however greater charging infrastructure is needed in the region to enable greater usage. Additionally some stakeholders referenced that the technology isn't available with certain vehicles (specifically utes).
- Stakeholders mentioned that often materials on trains head to the mines empty and that greater consideration could be given to filling these (e.g. timber palettes) to improve circularity.

> FREIGHT IS DEARER THAN THE PRODUCT

> ANY DISTANCE OVER 5 HOURS AWAY CAN'T BE SERVICED BY AN EV

# 3.1

# MANY METS COMPANIES ARE ALREADY DECARBONISING THEIR OWN BUSINESSES, ALTHOUGH THEY ARE EARLY IN THEIR JOURNEY TO REDUCE SCOPED EMISSIONS

## CURRENT STEPS TOWARDS DECARBONISATION

Most stakeholders are proactively seeking to reduce their carbon footprint through replacing lights with LEDs, sky lights and solar panels. This is largely driven by operational savings and are in the early stages of the scope 1, 2 and 3 journey.

These are typically small in scale and impact. Examples include:

- Solar installations
- Energy efficient lighting, skylights
- Recycling materials where possible
- Electrifying operations where possible
- Electric vehicles
- Recycling and repairing materials

## BENEFITS

Advantages afforded by decarbonisation are noted by some and include:

- **Proactive risk management** - Stakeholders advised that lenders are increasingly considering exposure to narrow industry areas, further supporting the need for diversification.
- **Talent attraction** - As employees become more invested in the holistic offering of their workplace, businesses that are decarbonising increase their appeal to new job seekers.
- **Attractiveness to suppliers** - Procurement processes are beginning to give greater weight to decarbonisation processes. An increased focus on scope 3 emissions means this trend will continue.

## BARRIERS

A high-level overview of common concerns raised by businesses are profiled below:

- Companies in leased properties were limited in what they could do (i.e. install solar, lighting)
- Operational savings may only accrue over a longer period and are impacted by pipeline
- Electric vehicle charging infrastructure is limited, especially on the roads to the mines
- Most electric vehicles are not fit-for-purpose for utility requirements on mine sites.

# 06

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KEMPPI

GW3D
GREATER WHITSUNDAY ALLIANCE
MACKAY ► ISAAC ► WHITSUNDAY

RESOURCES CENTRE of EXCELLENCE

LOCAL BUYING FOUNDATION
AN INITIATIVE OF THE LOCAL BUYING PROGRAM

Queensland Government