

Investing in the Mackay Future Foods BioHub



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 **aurecon**

Content based on *Investing in Biofutures Projects in the Mackay Isaac Whitsunday Region*, produced by Aurecon (June 2019).



The Hon. Kate Jones MP Minister for State Development, Tourism and Innovation

The Queensland Government recognises the world around us is changing very quickly and that economic growth is tied to the prosperity of our regions. The challenges of COVID-19 has forced rapid change in many industries across the global community. Supply chain disruptions have highlighted the importance of local production – for food and other essential goods that support the health of communities.

Plant-based foods represent a significant opportunity to expand our bioeconomy and create jobs for Queenslanders, while also helping to feed the world.

The *Advance Queensland Biofutures 10-Year Roadmap and Action Plan* outlines the Queensland Government's vision to develop a sustainable and export oriented industrial biotechnology and bioproducts sector.

Global food security relies on the development and delivery of new biotechnologies to increase food production. Queensland has an abundance of natural resources which, combined with world-class scientists and research institutions, provides a platform to harness the emerging opportunities in Future Foods.

Establishing a Future Foods BioHub in Mackay, will position our regional cropping industries and manufacturers at the forefront of the food and agribusiness revolution. The Mackay Isaac Whitsunday region is traditionally strong in agriculture, horticulture and manufacturing. Coupled with its strategic ports providing access to market, the region can play a key role for Queensland in realising this opportunity.

I see great opportunity for the region to lead the way in the manufacture of future foods and bioproducts and to capitalise on this fast-emerging industry. Manufacturing products in region and selling them domestically and internationally supports the continued growth of the regional economy by creating new business opportunities, new jobs and new income streams for farmers.

I congratulate the region on their journey to capitalise on this opportunity and on their collaboration and market driven approach to attract further investment in Queensland.



Ms Julieanne Gilbert MP

Assistant Minister for Treasury

Member for Mackay

As Queensland's Assistant Minister for Treasury and the local Member for Mackay, I want to deliver sustainable, well paid local jobs and the emerging Biofutures and Future Foods industries are a great opportunity to do just that.

Our region is one of the fastest growing and most dynamic economies in Australia with industries delivering minerals, diverse agricultural products and tourism to the world. In fact, our region has grown to be now worth around \$24 billion to the Australian economy.

Mackay is the ideal location for a Future Foods BioHub which will focus on the production of alternative foods, protein products and plant extractives. Our region enjoys ready access to feedstocks, global markets and an emerging industrial biotechnology sector with local skills and technical services.

As both an Assistant Minister in the Queensland Government and Mackay's local representative, I can assure you that we have the vision and commitment that should encourage any investors in our biofutures sector.

I thank you for taking an interest in biofutures investment opportunities in the Mackay Isaac Whitsunday region, and I look forward to welcoming projects that develop from this initiative.

Mackay Future Foods BioHub

The Queensland Government is aiming to establish a Future Foods BioHub in Mackay, drawing on the existing agricultural strengths of the Mackay Isaac Whitsunday region to create new foods and enter new export markets. Led by industry, the Future Foods BioHub will use advanced biomanufacturing to create plant-based alternatives that are healthy, sustainable and generate local employment opportunities for the region.

The Mackay Future Foods BioHub contributes to the Queensland Government's vision to build a \$1 billion sustainable and export-oriented industrial biotechnology and bioproducts sector, attracting significant international investment and creating regional, high-value and knowledge-intensive jobs. Significant advances in Queensland's industrial biotechnology and bioproducts sectors have positioned the Queensland bioeconomy with the foundational capabilities and manufacturing strengths to deliver on the global market for future foods.

A region-based Future Foods BioHub

The Queensland Government commissioned an industrial land planning investigation in 2018, to evaluate suitable sites for an advanced biomanufacturing precinct based on infrastructure and other site suitability characteristics. This built upon preliminary work which recognises the potential value of co-locating a biofutures development with existing industrial infrastructure and established local supply chains including freight and logistics.

Several options in the Mackay Isaac Whitsunday region were identified:

- co-location with a meat processing facility
- location at a port facility with direct access to port facilities
- co-location with an existing sugar mill allowing direct access to feedstock, steam and power.

The advantages of the regional BioHub approach:

- centralised facilities to take advantage of existing infrastructure and energy
- potential energy parks (steam and power) to support multiple biomanufacturing facilities

- established local supply chains
- anchor stakeholders may provide access to infrastructure e.g. road, rail, electricity and water (for capex reductions) and receive payments for services
- sharing plant and equipment with new enterprises
- co-investment with industry to upgrade or expand existing infrastructure with an agreed investment payback period or lease of facilities arrangements.

The Mackay region is an economic powerhouse and one of the most naturally beautiful and resource-rich locations in Australia. The region's abundant feedstocks, available land for crops and industrial development, a thriving higher education sector and access to roads, rail and sea distributions channels make it an ideal location. Mackay's Future Foods BioHub will focus on the production of alternative foods, protein products and plant extractives



Resources

More information can be found here:

<http://www.statedevelopment.qld.gov.au/industry/priority-industries/biofutures/biofutures-queensland.html>

Trade and Investment Queensland (TIQ)

TIQ is the Queensland Government's dedicated global business agency, with a charter to help potential investors find and take advantage of the endless opportunities this great state offers.

TIQ's specialist investment team offers a range of business and investment services to interstate and international investors, including:

- providing detailed industry knowledge about business costs
- preparing business cases
- arranging site visits
- arranging introductions to industry and service providers
- liaising with government agencies
- researching market intelligence
- partnering with local councils, economic development agencies and private service providers to identify 'investment ready' projects.

Biofutures Queensland

Biofutures Queensland is the Queensland Government's business unit for biofutures industry support.

Biofutures Queensland works across the government, industry and research sectors to drive development, investment and research and development in industrial biotech and bioproducts.



Grant funding

The Queensland Government offers a range of funding for proponents looking to establish advanced biomanufacturing facilities in Queensland.

Find Queensland Government grants and assistance programs that may help your project here:
www.grants.services.qld.gov.au

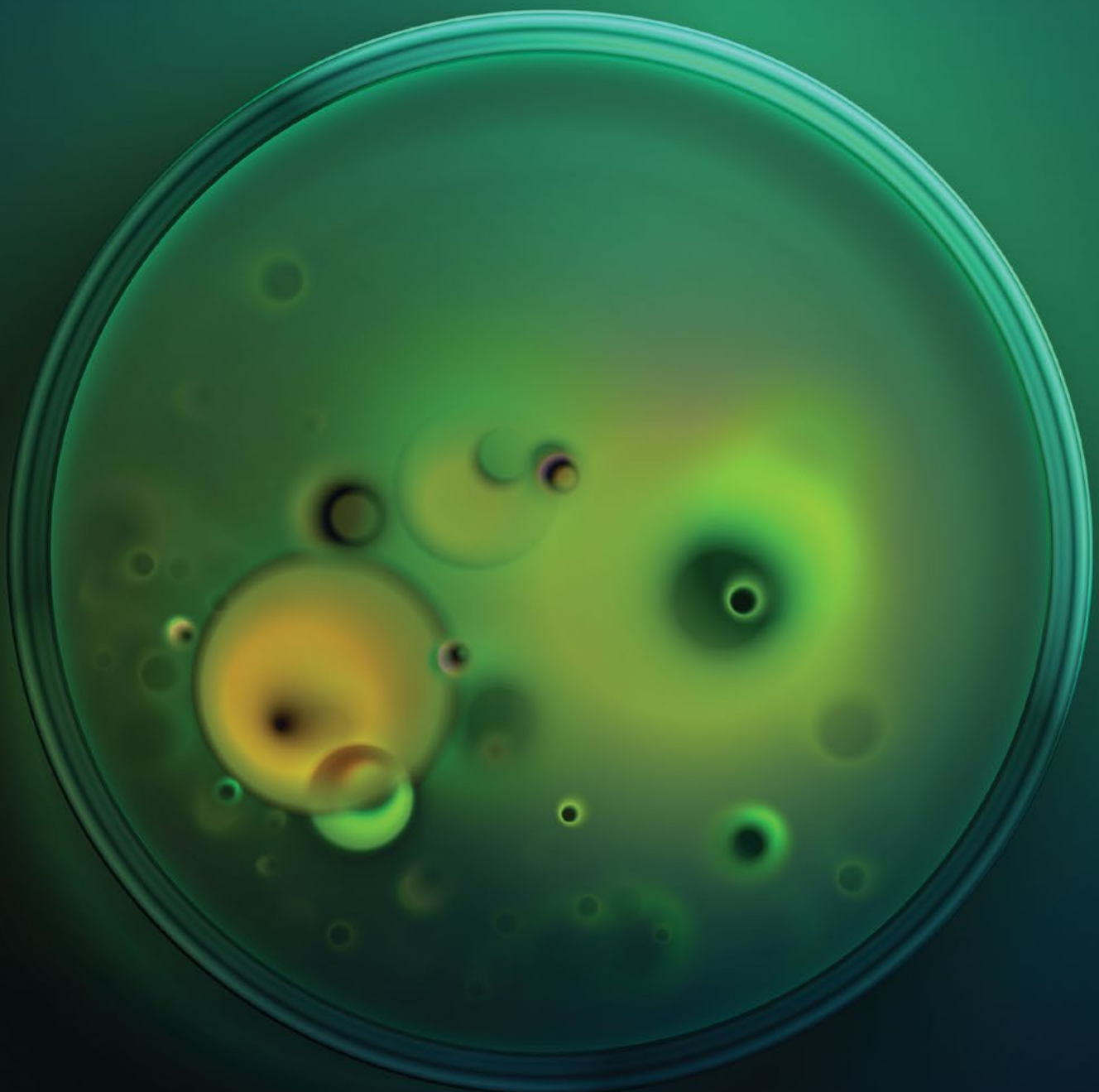


Advanced fermentation and contract-manufacturing capabilities

Queensland is home to several leading contract-manufacturing companies, with established capability in aerobic and anaerobic fermentation processes for the manufacture of biopharmaceuticals, food and beverage ingredients, dietary supplements, fortified animal feeds, and microbial products for agriculture and waste treatment.

These Queensland-based facilities have complementary manufacturing processes and serve as a testament to our state's capabilities across a broad spectrum of applications.

Additionally, the Queensland Government is currently exploring the construction of a contract-manufacturing facility with aerobic fermentation and downstream processing capabilities in the Mackay region.



Queensland is home to a network of world-leading facilities that can support the entire design-build-test cycle of synthetic biology and translation—from laboratory-scale to production-scale.



CSIRO-University of Queensland Biofoundry

RESEARCH AND DEVELOPMENT

An advanced robotic high-throughput DNA componentry assembly, cell-line engineering, and analysis facility, accessible to the Australian research and development community housed at the EcoSciences Precinct.



Australian Institute for Bioengineering and Nanotechnology (AIBN)

An integrated multi-disciplinary research institute offering research infrastructure capabilities and expertise to accelerate industrial outcomes for advanced biomanufacturing applications, including biofuels, chemicals, biologics and novel bio-inspired devices.



Australian Genome Research Institute (AGRF) - Brisbane Node

State-of-the-art genomic facilities, technology and expertise, including genotyping, gene expression, bioinformatics and DNA extraction. Housed at the University of Queensland, AGRF is available to academic, clinical and industrial clients.



Bioplatforms Australia - Queensland Node

Bioplatforms Australia offers expertise and access to scientific infrastructure in the fields of genomics, proteomics, metabolomics and bioinformatics. The Queensland nodes for metabolomics and proteomics are housed at the University of Queensland's AIBN.



Protein Expression Facility

SCALE-UP

Australia's leading protein research facility specialising in recombinant protein production for academic and industry researchers. PEF offers state-of-the-art facilities and expertise in molecular cloning, expression optimisation, large-scale expression, protein purification and characterisation.



Mackay QUT Biocommodities Pilot

MANUFACTURING

A pilot-scale Research and Development integrated biorefinery for the conversion of cellulosic biomass into bioethanol and high-value biocommodities with capacity of up to 10,000 litres (a project of the Queensland University of Technology).



Food Pilot Plant

State-of-the-art food-grade pilot plant and associated food technology, sensory and consumer science facilities for conducting research, and trialling new products and processes along with fermentation capabilities (jointly hosted by the Department of Agriculture and Fisheries and CSIRO).



CGMP grade pharmaceutical contract manufacturing

Queensland is home to the only two organisations fully dedicated to the CGMP-grade contract manufacture of pharmaceutical active ingredients - Patheon Biologics and Luina Bio. Patheon Biologics focuses on mammalian cell-culture products, while Luina Bio has expertise in microbial cell-derived products and live biotherapeutics.

Land area	9,014,010.6 ha
Population	172,523
Gross regional product of \$15.929 billion	4.87% of Queensland
Gross value agriculture product value of \$1.393 billion	9.9% of Queensland

Source: Australian Bureau of Statistics and Cat no. 3218.0 Regional Population Growth, Australia, 2017-8; Regional Development Australia Regional Profile June 2018

The Mackay Isaac Whitsunday region

- 1 Whitsunday Region
- 2 Mackay Region
- 3 Isaac Region



Located just north of the Tropic of Capricorn, the Mackay, Isaac and Whitsunday region is in the heart of the magnificent Whitsunday Islands and the Great Barrier Reef. The region is renowned for its scenic beaches, relaxed tropical lifestyle and recreational attractions, and its economy is proving that mining, tourism and agriculture can work harmoniously together.



Mackay Isaac Whitsunday's economic drivers

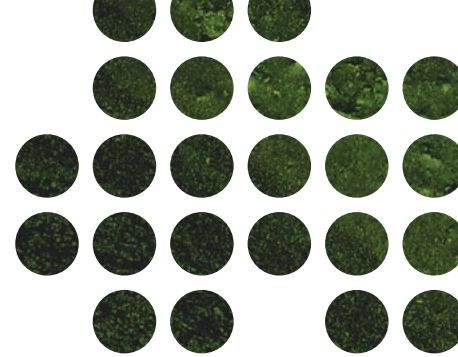
- A strong manufacturing base with 480 businesses and 4400 employees in the Mackay area
- A strong agricultural sector:
 - one of the Australia's largest sugar and biocommodity producers with 28 per cent of Australia's sugar cane
 - one of the largest winter produce growing regions in Australia
 - 5 per cent of Australia's beef
- Tourism is based around the Whitsundays and the Great Barrier Reef.

The Mackay Future Foods BioHub will:

- encourage collaboration and innovation
- promote sustainable economic growth and job creation
- deliver business and social benefits
- create construction, process engineering, industrial chemistry, researcher, logistics and agricultural jobs.

Both nationally and internationally we are increasingly seeing BioHub precincts attracting contract manufacturing opportunities. The Mackay Future Foods BioHub will build on the Mackay region's competitive advantages and leverage opportunities for the development of the sector.

The Mackay Isaac Whitsunday region's feedstock profile



The Mackay Isaac Whitsunday region has the capability to competitively produce some of the world's most energy dense and productive feedstocks such as sugar cane, eucalypts and algae.

The available feedstocks of the region include:



Cropping	Sugar • Sugar cane trash • Sugar cane bagasse • Sugar cane fermentation • Sorghum straw • Grain and pulses from local regions • Yeast and vinasse from ethanol processing
Food processing	Meat processing - tallow
Timber	Wood waste
Horticulture	Grains • Horticultural residues • Bananas • Tomatoes • Capsicums • Mangoes
Intensive livestock	Cattle, poultry and pig manure • Aquaculture waste – prawns, barramundi

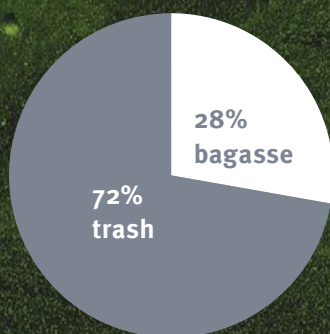
The current top seven feedstocks

Feedstock volumes for biofutures in the Mackay Isaac Whitsunday region (dry tonnes per annum) are:

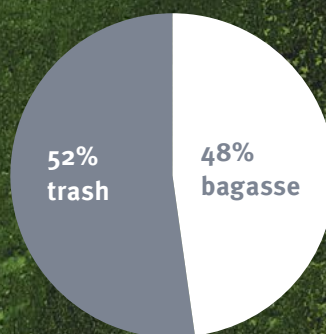
Sugar cane trash	1,518,000
Sugar cane bagasse	1,386,000
Paper waste	38,610
Timber waste	20,730
Cattle feedlot manure	17,090
Sorghum waste	12,810
Meat processing	10,850

Source: Queensland biomass mapping and data tool
www.statedevelopment.qld.gov.au/industry-development/queensland-biomass-mapping-and-data.html





28 per cent of Queensland's sugar cane trash and bagasse is in the Mackay Isaac Whitsunday region, equal to 2.9 million dry tonnes.



Of the 2.9 million dry tonnes of biomass fibre produced 52 per cent is trash and 48 per cent is bagasse.

The sugar cane trash and bagasse quantities are based on total sugar cane trash (field residues) and estimated available bagasse (mill residues) produced not required for primary production processes.

Other sugar cane biomass available in the Mackay Isaac Whitsunday region include fermentation feedstock (sugars, liquor and molasses) and mud.

The biomass data and mapping tool provides up-to-date data on forestry, cropping, urban waste, intensive livestock, food processing and horticulture:

www.statedevelopment.qld.gov.au/industry-development/queensland-biomass-mapping-and-data

Emerging feedstocks

Bioenergy development in the Mackay Isaac Whitsunday areas can utilise a variety of feedstocks to match the soil types, rainfall, irrigation, salinity, previous developments and competing land uses.

Biomass feedstock selection also depends on the business plan of the landowners and the priority given to bioenergy products, versus other benefits obtained from land, notably urban use, mining, food and conventional animal feeds.

Oilseed and rotational crops

Crops such as sunflower, pongamia, giant king grass, jatropha, moringa, agave and Indian mustard could be grown on the more marginal lands, whilst sugar cane, soybean and sorghum may be the optimum crops for the fertile flood plains on the coast.

Intelligently designed bioenergy feedstock production systems can significantly offset GHG emissions associated with fossil fuel-based energy systems and at the same time lead to increases in ecosystem benefits.

The planting of revenue generating oilseeds, sugars, energy or biomass crops on available land, mine rehabilitation areas, or as rotation crops on fallow ground, can also provide numerous benefits including soil nutritional improvements, potential fodder and co-products.

Algae

Algae is a potentially attractive biomass option as it offers high biomass yields per hectare of cultivation (yields are higher than terrestrial plants) meaning low total land requirements and cultivation strategies can minimise or avoid competition with arable land and nutrients used for conventional agriculture. There is increasing access to algae feedstock in the Whitsunday region due to the emerging aquaculture developments.

Potential opportunities

Heritage manufacturing



Sugar

There are five working sugar mills within the Mackay Isaac Whitsunday region - three Mackay Sugar mills at Racecourse, Farleigh and Marian and two Wilmar owned mills at Proserpine and Plane Creek.

Potential feedstocks include:

- fermentation feedstock including sugars, liquor and molasses
- sugar cane and green waste for use in biochemicals, biofuels and bioplastics
- sugar cane biomass for use in second generation biofuels or hydrocarbon replacement feedstocks.

Biomass co-generation and renewable energy

Opportunities exist for bioenergy to contribute to balancing the electricity grid and contributing to dispatchable power to supplement other renewable energy types. These include:

- Biogas — Gas engines and gas turbines that have a quick response time , even from a cold start, as well as high ramping capabilities
- Bioliquids — Engines and gas turbines, as well as for boilers in heating applications
- Solid biomass — Dedicated power plants; as a co-firing fuels in fossil (coal) plants requiring slower response times and can be used for seasonal adjustment
- Biomass in district power, heating and industrial CHP systems (i.e. hospitals, buildings etc) – connection to energy grids can bring significant additional balancing component if load varies considerably over day/week/season





Bioproduct feedstocks

Meat processing

The Thomas Borthwick and Sons facility, owned by NH Foods, at Bakers Creek is the major meat processing facility in the Mackay Isaac Whitsunday region. There are a variety of by-products that can be used as potential feedstocks into downstream bioprocesses including tallow and wastewater for biodigestors.

Aquaculture

The Mackay Isaac Whitsunday region is home to several aquaculture facilities.

Aquaculture require feeds for growing the marine organisms and there may be synergies in bioprocessing co-products. Aquaculture catches need to be processed, cooked, frozen and iced and there could be synergies with other bioprocessing facilities.

Algae

The *Advance Queensland Biofutures 10-Year Roadmap and Action Plan* identified algae as a potential feedstock. There is a developing use of algae in the Whitsunday regions and opportunities may present to co-locate these processes with other industrial and horticultural activities in the regions to value-add products.

Wastes

Horticultural waste

There are approximately 150 fruit and vegetable producers in the Mackay Isaac Whitsunday region with the majority within the Bowen area. Opportunities exist to value-add these feedstocks and waste products into alternate products with a better shelf life or extracting high-value bioproducts.

Conversion of horticultural wastes into animal feedstocks is possible through blending with other nutritional elements.

Opportunities also exist to utilise these organic wastes in biogas or biomass energy production.

Case Study

Transformation of surplus/waste tomato and capsicum produce into value-added products (stage one)

The Queensland Government is partnering with Bowen Gumlu Growers Association and the Whitsunday Regional Council to establish proof of concept protocols to utilise surplus/waste tomato and capsicum produce grown in the region. Processing the raw material will create high-value nutrition and bioactive rich powders, and liquid extracts that can find applications in food, health and feed industries. For more information please see https://fightfoodwastecrc.com.au/project/tomato_capsicum



Mackay Isaac Whitsunday – an enviable lifestyle

The region has a sub-tropical climate with reef, rainforest and outback landscapes. It also offers a more affordable lifestyle in terms of housing and distances to commute to work.

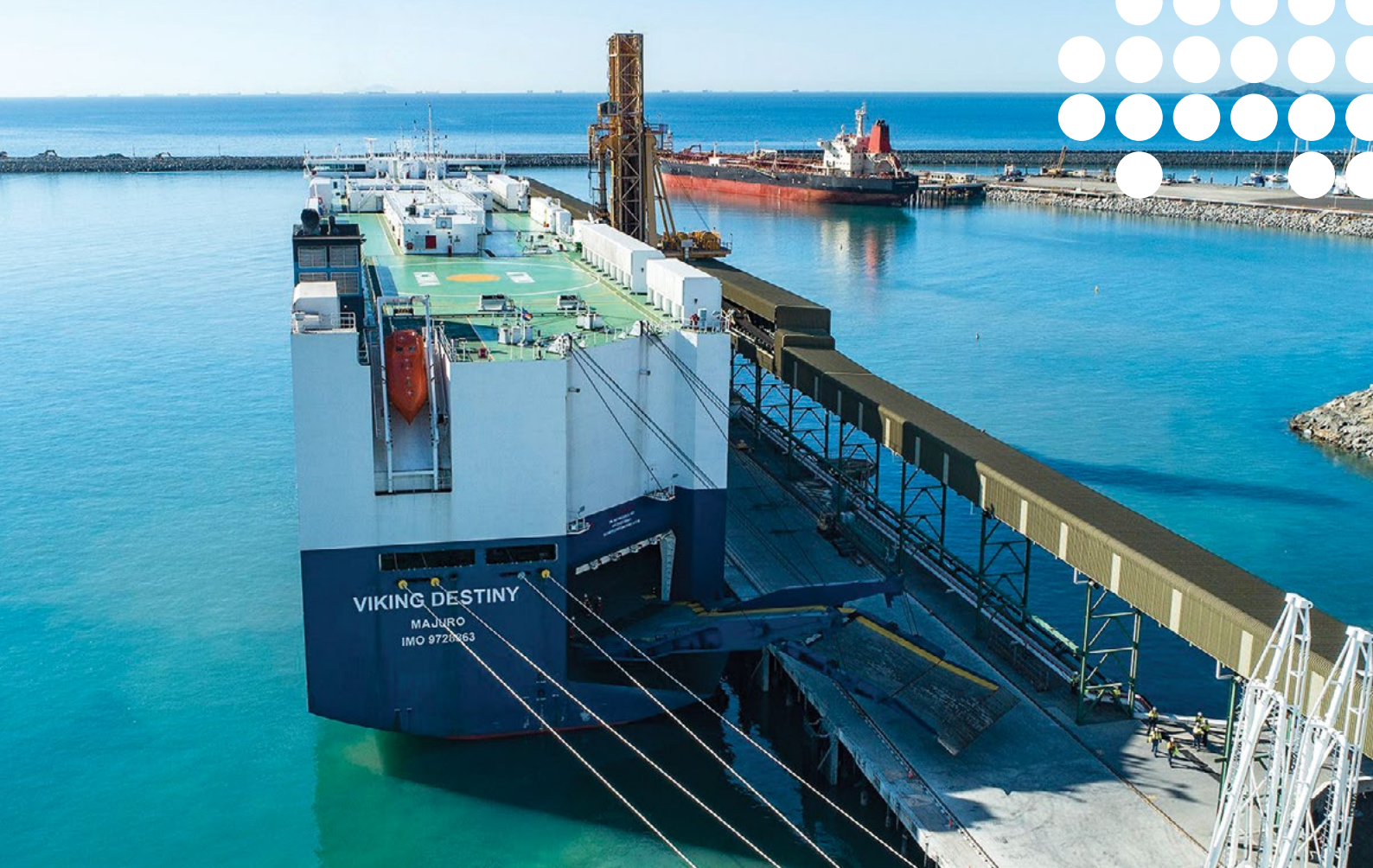
Why dream of a Queensland holiday when your family and your team could live and work in this stunning subtropical location?

An aerial photograph of a tropical coastline. At the top, turquoise waves with white foam crash onto a sandy beach. Below the beach is a row of lush green palm trees. A dark asphalt road runs horizontally across the middle of the image, with a white car driving away from the viewer. Below the road is a strip of dry, yellowish-brown vegetation.

**The Mackay Isaac Whitsunday
region offers a relaxed lifestyle
with big city standard**

Why invest in the Mackay Isaac Whitsunday region?

	THE MIW ADVANTAGE	BENEFIT TO INVESTOR	POTENTIAL SYNERGIES
Existing established sites	<p>Many sugar mills and industrial sites in MIW have under-utilised land that could readily be occupied by a co-located bioprocessing plant.</p> <p>This land is already zoned and licensed, and provides natural synergies with regards to site access, topography etc.</p>	<p>Use of an existing site will provide lower up-front capital expenses due to construction, site preparation, licensing etc.</p> <p>Close proximity to existing regional infrastructure will lower operating costs and synergies through existing logistics operations.</p>	<p>Existing sites can generate revenue from land that would otherwise be unused or underutilised.</p> <p>Existing operations can provide goods and services to the plant on a contract basis, to minimise the number of staff, infrastructure and systems.</p>
Greenfield sites and State Development Area (SDA)	<p>Rosella Industrial Park, a 500 ha site south of Mackay is strategically positioned adjoining the Bruce highway for regional and interstate connectivity.</p> <p>The Abbot Point SDA offers the ideal location for industrial and port-related development that requires a large footprint, proximity to a port and separation from sensitive receptors.</p>	<p>Concentration of industrial development in selected areas, thereby minimising or avoiding:</p> <ul style="list-style-type: none"> • environmental impacts • loss of amenity • infrastructure duplications • transport conflicts. 	<p>Behind the meter power, heat and steam options.</p> <p>Sharing common infrastructure to reduce costs.</p>
Site proximity to ports	MIW is located coastally and close to established ports, sugar terminals and bulk cargo storage.	Access to port facilities may reduce transport costs of inputs and feedstock to site and enable efficient export of product/co-products.	Exports can become an alternate revenue stream for the local ports and terminal.
Sugar and sugar streams as low-cost fermentation feedstock	<p>MIW is a rich source of first-generation fermentation feedstock from sugar cane.</p> <p>Sugar cane biomass available in the MIW include fermentation feedstock—sugars, liquor, molasses—and mud.</p>	High-quality feedstock streams are available with lower transportation costs.	MIW sugar mills can sell feedstock as another value-add stream.
Local skills and technical services	MIW has major service support centres that can effectively service construction and maintenance requirements.	<p>Plants can be serviced efficiently and effectively by experienced local contractors.</p> <p>Capital costs may also be reduced compared to other locations due to the high concentration of original equipment manufacturers and similar process equipment in the regions.</p>	<p>Local tradespeople, service providers and merchants can provide year-round operations and maintenance.</p> <p>This will enable a broader base to employ additional people and expand operations.</p>



Infrastructure and services in the MIW region

Connection to logistics markets through reliable and efficient infrastructure including:

- three regional airports at Mackay, Proserpine and Moranbah
- modern and efficient road networks
- reliable freight service rail networks
- seaports at Mackay and Bowen and three bulk shipping terminals at Abbot Point, Dalrymple Bay and Hay Point
- five advanced raw sugar mills, ethanol, cogeneration and white sugar refinery facilities.

Ideal positioning at the gateway to the Asia-Pacific and close economic ties with expanding Asia-Pacific markets—a clear advantage as an investment destination and export point.

An emerging industrial biotechnology sector and world—class expertise in research and development.

Higher education and research—Higher education and research delivered by CQUniversity and James Cook University campuses, QUT research facility.

Mackay Port, North Queensland Bulk Ports

Queensland's fourth largest multi-commodity port by throughput, Mackay is one of the major servicing centres for the Central Queensland mining and agricultural industries. The Mackay region is the largest sugar producing area in Australia, and the port hosts one of the world's largest bulk sugar terminals.

The Port of Mackay provides excellent access for transport logistics. There is land available with access to utilities ready for developments. Ideally positioned to accommodate smaller biocommodity producers requiring well-resourced manufacturing sites and facilities. Mackay Port is committed to attracting new trade and increasing vessel numbers to the region.



Queensland Government's biofutures vision

The Queensland Government has created the Biofutures Roadmap as a way to assist Queensland industries to partner with emerging technology providers to create new value chains and gain alternate and higher value revenue streams.

The *Advance Queensland Biofutures 10-year Roadmap and Action Plan* identified Queensland's agriculture regions as playing a key role in Queensland's vision for the growth of biofutures for the state, based on their opportunity to grow feedstock.

Queensland has strong competitive advantages in climatically diverse agricultural production, a world class innovation ecosystem and supporting regulatory and policy environment.

This vision will become a reality and Queensland will be renowned both nationally and internationally as a place to invest, research and commercialise Biofutures projects. In partnership with our research and industrial sectors, the Queensland Government will forge a prosperous biofuture for the state.

The Queensland Biofutures 10-year Roadmap and Action Plan includes three key strategies:

- provide direct funding support for specific industry development initiatives
- identify and promote the opportunities available for investment in Queensland
- provide strong government leadership to create and maintain an attractive environment for investment.

The Queensland Government is currently facilitating 29 major biofutures projects across Queensland, ranging from bankable feasibility stage to project delivery, through four funding programs. Collectively, these 29 projects could represent over \$1.9 billion of investment and create over 2600 new jobs throughout rural and regional Queensland if they are all realised.

Mackay Isaac Whitsunday Circular Economy



For the latest information on Biofutures in Queensland visit www.statedevelopment.qld.gov.au/biofutures

Figure 1: Mackay Isaac Whitsunday circular economy model



The biofuture of Queensland

According to the 2018 *Bioenergy State of the Nation* report produced by Bioenergy Australia, Queensland is the leading state government in Australia in framing policies as a means of developing an economic and environmentally sustainable bioenergy sector.

Biofuels to bioproducts: a growth industry for Australia discussion paper, produced by the Queensland University of Technology in 2018 estimated the growth of biorefinery industries in Queensland alone could result in an increase to the Gross State Product of more than \$1.8 billion per year, and the creation of around 6640 jobs, most of which would be in regional communities.



Figure 2: Industry drivers

What is driving investment in biofutures?

Biofutures is seen internationally as the next wave of economic development, providing major opportunities for innovation, jobs and growth.

Bioproducts offer a renewable and environmentally beneficial alternative to existing conventional chemical and fossil fuel refining processes. Many of the potential feedstocks are the by-products of agricultural processes, or waste products that would otherwise require disposal or combustion.

'It is recognised that the sector does not solely exist within the scientific and research community, but rather there are fundamental roles for primary producers and other industries, the investment and finance sector, and all tiers of government that contribute to various parts of the industry supply chain.'

Critically, it is also recognised that infrastructure to develop scientific research, support manufacturing, connect to export gateways and enable commercial scale of production is fundamental to advanced biomanufacturing activities.'

Unlocking Advance Biomanufacturing, LSQ

Why Queensland?



Abundant feedstock

Queensland accounts for 95% of Australia's raw sugar production, of which 85% is exported.



Robust regulatory environment and IP security

A legal framework providing strong IP protection (Australia is also a signatory to a number of international agreements that protect IP in other countries).



Established capability in microbial fermentation

Several leading biopharmaceutical contract-manufacturing companies, with established capabilities in aerobic and anaerobic microbial fermentation processes.



Strong transport and logistics links

World-class infrastructure, including 15 seaports, 7 bulk shipping terminals and 3 international airports with direct freight routes to major Asian cities.



Highly skilled workforce

An educated, highly skilled and motivated workforce with access to world-class training facilities.



Expertise in fermentation and process engineering

A mature brewing industry supported by a craft brewing strategy and well-established capability in fermentation and brewing processes. Queensland is home to several major breweries including XXXX (Lion Nathan) and Asahi, and a state-of-the-art BrewLab facility focused on improving brewing processes.



Leader in Cogeneration

Largest bioenergy sector of any Australian state, with Queensland power stations accounting for almost half of the country's bioenergy generation



Research capability

Strong research and translational capabilities built through long-term investment in life sciences and advanced robotics



Enabling infrastructure

Supporting infrastructure, including three biorefineries, a number of pilot plants and the development of an 'at-scale' bioincubator



Existing biofutures businesses

The Mackay Isaac Whitsunday region has a range of heritage and emerging industrial biotechnologies and bioproducts.

Wilmar Sugar mills at Proserpine and Plane Creek

Wilmar Sugar Australia is Australia's largest sugar producer and leading producer of renewable energy from biomass.

Wilmar Sugar own and operate the Proserpine Mill and the Plane Creek Mill in the Mackay Isaac Whitsunday region.

Mackay QUT Renewable Biocommodities Pilot Plant at Racecourse Mill

The Mackay Queensland University of Technology (QUT) Renewable Biocommodities Pilot facility is located at Mackay Sugar Limited's Racecourse Mill. It 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 the pilot scale and is available for use by industry and research partners.

Mackay Sugar Limited mills at Racecourse, Marian and Farleigh and Sugar Australia's White Sugar Refinery at Racecourse Mill

Mackay Sugar Limited is the second largest sugar milling company in Australia and own and operate three mills in the Mackay Isaac Whitsunday region at Racecourse, Marian and Farleigh which harvest up to 5.5 million tonnes of cane per year.

A 38 MW renewable bagasse cogeneration plant at Racecourse Mill produces more than 25 per cent of Mackay's electricity year-round.

Racecourse Refinery was constructed in 1994, from a joint venture between Mackay Sugar and ED&F Man and produces about 400,000 tonnes of refined white sugar annually. It is powered by the renewable cogeneration plant.



Local case study: Wilmar's integrated biorefinery at Sarina

Wilmar operates an integrated biorefinery precinct at Sarina with the BioEthanol distillery and the Plane Creek Sugar Mill. The distillery manufactures ethanol to meet the demands of a wide range of applications: the printing industry, cosmetics, toiletries, aerosols, industrial chemicals, household cleaners, pharmaceutical, medical and biological products, food and beverages, flavours, fragrances and surface coatings.

Wilmar BioEthanol is a leading Australian producer and importer of ethanol products, supplying a significant share to the food, beverage, pharmaceutical, printing and general industrial markets as well as supplying the growing fuel market in Australia.

Wilmar AgServices operates a liquid fertiliser and stock-feed business based at the Wilmar BioEthanol plant at Sarina which converts the co-product from the distillery known as Bio Dunder® into a highly valued liquid fertiliser. This is marketed back into the sugar cane, horticulture and stock-feed markets in the Central and Northern Queensland region. Nineteen cartage and application contractors transport and apply the products using state of the art variable rate and GPS controlled truck and tractor applicators.

Wilmar AgServices is leading the way in the efficient delivery of environmentally friendly nutrient solutions in some of the most sensitive Great Barrier Reef Catchments. They have been recognised for their innovative approach with numerous industry and environmental awards.

Investor support

More information can be found here:
www.tiq.qld.gov.au

Case facilitation

The Queensland Government and local councils both offer a range of case facilitation services depending on the complexity of a development project, the project value and employment creation potential, and project alignment with government policies and initiatives.

The Queensland Government is committed to establishing an internationally competitive Future Foods industry, and is actively looking to support advanced biomanufacturing companies wanting to establish and scale-up projects in the Mackay region, including manufacturing, design and research and development.

Mackay's mature agriculture and sugar industries, proximity to Asia, significant biomass feedstock, and willingness to diversify position the region to meet growing demand for future food products in both domestic and international markets.

The Queensland Government offers a suite of resources, services, tools and support to help you start-up or expand your business, and can accommodate your desired infrastructure and skill requirements.

Department of State Development, Tourism and Innovation

Biofutures Queensland is the Queensland Government's focal point for biofutures industry support. Biofutures Queensland works across the government, industry and research sectors to drive development, investment and research and development in industrial biotech and bioproducts.

The Mackay Isaac Whitsunday regional office can help local businesses find project opportunities, compete for work and improve their tendering and supply chain capabilities.

Greater Whitsunday Alliance

The Greater Whitsunday Alliance (GW3), established in 2017, provides a regional economic development approach, creating opportunities for the Mackay Isaac Whitsunday region. The organisation is strategic and coordinated, focusing on local, national and international networks, and advocates for projects and opportunities from both government and the private sector.

Regional Development Australia, Mackay Isaac Whitsunday

Regional Development Australia Mackay Isaac Whitsunday (RDAMIW) promote regional needs and attracts investment from a range of sources for Mackay, Isaac and the Whitsundays. RDAMIW is focused on a vision of lifestyle, opportunity and prosperity for the region and work closely to collaborate with federal, state and local government agencies and other regional partners to make this happen.



Figure 3: Investment attraction process

Queensland's Unite and Recover Strategy



The global pandemic has focused the Queensland Government on creating more resilient regional economies with new business opportunities. There is a renewed commitment to projects that are able to withstand global disruptions, particularly in producing food locally which is able to be exported across the world.

A Future Foods BioHub in Mackay aligns directly with Queensland's Unite and Recover Strategy:

- **Adapt to build a more resilient and stronger economy for Mackay**—development of new and alternative food and feed products will complement and build on Mackay's abundant agricultural production and food processing industry.
- **Invest in productive infrastructure for the future**—by supporting investment in future foods infrastructure for manufacturing, biomanufacturing and industrial fermentation.
- **Build on the Mackay region's strengths**—short supply chains from paddock will support food and feed industries and the bio commodities sector.
- **Create an environment for business confidence and investment**—there is increasing market demand for better utilisation of food wastes and losses from food supply chains.
- **Support Queensland communities to be healthier and more united**—the Future Foods BioHub aims to increase the use of byproducts, residues and wastes, and contribute to Queensland's transition to a circular economy.

Queensland Future Foods

Significant advances in Queensland's industrial biotechnology and bioproducts sectors have positioned the Queensland bioeconomy with the foundational capabilities and manufacturing strengths to deliver on the global market for future foods.

The production of new and alternative food and feed products is a rapidly growing sector, attracting global investment. Queensland is ideally placed to become an Asia Pacific Hub for the manufacture of future foods and bioproducts. By 2035, an industrial biotechnology and bioproducts sector could contribute over \$4 billion to Queensland's annual Gross State Product.

Further, global protein consumption has risen 40 per cent since 2000, with over half of the increase driven by Asia. This emerging market for alternative proteins should not be viewed as a threat to existing production systems, but as a means of diversifying choices for producers, processors and consumers to fill the growing gap between global protein demand and supply. The Queensland agriculture sector will thrive as it responds to meet this increasing global demand for food, especially alternative proteins.

Queensland has multiple advantages and is well equipped to meet the needs of the emerging global synthetic biomanufacturing industry:

- Proven capability and natural assets with a proven history of successfully partnering with industry to enable the growth of new economies. Coupled with a natural comparative advantage in the availability of feedstock materials and globally recognised research and development expertise supported by infrastructure, Queensland is positioned to realise this multi-billion-dollar opportunity.
- Established export market—Queensland enjoys a positive consumer sentiment in Asia and China towards Australian made products. It has a strong brand with produce being known to be safe, clean and green.
- Market access—Queensland has strong transport and logistics links including direct routes to Asian capitals (five International airports and 15 trading ports) with access and proximity to high growth Asian markets that are located within similar time zones.

We are working in partnership with Queensland's world-leading agriculture, bioproducts and research sectors to ensure we deliver on the Queensland Government's Advance Queensland Biofutures 10-Year Roadmap and Action Plan.

Investor opportunities

The Mackay Isaac Whitsunday region has proven commitment and expertise in biofuture advanced biomanufacturing activities as demonstrated by the establishment of sugar mills, biofuel production.

These facilities can offer investors the opportunity to partner and further expand upon existing biomanufacturing organisations and contribute to the growth of the Mackay Future Foods BioHub.

In addition, there are green field investment opportunities in:

- a diverse range of feedstocks and fertile land to grow new crops
- developing investor owned bioprocessing infrastructure
- research and development pilot projects

All levels of business, government and the community have a proactive approach to investment and further developing the growth of the biofutures industry in the Mackay Isaac Whitsunday region.

The following agencies can provide investors with further information:

Department of State Development, Tourism and Innovation

www.statedevelopment.qld.gov.au/regions/queensland/mackay-isaac-whitsunday.html

Regional Director
Department of State Development,
Manufacturing, Infrastructure and Planning
Mackay Isaac Whitsunday Regional Office

Telephone: +61 7 4898 6800

Email: mackay@dsdmip.qld.gov.au

Trade and Investment Queensland (TIQ)

www.tiq.qld.gov.au/

Principal Trade and Investment Officer Mackay

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We look forward to an opportunity
to answer any questions from
investors and invite you to visit
our region



