Investing in Biofutures projects in the Mackay Isaac Whitsunday Region









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As the Assistant Minister for State Development and Member for Mackay, I invite you to view this prospectus as an opportunity to gain a greater understanding of the biofutures investment options that are available in the Mackay, Isaac and Whitsunday regions of Queensland.



This region is one of the fastest growing and dynamic economies in Australia delivering minerals, diverse agricultural products and tourism to the world and contributing around \$20 billion in Gross Regional Product (GRP) to the Australian economy.

As Assistant Minister for State Development, I am keen to attract investment to Queensland in biofutures and as the Member for Mackay I have an in-depth knowledge of the biofutures opportunities in the Mackay Isaac Whitsunday region. I commend the Greater Whitsunday Alliance (GW3) for initiating and chairing the Mackay Isaac Whitsunday Biofutures Steering Committee.

The Greater Whitsunday Alliance represents the three local governments of Mackay, Isaac and Whitsunday Regional Councils and strives for sustainable economic growth and to promote the liveability of the region. The organisation is an independent, strategic and coordinated point of contact for local, national and international networks and effectively advocates for projects and opportunities from both government and the private sector.

I endorse the prospectus which accurately reflects the biofutures direction of the region and promotes current and future opportunities available to investors. The prospectus provides details regarding the Queensland government biofutures policy, existing regional biofutures businesses and feedstocks, regional success stories, possible co-location and partnering opportunities and contact details of those who can provide further information.

This prospectus is evidence of the vision, commitment and collaborative approach this region has adopted to further enhance opportunities for those wishing to invest into our region in the biofutures sector as well as other industry sectors, assisting in developing a sustainable and diverse economy for our communities.

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

Julieanne Gilbert Assistant Minister for State Development Member for Mackay

Queensland Government's biofutures vision

Queensland's vision is for 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.

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 <u>Queensland Biofutures 10-year</u> 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.

The Queensland Government is increasing its support to accelerate the biofutures industry as part of the diversification of the Queensland economy. It will help create thousands of jobs and a new high-value, knowledge-intensive industry in Queensland, particularly in rural areas and regional centres. Whilst there are challenges in expanding this industry, such as strong international competition from other markets and an underdeveloped venture capital market in Australia, there is real potential for catalytic growth of this industry in Queensland.

Through the Biofutures Roadmap, three funding programs have delivered direct financial and supplementary support for 15 new biofutures projects across Queensland, including 10 potential new or expanded biorefineries.

Queensland has strong competitive advantages such as a subtropical and tropical climate and world-class agricultural and research sectors supported by strategies and actions that we are implementing. 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.



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

cleaners, cosmetics)

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.

The Biofuels to bioproducts: a growth industry for Australia study 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 6,640 jobs, most of which would be in regional communities.



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.

Queensland's biofuels mandates

The Queensland Government's sustainable *biofuels mandates set minimum requirements for* the sale of biobased petrol and biobased diesel: 4% of the total volume of regular unleaded petrol sales and ethanol-blended fuel sales by liable fuel retailers must be biobased petrol (ethanol) and 0.5% of all diesel fuel sold by fuel wholesalers to be biobased diesel.

The 2018 Bioenergy state of the nation report stated biofuels production is expected to increase due to mandates and a growth in the global demand for biofuels, specifically for the aviation and marine sector.

Queensland's new waste strategy

The Queensland Government is developing a comprehensive new Waste Management and Resource Recovery Strategy, underpinned by a waste disposal levy, to attract investment, develop new jobs and industries and reduce waste.

Within the Mackay Isaac Whitsunday region, the councils, mines and other large businesses are investigating options for reducing their waste to landfill volumes, to address the introduction of a Landfill Levy in Queensland on 1 July 2019. A co-located waste to energy plant with multiple waste feedstocks could provide additional electricity and steam for other biorefineries, food processing or manufacturing.





Mackay Isaac Whitsunday's economic drivers

- a strong **manufacturing base** focused in the Mackay area
- the strong agricultural sector:
- one of the Australia's largest sugar and biocommodity producers with 28% of Australia's sugar cane
- one of the largest **winter produce** growing regions in Australia
- 5% of Australia's beef
- the Bowen and Galilee basins containing the largest coal mining deposits in Australia and the majority of Queensland's prime coking coal with 26 operating mines in the region
- tourism based around the Whitsundays and the Great Barrier Reef

4.87% of Queensland 9.9% of Queensland

Source: Australian Bureau of Statistics and Australia, 2017-8; Regional Development Australia Regional Profile June 2018

The Mackay Isaac Whitsunday 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.

Map Source: RDAMIW Regional Profile (2018)



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 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 • State forest • Construction waste
Horticulture	Bananas • Tomatoes • Capsicums • Mangos
Intensive livestock	Cattle, poultry & pig manure • Aquaculture waste – prawns, barramundi
Urban waste	Municipal solid waste • Biosolids

The current top seven feedstocks

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

Sugarcane 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 https:// www.statedevelopment.qld.gov.au/industry-development/ queensland-biomass-mapping-and-data.html 28% of Queensland's sugar cane trash and bagasse is in the Mackay Isaac Whitsunday region, equal to 2.9 million dry tonnes

28%

The sugarcane trash and bagasse quantities are based on total sugarcane 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:

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. 52% trash 48% bagasse

Of the 2.9 million dry tonnes of biomass fibre produced

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.



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% 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 400,000tonnes of refined white sugar annually. It is powered by the renewable cogeneration plant.



Local case study: Wilmar's integrated biorefinery at Sarina

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 Queensland 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.

Wilmar operates an integrated biorefinery precinct at Sarina with the BioEthanol distillery and the Plane Creek Sugar Mill. The distillery manufactures pure and methylated 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.

The companion market approach

The Mackay Isaac Whitsunday region has existing companion markets that can provide alternate revenue streams and cost sharing opportunities to biofutures initiatives.

These include the following markets:

- sharing of infrastructure, marketing and industry facilitation
- logistics, packaging and distribution
- electricity retail
- renewable energy supply
- waste management and reduction
- liquid fuels
- animal feeds
- processing of perishable foods to packagables



Research confirms that the key to commercial success for emerging biofutures projects relies on the ability to gain the maximum full value out of feedstocks, bioproducts, coproducts and waste streams. The ability to utilise companion markets is critical to gain operational efficiencies, sharing of infrastructure, infrastructure, marketing and industry facilitation.



Source: BETO Strategic Plan for a Thriving and Sustainable Bioeconomy,2016

A region-based precinct concept for biofutures

The Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) commissioned an industrial land planning investigation in 2018, to evaluate suitable sites for a bioenergy industry precinct based on infrastructure and other site suitability characteristics. This built upon preliminary work undertaken by the DSDMIP which recognises the potential value of co-

locating a biofutures development with existing industrial infrastructure.



Clean energy investment options

The world's energy markets are transitioning from fossil fuels to renewable energy, from centralised to distributed generation and from supply-led to demand-driven use.

As technology and economies of scale improve over time, the initial capital cost of building clean energy options is decreasing. Standalone behind-themeter point solutions are becoming competitive, particularly where the costs of connecting to the grid are prohibitive.



Build your own

Companies such as Yurika Energy have been formed to create microgrids and virtual power plants to supply across-the-fence steam, power and heat to emerging industries, thus saving capital and project complexity. Microgrids can provide localised delivery of reliable, economical and eco-friendly energy to biorefineries looking for sustainable operations.

Renewable solutions

The Mackay Isaac Whitsunday region is blessed with broad acre farming, timber industries, agricultural processing, biomass cogeneration installations, solar installations and many large grid interconnections.

The opportunity for clean energy and hybrid energy installations exists to build sustainable and integrated industries.



Several precinct options in the Mackay Isaac Whitsunday region were identified:

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

The advantages of a precinct

- **Centralised facilities** to take advantage of existing infrastructure and energy
- **Potential energy parks** (steam and power) to support multiple processing facilities
- Established local supply chains
- Anchor stakeholders may provide access to infrastructure e.g. road, rail, electricity and water (for capex reductions) and receive payment 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

Why invest in the Mackay Isaac Whitsunday (MIW) region?

	THE MIW ADVANTAGE	BENEFIT TO INVESTOR	POTENTIAL SYNERGIES
Existing established sites	Many sugar mills and industrial sites in MIW have under-utilised land which could readily be occupied by a co-located bioprocessing plant. This land is already zoned and licensed, and provides natural synergies with regards to site access, topography etc.	Use of an existing site will provide lower up- front capital expenses due to construction, site preparation, licensing etc. Close proximity to existing regional infrastructure will lower operating costs and synergies through existing logistics operations.	Existing sites can generate revenue from land that would otherwise be unused or underutilised. Existing operations can provide goods and services to the plant on a contract basis, to minimise the number of staff, infrastructure and systems.
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.
Bagasse as green, clean and low-cost fuel	All MIW sugar mills make use of bagasse to fuel their boilers for steam and power generation. There are opportunities to increase energy efficiency of the existing mills to generate even more bagasse to provide fuel for non-crush operations.	Bagasse will be produced during the crushing season, and quantities are available for fuel power and steam generation. Long term fuel supply agreements can lower the cost of logistic operations by optimising systems to import fuel.	Sites can sell bagasse, biomass or other fuels, steam and power as another value-add stream. This also can provide a means to justify process improvements to generate further excess bagasse from the mill to gain additional revenue.
Sugar and sugar streams as low-cost fermentation feedstock	MIW is a rich source of first- generation fermentation feedstock from sugar cane. Sugar cane biomass available in the MIW include fermentation feedstock - sugars, liquor, molasses - and mud.	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.	Plants can be serviced efficiently and effectively by experienced local contractors. 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.	Local tradesmen, service providers and merchants can provide year- round operations and maintenance. This will enable a broader base to employ additional people and expand operations.



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 Abbott 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 -CQUniversity and James Cook University campuses, QUT research.

Potential opportunities

Heritage manufacturing



Sugar

There are five working sugar mills within the Mackay Isaac Whitsunday region - three Mackay Sugar mills operated 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
- sugarcane and green waste for use in biochemicals, biofuels and bioplastics
- sugarcane 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 which 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, slower response times, can be used for seasonal balancing
- 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

Oil seed & grains

A proposed oil seed processing and biodiesel production facility is being been investigated for the Mackay Isaac Whitsunday region.

Plans to establish oil seed processing in Central Queensland would provide a local supply of soy bean, sunflower and cotton seed meals for use in animal nutrition in feedlots and cattle properties. The facility could also use vegetable oil and tallow to produce biodiesel for local blending into B5 or B20 biofuels.



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 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.



of domestic waste and other wastes arising from Council activities. MIW councils are investigating options for reducing their waste to landfill volumes to address the introduction of a Landfill Levy in Queensland up to \$75/tonne. A colocated waste to energy plant for biomass would provide additional electricity and steam for other processes. The Council waste treatment facility would also have organic loading that could contribute to the anaerobic digestor.

Other large businesses in the Mackay Isaac Whitsunday region, including the 26 operating mines, are potential high volume waste streams.

Municipal solid waste

Municipal solid waste is defined as a combination

Investor support

More information can be found here: 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.



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.

Grant funding

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

Find Queensland Government grants and assistance programs that may help your project here:

grants.services.qld.gov.au

Resources

Biofutures Queensland

Biofutures Queensland is the Queensland Government's focal point for biofutures industry support.



More information can be found here: statedevelopment.qld.gov.au/industrydevelopment/biofutures-queensland.html



A dedicated unit within the department, Biofutures Queensland works across the government, industry and research sectors to drive development, investment and R&D in industrial biotech and bioproducts.

Investor opportunities

The Mackay Isaac Whitsunday region has proven commitment and expertise in biofuture activities as demonstrated by the establishment of sugar mills, biofuel production, cogeneration and well-established supporting infrastructure.

These facilities can offer investors the opportunity to partner and further expand upon existing bioprocessing organisations and establish bioproduct precincts.

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:

Greater Whitsunday Alliance (GW3) http://www.greaterwhitsundayalliance.com.au/

Chief Executive Officer Greater Whitsunday Alliance (GW3)

Telephone: +61 7 4845 8222 Email: admin@gw3.com.au

Department of State Development, Manufacturing, Infrastructure and Planning

statedevelopment.qld.gov.au/regionaldevelopment/mackay-isaac-whitsunday.html

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