Pilot scale research and innovation

Our Mackay Renewable Biocommodities Pilot Plant (MRBPP) is based on the site of an operating sugar factory. It is a unique research and development facility that converts biomass into biofuels, green chemicals and other bioproducts.

The pilot plant is currently used to develop new industrial products and processes using a wide range of biomass feedstocks from the sugar mill, including sugarcane bagasse, trash, molasses, and other agricultural products like cotton, grains and horticultural wastes.

It is available to research and industry partners for developing and demonstrating a wide range of technologies at pilot-scale.

Our research aims and activities

Our aim is to increase the uptake of renewable bioproduct technologies in Australia by developing innovative, commercially viable products.

Researchers from the Institute for Future Environments (IFE) at the Queensland University of Technology (QUT) use the facility to conduct research in industrial biotechnology, sugarcane processing and biomass conversion for high value product development.
Equipment and capabilities

Biomass pretreatment
Biomass is pretreated in the conversion process to produce high-value products. The MRBPP facility has a unique reactor constructed from corrosion-resistant alloys, for biomass pretreatment. The reactor can pretreat and fractionate biomass using various physical and chemical processes. Pretreatment processes include steam explosion, single-stage and multi-stage acidic, alkali and solvent-based processes.

Carbohydrate hydrolysis and fermentation
A wide variety of yeast, fungal and bacterial organisms can be used to produce bioproducts through fermentation. Enzymatic hydrolysis and fermentation can be undertaken in bioreactors of varying sizes up to 10,000 litres.

Product purification and recovery
Product separation, purification and recovery equipment is available for demonstration in trial quantities. Equipment includes centrifuges, membrane filtration, solvent extraction, and a supercritical fluid process development unit (PDU).

Process development
Specialist process development equipment includes:
- reaction calorimeters
- Parr reactors
- sand-bath reactor
- microwave reactor
- supercritical fluid process development unit.

Analytical capability
QUT experts have significant analytical capability, particularly in the analysis of biomass characterisation, including:
- biomass composition
- carbohydrate and organic acid characterisation
- enzymatic hydrolysis and fermentation
- biochemical and thermochemical processing techniques
- lignin characterisation and functionalisation
- biomass imaging and spectroscopy.