

10 January 2017

Queensland Productivity Commission  
PO Box 12112 George St  
Qld 4003

Dear Sir/Madam

### **Inquiry into Manufacturing in Queensland**

Queensland University of Technology and the Sugar Research Institute work together to deliver research and development, consultancy, and training services to the Australian sugar manufacturing industry.

We welcome the Inquiry into Manufacturing in Queensland and have identified some key opportunities and challenges for the sugar manufacturing industry.

We have attached our submission to the Inquiry.

Yours sincerely



Sagadevan Mundree  
Director  
Centre for Tropical Crops and Biocommodities  
Queensland University of Technology  
GPO Box 2434  
Brisbane Qld 4001



David Green  
General Manager  
Sugar Research Institute  
PO Box 15758  
City East Qld 4002



# Inquiry into Manufacturing in Queensland

Submission by Queensland University of Technology and the Sugar Research Institute

## Queensland University of Technology/Sugar Research Institute

Queensland University of Technology (QUT) is the largest supplier of R&D services to the Australian raw sugar manufacturing industry and a significant supplier of consultancy and training services to the sector. The Centre for Tropical Crops and Biocommodities (CTCB) within QUT is the main provider of those services. In 2016, CTCB's Bioprocessing Group, which is strongly focused on manufacturing from biomass sources (particularly sugarcane) conducted \$3.5 M in research and development and \$1.2 M in consultancies and training, predominantly for Queensland industry.

Australia's Sugar Research Institute (SRI) was established in 1949 and is a company limited by guarantee, wholly owned by the Australian sugar milling industry. SRI's focus is to offer our owners a competitive advantage based on technical and operational excellence. SRI works hand-in-glove with QUT's CTCB to solve technical and operational issues of cane sugar processing, maintain the e-library knowledge base, support training and fund graduate scholarships in order to support the Australian sugar milling industry.

## The Queensland sugar manufacturing industry

The Queensland sugar manufacturing industry consists of 21 raw sugar factories (of a total of 24 in Australia) and 2 refineries (of a total of 4 in Australia). The 21 raw sugar factories are hubs in regional Queensland around which the Queensland sugarcane crop is grown. Existing infrastructure is in place to transport the crop to these factories.

## Sugarcane R&D in Australia

The sugarcane R&D landscape in Australia significantly changed in 2013 with the formation of Sugar Research Australia (SRA), an industry-owned company, funded by levy equally by Australia's growers and millers and attracting contributions from the Commonwealth and Queensland Governments. SRA replaced the Sugar Research and Development Corporation and the Sugar Research Institute as the main funders of sugar manufacturing R&D.

## Outlook for sugarcane-based manufacturing in Queensland

### High-value, low-volume vs low-value, high-volume

The Issues Paper suggests that *one of Australia's comparative advantages lies in high-value, low-volume manufacturing—with a strong focus on design, R&D and innovation. Australia's mindset about manufacturing must change. Australia cannot compete with low-cost, high-volume production. Our future is not in traditional assembly line production. It is in advanced manufacturing and opportunities in the global supply chain.*

Sugarcane R&D in Australia remains focussed on low-cost, high-volume production of raw sugar. The SRA Strategic Plan 2013/14-2017/18 identifies the main research priority to increase yield, productivity, and profitability. Much of the SRA research budget is focussed on sugarcane production with 10% to 15% directed to milling efficiency and technology and 5% to 10% to product diversification and value addition. In addition, 2% to 10% is devoted to knowledge and technology transfer and adoption and capability development, attraction and retention across both growing and manufacturing sectors.

The draft National Sugarcane Industry RD&E Strategy (14 June 2016), in contrast, identifies the need for change with a production target defined in terms of revenue per hectare. It has five-year horizon priorities in complementary crops, cogeneration, ethanol, animal feeds, and new cane areas. Over longer term horizons, higher-value products are prioritised. However, the current research funding process through SRA has a strong focus on whole-of-industry benefits, and as such is more suited to large-scale commodity products, rather than high-value, low-volume manufacturing.

### Key challenges

Funding of the R&D necessary to determine and develop the profitable opportunities is essential. The Queensland sugar industry currently has limited ability to provide this funding. There are likely two main approaches to investing in high-value products:

- Buying the necessary R&D from international providers who have already proven their technology is likely to be only attractive for a domestic market. It is likely that the provider will already have captured their international market and will most likely have a lower production cost.
- The alternative of undertaking the R&D to develop a new project and having access to international markets requires considerable investment. QUT has a biorefinery pilot plant co-located with Racecourse Mill in Mackay where prototype development of both chemical and biological technologies can be undertaken.

## Drivers of sugarcane-based manufacturing growth

### Sugar industry location

Commercial sugarcane production in Queensland currently occurs on prime agricultural land in the 1900 km long coastal strip between Mossman and the Atherton tablelands in the north and the Queensland/New South Wales border. Given its location, this land is also highly desirable for development. Combined with issues such as climate change and increasingly stringent environmental compliance, it is clear that the long term trend will likely be a reduction in the land under sugarcane cultivation in the traditional Queensland sugarcane growing regions. *A clear opportunity to drive growth of the industry is to expand sugarcane production into areas where there is less competition for land use.* It is clear that Northern Australia, and specifically Northern Queensland is the next frontier for the Australian sugar industry.

### Alternative crops

Sugar mills in Queensland currently crush sugarcane from June to December. As a result, despite considerable capital investment in milling infrastructure, sugarcane mills do not operate for six

months of the year. While there has, and continues to be, considerable investment in generation and export of electricity from sugar mills outside of the crushing season, there is still enormous scope to utilise existing sugar milling infrastructure for a longer period during the year. One option is for the industry to embrace the concept that sugar mills can be 'crop' processing facilities rather than their current role as purely sugarcane processing facilities. There is considerable international research, development, and commercial exploitation of alternative crops that can be grown for the production of fibre (*i.e.*, electricity), sugar, or both and processed in existing sugar mill infrastructure. Such crops include so-called 'energy' canes, sweet sorghum, and bamboo and could be grown in rotation with sugarcane, on the margins of sugarcane land to assist with the control of nutrient and sediment run-off, or in marginal land adjacent to existing sugarcane farmland that is unsuitable for sugarcane production. Further, growing alternative crops in combination with sugarcane opens up additional opportunities to make sugarcane production and milling in the new potential production areas in Northern Queensland profitable. However, given that SRA funding of research and development is focussed on a sugarcane 'business as usual' model, there are effectively no sugar industry funding opportunities to support commercial development in this area with high quality research and development.

### Capacity to demonstrate new technologies at scale

The Queensland sugar industry is mature and stable with respect to the goods produced (raw sugar, molasses, and electricity). Greater than 90% of the revenue from sugarcane currently comes from sucrose which is only 15% of the crop. Raw sugar is sold into the commodity market, and opportunities for product innovation for such a product are limited. Value-adding to sugarcane components (bagasse, trash and tops) and products of sugar manufacturing (sugar, molasses, mill mud, and boiler ash) is being increasingly recognised as a medium to long term strategy that will underpin industry profitability. However, ethanol produced via first generation fermentation of molasses remains the major value-added commodity from Queensland sugarcane production. *A key impediment to the expansion of value-adding to sugarcane production and processing is the lack of capacity for demonstration-scale production of new products.* Such a facility would allow innovative processes to be trialled and optimised at the demonstration-scale (tonnes/day), provide the data for 'real world' technoeconomic assessment of production, and substantially increase the likelihood that new product opportunities are exploited by Queensland sugar mills with a positive impact on profitability. Neither research and development providers nor sugar milling companies have the available capital to build such a facility.

### Government policies and programs

#### Biofuel mandate

The Queensland biofuel mandate commenced on the 1<sup>st</sup> of January 2017 and set minimum requirements for the sale of ethanol-blended regular unleaded petrol and biobased diesel. The mandate requires that ethanol constitutes 3% of the total volume petrol sales per annum. Unfortunately, there is sufficient existing capacity to produce the mandated level of ethanol and relatively limited incentive for investment in new bioethanol production facilities. Development of additional infrastructure for bioethanol production from sugarcane (using either first or second generation technologies) increases not only bioethanol production capacity but would also reduce the cost associated with the commercial development of other sugarcane-based value-added

products (through co-utilisation of equipment). Further, ethanol itself is a 'gateway' chemical for the production of industrial chemicals, bioplastics, and advanced fuels.

### Foreign investment

It would not be an overstatement to say that overseas investment has been, and continues to be, crucial to the survival of the Australian sugar manufacturing industry. Of the eight current milling groups which own the 24 Australian sugar mills, three are directly foreign-owned (representing 54% of mills and 64% of annual production) and Bundaberg Sugar Limited is part of the Belgian Finasucre group (a further 8% of mills and 5% of production). Continued overseas capital investment will be necessary for the industry to move forward into product diversification strategies. Those mills that are unable to generate capital to invest are unlikely to survive as the continuation of the 'business as usual' approach will not suffice. The most likely source of this capital is overseas investment. The financial stability of the country, the stability of key policies relating to, for example, ethanol production and renewable energy targets, and the industry's ability to leverage its strengths (efficiency, automation, and innovation) will be essential to make the industry attractive to overseas investors.