

SRDC

ANNUAL
OPERATIONAL PLAN
2012–2013



Investing in sugar research innovation



Australian Government

Sugar Research and Development Corporation

Sugar Research and Development Corporation

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SRDC Annual Operational Plan 2012–2013

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Cover image: BSES Limited Researcher Dr Prakash Lakshmanan leads a BSES and CSIRO joint venture project focused on molecular breeding (photo courtesy of BSES Limited).



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30 April 2012

Senator the Hon. Joe Ludwig
Minister for Agriculture, Fisheries and Forestry
Parliament House
PO Box 6022
Canberra ACT 2600

Dear Minister

Re: Sugar Research and Development Corporation – Annual Operational Plan 2012–2013

I have pleasure in submitting for your approval the SRDC Annual Operational Plan for 2012–2013, as required in Section 25 of the *Primary Industries and Energy Research and Development Act 1989*.

This Annual Operational Plan is aligned with the priorities, strategies and key deliverables of the SRDC Research, Development and Extension Plan 2012–2017 and is due to commence from 1 July 2012.

This Annual Operational Plan is also consistent with the performance framework required by the *Commonwealth Authorities and Companies Act 1997*.

This plan incorporates priorities identified by both the sugar industry and the Australian Government during the development of the National Sugarcane Industry Research, Development and Extension Strategy and approved by you and the Primary Industries Ministerial Council in September 2010.

It describes in detail proposed activities to address the Government's National and Rural Research Priorities, in the context of the four programs outlined in the Research, Development and Extension Plan 2012–2017.

I commend the SRDC 2012–2013 Annual Operational Plan to you.

Yours sincerely,

Ian Causley
Chairman
Sugar Research and Development Corporation

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University of Queensland Professor Susanne Schmidt and PhD student Prapat Punpee observe sugarcane plants in the University of Queensland greenhouse.

Introduction

The Sugar Research and Development Corporation (SRDC) is a Statutory Authority of the Australian Government, established under the *Primary Industries and Energy Research and Development Act 1989* (the PIERD Act).

SRDC functions as a Research, Development and Extension (RD&E) investment body and partner, drawing on funds provided by both the sugarcane industry and the Australian Government.

SRDC obtains income from levies paid by the sugar industry, matching funds from the Australian Government, and interest. The levy is set by the Australian Government Minister for Agriculture, Fisheries and Forestry on the advice of SRDC's Representative Bodies. In 2012–2013 the levy is expected to remain at \$0.14 per tonne of sugarcane payable on sugar cane that is produced in Australia and accepted at a sugar mill for processing for the purpose of producing raw sugar. This levy is divided equally between growers and millers.

Priorities

As outlined in this Plan, SRDC will work towards the Corporate Outcome to deliver against four program priorities.

- 1. Growing the Crop** – A profitable and market driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane
- 2. Milling the Crop** – A profitable milling sector utilising new and improved technologies processes
- 3. Sustaining the Environment** – Coordinate, facilitate and extend, as appropriate, existing environmental stewardship programs
- 4. Skills and Capabilities** – An industry committed to supporting a culture of education, learning and innovation.

Core business objectives

To seek out and invest in strategic research, development and extension which will underpin an innovative and sustainable Australian sugarcane industry characterised by:

- World-class farming, harvesting, transport and milling practices
- Average cane yields in excess of 100 tonnes per hectare
- Being capable of reliably exceeding 36 million tonnes of sugarcane per annum
- Providing leadership in environmental stewardship and social sustainability
- Extending the value proposition of the sugarcane plant.

SRDC receives funding primarily from industry levies and government matching funding. SRDC annually assesses industry and government priorities and determines target issues for the annual call for projects. SRDC invests in research and development projects consistent with the outcomes, key deliverables and strategies of the RD&E Plan.

Corporate Outcome

A profitable and internationally competitive and sustainable Australian sugarcane industry providing economic, environmental and social benefits for rural and regional communities through targeted investment in research and development.

Mission

To foster an innovative and sustainable Australian sugarcane industry through targeted investment in research and development.

SRDC Planning

AND INVESTMENT APPROACH

SRDC believes that innovation is essential to deliver its *corporate outcome*. Innovation is about looking at things from a different perspective, harnessing the creativity of people, and taking advantage of new technology, information and ways of thinking. SRDC expects innovation to beneficially impact all sectors of the industry long term.

SRDC invests in RD&E projects conducted by others and does not carry out research in its own right. Partnerships are formed across all sectors with RD&E providers, Rural Research and Development Corporations, Universities, Government and industry participants. The Corporation regards its partners as co-investors of projects in the quest to grow a profitable, internationally competitive and sustainable Australian sugarcane industry.

SRDC people are committed to:

- Setting the right targets for RD&E investments
- Making sound investment decisions which address priorities using rigorous transparent processes
- Managing investments so that results are optimised
- Ensuring RD&E delivers outcomes relevant and valuable to the industry
- Building capacity for change, learning and innovation across the industry.

SRDC strives to deliver high rates of return on its RD&E investment by managing technical and market risk and by applying significant resources to translate research outputs into practical industry outcomes.

The PIERD Act requires SRDC to investigate and evaluate the requirements of the sugarcane industry for RD&E and on the basis of that to prepare a Five Year RD&E Plan and develop an Annual Operational Plan (AOP) each year to correspond to the RD&E Plan as necessary.

Accordingly, SRDC takes account of the priorities, needs, and opinions on RD&E of the Australian Government, SRDC Representative Bodies, and other interested stakeholders – all of whom were consulted extensively at various stages during the development of the RD&E Plan and AOP.

Research, Development and Extension Plan 2012–2017

Every five years, SRDC is responsible for developing a Research, Development and Extension (RD&E) Plan about what types of RD&E programs and projects should be delivered to meet Government and industry priorities. The RD&E Plan is then used as the framework to select new research projects and to construct an Annual Operational Plan each year.

As outlined in Section 19 of the PIERD Act, SRDC's RD&E Plan 2012–2017 was finalised by the SRDC Board in April 2012 following extensive stakeholder consultation and approval by the Federal Minister for Agriculture, Fisheries and Forestry in June 2012.

Annual Operational Plan

Section 25 of the PIERD Act requires SRDC to develop and prepare a written Annual Operational Plan (AOP) every financial year. The AOP is required to set out the broad groupings of eligible activities that the Corporation proposes to fund in the year ahead. The AOP must also describe the extent to which these activities give effect to the RD&E Plan in force during the same period.

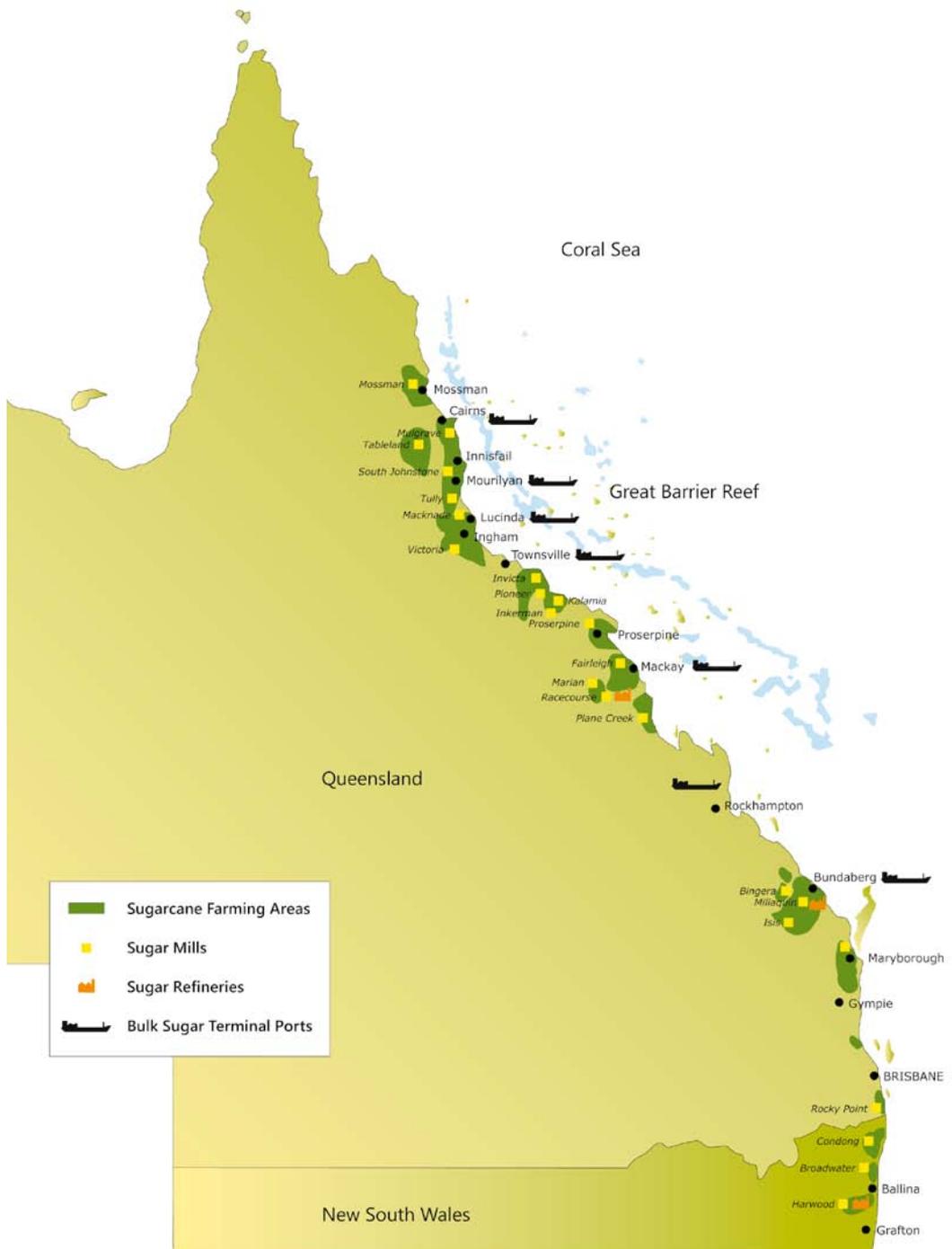
This AOP for 2012–2013 is aligned with the approach, structure, outcomes and deliverables of the RD&E Plan 2012–2017 and the National Sugarcane Industry Research, Development and Extension Strategy approved in September 2010. Also, the AOP incorporates an outcome/output framework to facilitate performance reporting required by the *Commonwealth Authorities and Companies Act 1997*.

This AOP outlines key elements of the RD&E Plan 2012–2017, including SRDC's vision, investment approach, and priorities. In this context the Plan describes the Corporation's proposed activities in 2012–2013 to deliver against the outcomes of the RD&E Plan and National Sugarcane Industry Research, Development and Extension Strategy and priorities identified by SRDC's Representative Bodies and the Australian Government.

SRDC Executive Director Annette Sugden led a tour group of Industry and Government stakeholders through the Mackay sugarcane region in August 2011. Pictured is BSES Limited Research Scientist George Piperidis at the Mackay farm trial site.



Industry OUTLOOK



Value of Sugar Production – estimates

	2011–2012	2012–2013
Cane crushed (million tonnes)	27,942	30.5
Cane farm business	3,900	3,900
Average yield of cane crop (tonnes per ha)	75	85
Sugar mills in Australia	24	24
Bulk sugar storage ports	6	6
Average annual production	3.733 Mt	4.251 Mt
Export volume	2.732 Mt	2.955 Mt
Export value of sugarcane crop production (\$AUS)	\$1.5 billion	\$1.334 billion

Production estimates by region (tonnes)

	2011–2012	2012–2013
Northern region	3.6 Mt	4.6 Mt
Herbert and Burdekin region	12.5 Mt	12.2 Mt
Central region	6.7 Mt	8.4 Mt
Southern region	3.5 Mt	4.0 Mt
NSW region	1.6 Mt	1.3 Mt
Total	27.9 Mt	30.5 Mt

Map and statistics courtesy of Canegrowers and ASMC.
Information correct as of 30 April 2012.

Industry Overview

Sugar is a nationally significant rural commodity contributing an annual gross value of production of up to \$1.5 billion to the economy. Growing sugarcane and the associated processing into raw sugar is one of Australia's largest and most important rural industries and contributes significantly to the economy of many coastal communities in Queensland and northern New South Wales.

Annually around 3,900 farming enterprises supply on average around 35 million tonnes of sugarcane to 24 sugar mills. Sole proprietors or family partnerships own most sugarcane farms, although corporate ownership of farms is increasing.

Australia is a relatively low cost producer and a major exporter of raw sugar. The Australian sugarcane industry is world renowned for having efficient, innovative producers with demonstrated capacity to respond to changing conditions. On farm productivity is among the best in the world. The environmental report card for the sugarcane industry is positive with a number of continuous improvement strategies in place (both in the field and in sugar mills).

As most Australian sugar is exported, industry success has been built on, and continues to require, world's best practice in production, handling and marketing, as well as a reputation for quality, supply reliability and service. At the farm gate, yields have levelled out over the last 10 years, mainly reflecting the impact of inclement weather and major disease. Despite this, the Australian sugarcane industry has maintained export competitiveness via innovation, particularly through varietal improvement, mechanisation, new farming practices and, more recently, diversification.

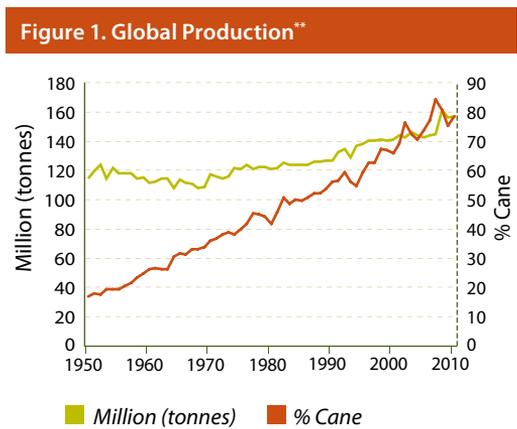
The long term sustainability of the Australian sugarcane industry has depended on continued high quality raw sugar production. The industry has recently had the potential to capitalise on the energy value of bagasse and other sugarcane products.

In addition to innovative improvements in sugarcane growing, harvesting, milling and sugar manufacturing, the industry has supported initiatives that identify and foster innovation and diversification opportunities to provide a forward-looking and more broadly based sugarcane industry.

While ethanol fuel, electricity cogeneration and other products currently form a small part of industry production, these offer potential for industry diversification and profitability while achieving positive environmental outcomes.

Current Global Status

Current market expectations are for world sugar prices to remain high for the remainder of 2012–2013. Global sugar production is expected to continue to expand in line with 2011–2012 increases, which are forecast to rise to 168 million tonnes up 4% from the previous year (for the trend up to 2010 see Figure 1).



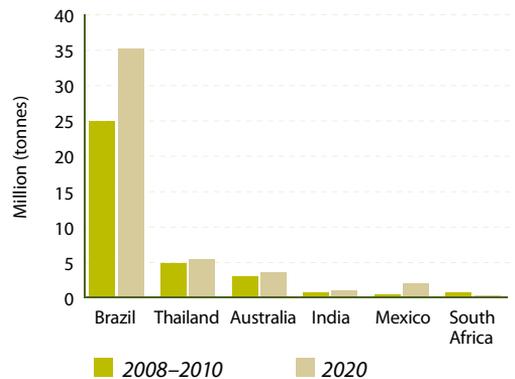
** Source: F.O. Licht’s International Sugar and Sweetener Report.

Production levels are expected to be 10% lower in Brazil in 2012–2013; however, this has been offset by increases in the European Union, Russia and Thailand. Poor growing conditions adversely affected production in Brazil. Increased production area combined with favourable weather conditions and better than expected yields resulted in Thailand’s record production in 2011–2012. Measures by the European Commission to encourage production and stimulate demand from processors are expected to result in high yields and record European Union (EU) production of sugar beet.

Global consumption is also set to continue to increase. During the 2000s, global consumption rose at a steady rate of 2.5% per year and is forecast at a record 159 million tonnes in 2011–2012. Increased consumption in Asia (particularly India and China) is expected to drive continuation of this trend.

Despite its low per capita consumption given its large population, China is still the second biggest sugar-consuming country in Asia behind India, consuming 15 million tonnes of sugar per year. As it does not produce enough sugar domestically to supply its consumers, China is expected to become the biggest importer over the next decade, surpassing the EU and USA. The majority of exported sugar already goes to developing countries rather than developed countries (for trends in global exports see Figure 2).

Figure 2. Predicted sugar exports**



** Source: F.O. Licht’s International Sugar and Sweetener Report.

As increasing amounts of sugarcane is grown in Brazil, many sugar processors and traders have invested in Brazilian-based production facilities. More than 10% of Brazilian cane output is estimated to be controlled by foreign investors. This foreign investment continues to be driven by a significant interest in using sugarcane to produce biofuel as a transport fuel as well as in industrial manufacturing based on sugar and biomass carbon. Around 20% of global production is currently used for fuel sugar rather than food sugar and this trend is expected to continue.

Domestic Status – Australia

Australian sugar production in 2012–2013 is estimated to be 30 million tonnes. The industry in Australia will produce about 4.2 million tonnes of sugar in 2012–2013, the majority of which will be exported.

Changes in global sugar prices, exchange rates, and the volume of sugar production drive industry revenue. There has been a decrease in sugarcane production over recent years associated with adverse weather conditions, the outbreak of sugarcane smut and increased competition for land for cane growing due to urban growth and alternative crops.

Domestically, the industry is responding to changing government environmental policy. Government-led initiatives include programs such as the Reef Rescue Plan (a five year plan commenced in 2008) which was implemented to reduce the risk of sediment, nutrients and herbicides leaving coastal farming operations and affecting the health of the Great Barrier Reef.

The Australian Government's renewable energy target saw a renewed interest in sugarcane cogeneration operations. Recent challenges and changes to the accompanying legislation have severely limited the adoption of the cogeneration plans of many of the milling companies. Public pressure is expected to continue to demand that Government policies protect the country's natural resources. RD&E is important to help growers and millers adapt to, comply with and realise opportunities arising from changes to government consideration of issues such as climate change and carbon pricing.

An opportunity for the industry lies with diversification into other sugarcane products and complementary uses of sugarcane land. Diversification opens opportunities for exploring new markets and new products. The Australian sugarcane industry is already producing raw and refined sugars, ethanol, molasses, liquid fertiliser, compost, fodder, landscape mulch, and cogenerating electricity from the sugarcane crop. The industry is evaluating opportunities for the use of new production systems for paper products, bioplastics, nutraceutical compounds, value added foods, industrial proteins and high fibre varieties for biomass production as well as some of the

more specialised biofuels for aviation and maritime application. Some of these opportunities are likely to take many years to develop and implement.

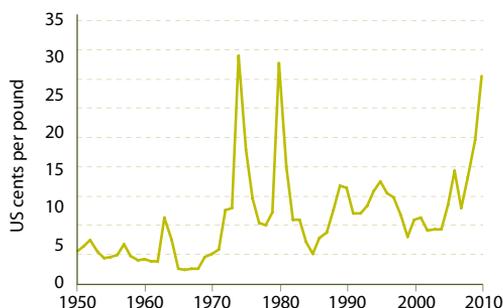
The industry faces many challenges and opportunities which will need RD&E and other solutions for example:

- Pricing structures and efficiencies affect farm viability
- Margin pressure favours larger farms, corporate farming and increased sugarcane farming by mill owners (vertical integration) to manage costs
- Preparedness for an epidemic of known or existing diseases such as Orange Rust
- Delay time associated with the transition from susceptible to resistant cultivars following the incursion of exotic diseases
- Continued investment in the development of genetically modified (GM) sugarcane varieties
- Urban encroachment pressure on sugarcane land in popular coastal regions
- Challenges and opportunities presented by climate variability
- Opportunities for diversification into cogeneration and specialty fuels
- Changes in mill ownership and challenges associated with efficient mechanised harvester operations
- Declining numbers of researchers committed to sugar industry research and development
- Environmental impacts, particularly water use and quality, which are paramount industry concerns
- Socio-economic factors such as grower age, succession planning and small farm size
- A shortage of suitably qualified labour in the agricultural and milling sectors, exacerbated by the attraction of these skilled staff to positions in the mining industry.

The Future

The volatility of the global sugar price (see Figure 3) highlights the challenges facing the Australian sugar industry. Prices have remained marginal for many years with an occasional ‘spike’ in prices often associated with production/demand imbalances. Recent years have seen an increase in pricing which may also reflect changing global dynamics for carbohydrates and starches as part of the emerging biofuels industry.

Figure 3. Normalised global sugar price**

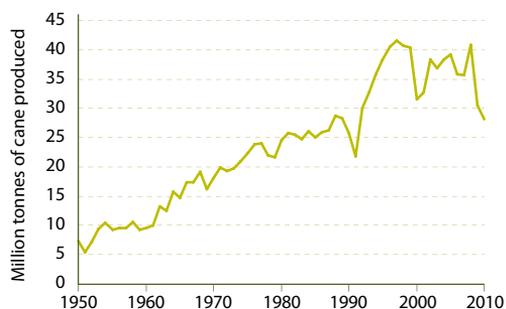


** Source: F.O. Licht’s International Sugar and Sweetener Report.

For Australia however, less than favourable production conditions have offset these high prices. Cash flow challenges, adverse weather across the industry and the attraction of alternative crops with higher marginal returns have resulted in a decline in production. In recent times, inputs (irrigation and fertiliser in particular) have been applied at appropriate levels to achieve optimum economic returns to the industry.

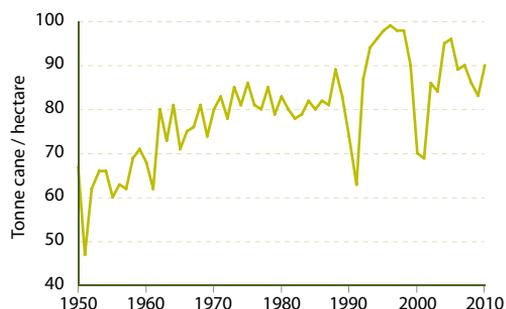
This background of generally poor production and sometimes low prices has led to a shorter term focus for the future than has been experienced in preparing most of the earlier RD&E Plans. To ensure future viability, industry productivity needs to return to the higher levels of the late 1990s, of 40 million tonnes of cane annually, and productivity of 95–100 tonnes of cane per hectare (see cane production in Figure 4 and cane yields in Figure 5).

Figure 4. Australian cane production*



* BSES Mill statistics

Figure 5. Australian cane yields*



* BSES Mill statistics

Production technologies for the milling and growing sectors exist to support this level of production. Much RD&E, however, is synonymous with a significant risk and long development period (often of the order of 10 years or more). While immediate challenges to the industry will focus on the return to earlier production levels, there is recognition that, in order to remain at the forefront of technology, the investment in RD&E must continue for the medium to long term. It is important now more than ever despite the risks usually associated with a shorter timeframe. External analyses of the SRDC project portfolio carried out by AgTrans and PwC have shown an excellent return on investment for previous funding decisions.

Global markets for rural commodities have changed dramatically over the last five years, particularly where there is competition between the food and energy value of the commodities themselves. For sugarcane this challenge presents an enormous opportunity. The marketplace is no longer simply focusing on sucrose production from sugarcane.

Industrial and energy manufacturers are now investing in bio-based production systems for the production of their future supply of traditional building and industrial materials.

RD&E agendas must focus on not only the more efficient and effective cultivation and processing of the crop for traditional markets, but also on future opportunities for alternative uses of the Australian sugarcane plant. Many of these new opportunities will be niche market focused.

While large scale production options will be available where economies of scale allow (for instance, greater than 5 million tonnes of cane equivalents), the more likely market niche of relevance to the Australian sugarcane industry remains in the medium to high priced markets applicable to a small or medium mill area.

Current and emerging opportunities to partner with the Australian industry sectors support this concept. Many large industrial manufacturers have established relationships with the industry in high production areas such as Brazil for the production of basic commodities such as polyethylene from sugar. Australia, on the other hand, provides a stable political, financial and intellectual property environment in which these smaller business platforms would be appropriate for more niche products.

Whatever the outcome of this current trend in industrial manufacturing, sugarcane production and processing techniques must continue to improve in order to maintain the future viability of the industry. Without this, value adding opportunities will not be viable. To this end, SRDC will continue to invest in innovative RD&E to ensure increased competitiveness of the industry and maintenance of its position in the international market.



CSIRO Research Technician Dr Donna Glassop investigates sugarcane growing in a controlled environment.

Some external activities have had or may cause an impact on the future operations and directions of the SRDC.

Rural Research and Development Council

In 2009, the Minister formed a Rural Research and Development Council to investigate opportunities to improve productivity and environmental outcomes throughout the value chain, from paddock to plate and to provide high level advice and coordination to better target and improve the effectiveness of the Federal Government's investment in RD&E.

In early 2011, the Rural R&D Council sought stakeholders' input into the development of the National Rural RD&E Investment Plan. The resulting draft Plan discusses the challenges facing the rural sector, including climate change, food security and resource sustainability and the core role that research, development and extension plays in driving productivity growth.

The Council estimates that investment in rural research, development and extension (RD&E) in Australia was \$2.9 billion in 2008–2009 from all sources and suggests that this investment should now be actively monitored in order to inform judgments about how to achieve optimal returns for the sector. The proposed approach places producers and processors at the centre of this expanding system. It respects the high level of ownership that rural industries contribute to enhancing RD&E across Australian agriculture.

The Council completed its three year term in December 2011. Moving forward the Rural Research and Development Corporations will be working closely with the Department of Agriculture, Fisheries and Forestry to implement some of the key recommendations identified by the Council.

Productivity Commission Review

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role is to help governments make better policies in the long term interest of the Australian community.

In 2010–2011 the Productivity Commission conducted an Inquiry into the Rural Research and Development Corporations model. The Commission released a draft report on 23 September 2010, hosted 11 public hearing meetings across Australia in November 2010 and received 295 submissions.

Recommendations from the Productivity Commission's Inquiry were presented in a final report to the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Joe Ludwig, on 15 February 2011 and released to the public in June 2011.

The focus of the report considered the economic and policy rationale for the Australian Government's investment in rural research and development. It also examined the interactions and potential overlaps across governments and programs to ensure Australia gets the best value for its research and development.

Amongst other things, the Inquiry examined the:

- Rationale for Commonwealth Government investment in rural research and development
- Appropriateness of current funding levels and arrangements – particularly levy arrangements, and matching Commonwealth contributions
- Extent to which Rural Research and Development Corporation (RRDC) funded projects provide for an appropriate balance between industry-specific and broader community benefits
- Effectiveness of the RRDC model in enhancing the competitiveness and productivity of Australia's rural industries
- Scope for improvements to the RRDC model – and any alternative models that could deliver better outcomes.

Under the Productivity Commission Act 1998, the Government tabled the report in each House of the Parliament in mid 2011 and the final report is available to the public from the Productivity Commission's website www.pc.gov.au

The Australian Government is now considering the Productivity Commission's report and the Department of Agriculture, Fisheries and Forestry will be working with the Rural Research and Development Corporations to deliver some recommendations identified by the Council.

Australian Sugar Industry Alliance

In 2009, the Australian Sugar Milling Council and the Australian Cane Growers' Council Limited (Canegrowers), formed a single entity for sugarcane industry representation called the Australian Sugar Industry Alliance (ASA).

SRDC recognises that the SRDC RD&E Plan 2012–2017 and this AOP 2012–2013 have been developed through a period of significant change in the RD&E sector of the industry. Industry groups including ASA commenced a series of consultancies and programs to restructure the total industry investment and infrastructure providing RD&E for the industry.

In 2011, ASA delivered its first report outlining their preferred model for delivery of RD&E and some recommendations pertaining to the structure of BSES Ltd have been implemented.

In 2012, ASA delivered its second report to the Australian Government and Minister for Agriculture, Fisheries and Forestry for consideration. This report is available from the Research Reform section of the Canegrowers website www.canegrowers.com.au

During development of the SRDC RD&E Plan 2012–2017 and Annual Operational Plan 2012–2013, SRDC considered priorities raised by our Representative Bodies, the Australian Government, ASA and other stakeholders when aligning investment programs and projects in the Plans.

This Plan has been developed on the basis that until such time as the outcome of the industry processes is finalised and agreed to, SRDC is required to have a RD&E Plan and AOP for the period commencing 1 July 2012.

CSIRO Senior Research Scientist Dr Rosanne Casu works with an automated pipetting robot at the CSIRO Plant Industry labs. Dr Casu is involved with the Sugarcane Genome Team that was awarded the Research Team Innovation Award in 2012.



National Sugarcane Industry Research, Development and Extension Strategy

Following the endorsement by the Primary Industries Ministerial Council (PIMC) of the National Primary Industries Research, Development and Extension (RD&E) Framework, a National Sugarcane Industry RD&E Strategy was developed to:

- Improve the focus, efficiency and effectiveness of sugarcane industry RD&E
- Create a system of sugarcane industry RD&E that better integrates the priorities of industry and industry organisations, all levels of government and RD&E providers for industry benefit
- Enhance RD&E capability through increased collaboration, specialisation and critical mass
- Provide an RD&E system that is responsive and accountable to industry needs and which improves industry sustainability and competitiveness.

The Strategy was supported by all the sugarcane industry's representative bodies and key RD&E stakeholders following consultation with numerous sugarcane industry representative organisations, RD&E funders and RD&E providers.

The strategy includes an industry overview and a capability assessment. It describes four industry goals and an agreed set of ten industry RD&E themes, which relate closely to current and proposed investment plans of industry, university and government RD&E providers and the ASA.

The strategy also outlines the agreed processes for industry led RD&E priority setting and resource allocation, which will improve information sharing and collaborative investment on behalf of industry, government and RD&E providers.

The Queensland Government and SRDC are responsible for oversight of the Strategy and implementation with the support of a Committee that includes representatives from SRDC's three Representative Bodies, sugar industry groups and RD&E providers.

The Strategy provided the framework for SRDC's future investments and has been a primary consideration in the development of this Annual Operational Plan and the SRDC RD&E Plan 2012–2017.

During implementation, SRDC will continue to work with industry and government stakeholders to ensure SRDC activities continue to deliver relevant and valuable RD&E projects for the industry.

Collaboration with Rural Research and Development Corporations

SRDC will continue working in collaboration with other Rural Research and Development Corporations (RDCs) and other institutions to address common issues. For example SRDC will continue its partnership in the Managing Climate Variability Program, and the Farming and Fishing Health and Safety Collaborative Partnership. Partnerships with Grains Research and Development Corporation (GRDC) are also in place to assess the nitrous oxide emissions from sugarcane production, and to explore optimisation of farming systems and diversification opportunities.

To ensure accountability, SRDC will continue measuring the return on investment and the broader impacts of its RD&E through comprehensive follow up analyses. These will be part of the evaluation program of the Rural RDCs and in house evaluation frameworks for project monitoring.

Industry and Government Research Investment Priorities

The following diagram outlines the priorities established by the Australian Government through the PIERD Act, the National and Rural RD&E Priorities, the National Sugarcane Industry Research, Development and Extension Strategy, and the broad strategic industry needs identified through consultation. In all aspects of its investment activity, SRDC analyses these priorities and identifies how RD&E can best be targeted to deliver outcomes that meet the expectations of industry, government and the community.

Australian Government:
 Objects of the *Primary Industries and Energy Research and Development Act 1989* (The PIERD Act)

- Increase economic, environmental and social benefits
- Achieve sustainable use and management of natural resources
- Make more effective use of human resources and skills
- Improve accountability for expenditure

Australian Government		Australian Sugarcane Industry	
National Research Priorities	Rural RD&E Priorities	Strategic Goals	National Sugarcane Industry Research Development & Extension Strategies
<ul style="list-style-type: none"> ■ An environmentally sustainable Australia ■ Promoting and maintaining good health ■ Safeguarding Australia <p><i>Supporting priority:</i></p> <ul style="list-style-type: none"> ■ Frontier technologies for building and transforming Australian industries. 	<ul style="list-style-type: none"> ■ Productivity and adding value ■ Supply chain and markets ■ Natural resource management ■ Climate variability and climate change ■ Biosecurity <p><i>Supporting the priorities:</i></p> <ul style="list-style-type: none"> ■ Innovation skills ■ Technology. 	<ul style="list-style-type: none"> ■ International competitiveness (particularly through reforms that develop mill areas as the major business unit of the industry, manage scale, apply capital effectively throughout the value chain, and improve commercial understanding and skills) ■ Profitable and sustainable farming and harvesting systems at the mill area/ regional level ■ Profitable, efficient and sustainable transport, milling and marketing systems at the mill area/regional level ■ Appropriately-trained, high-calibre, committed people throughout the industry. 	<ul style="list-style-type: none"> ■ A growth industry, successfully competing in the world market, through profitable businesses ■ Successful diversification into related sugarcane products, using world class research and development ■ Global leaders in environmental sustainability ■ Dynamic and cooperative industry leadership.

SRDC Corporate Strategies

SRDC's core business objectives are to seek out and invest in strategic Research, Development and Extension (RD&E) which will underpin an innovative and sustainable Australian sugarcane industry.

These objectives are characterised by:

- World-class farming, harvesting, transport and milling practices
- Average cane yields in excess of 100 tonnes per hectare
- Being capable of reliably exceeding 36 million tonnes of sugarcane per annum
- Providing leadership in environmental stewardship and social sustainability
- Extending the value of the sugarcane plant.

A series of strategies has been identified to underpin the organisation's focus and operations.



Grower Group Services Director Joe Muscat chats with SRDC Executive Director Annette Sugden during a field trip outside of Mackay.

Strategy 1

Support, coordinate and lead the implementation of the National Sugarcane Industry RD&E Strategy

Critical Success Factors

- Focused, efficient and effective sugarcane industry RD&E
- Co-ordinated and integrated priorities for the growing, harvesting, milling, government and RD&E sectors delivering industry and social benefits
- Enhanced RD&E capability through research provider collaboration and specialisation
- An RD&E portfolio balance that manages the level of investments in strategic and applied RD&E
- An RD&E system that is responsive and accountable to industry and government needs while improving the industry's competitiveness.

Deliverables and Measures of Success

The implementation of the National Sugarcane Industry RD&E Strategy

- SRDC convenes and contributes to meetings to agree to and implement the National Sugarcane Industry RD&E Strategy.
- SRDC consults Representative Bodies and Sugarcane RD&E Committee members (individually and collectively) each year to develop the Annual Operational Plan.
- SRDC annually demonstrates SRDC alignment with National Sugarcane RD&E Strategy through reporting the projects and proportion of investments that contribute to the national strategy's goals.

Outcome

- Stakeholders support and actively implement the National Sugarcane Industry RD&E Strategy through mutually agreed roles to efficiently and effectively utilise RD&E investment and capability to achieve the strategy's objectives and outcomes.

Strategy 2

Grow and leverage the total investment in Sugarcane RD&E

Critical Success Factors

- Funds available from other government programs
- International RD&E collaboration on priority issues occurring
- Increased private investment in sugarcane RD&E is facilitated
- RD&E outputs are suitable for commercialization by appropriate parties
- Returns from RD&E investment are demonstrated to industry and investors
- Increased collaboration with other RDCs.

Deliverables and Measures of Success

- Achieve an SRDC RD&E investment greater than \$15 million per annum by 2017.

Outcome

- Total RD&E investment by National Sugarcane Industry RD&E Strategy stakeholders greater than \$60 million per annum by 2017.

Strategy 3

Engage effectively with our customers and stakeholders

Critical Success Factors

a) Growers and Millers:

- Clear demonstration of relevance of RD&E and its outputs and how it benefits operations and profitability/sustainability
- Active involvement in RD&E priority setting (as for industry organisations)
- Effective communication.

b) Industry Organisations:

- Active involvement in RD&E priority setting
- RD&E programs deliver against industry research priorities
- Effective communication providing feedback on the performance of RD&E programs ensuring transparency and accountability
- Support from industry organisations to communicate RD&E outcomes to their members.

c) Australian Government:

- RD&E programs deliver against the National Research Priorities and Rural Research Priorities
- Delivery of the National Sugarcane Industry RD&E Strategy
- Financial and corporate governance and risk management requirements met
- Cross-sectoral investment opportunities recognised
- Effective communication providing feedback on SRDC performance.

d) RD&E Partners:

- Implementation of the National Sugarcane Industry RD&E Strategy includes an effective mix of RD&E partners, local and international
- 'Best Operating Practice' in investment processes aligned with the requirements of the National Audit Office and the Department of Finance and Deregulation is achieved
- Effective communication to assist in the delivery of research priorities and research outcomes
- Operating efficiencies that deliver mutual benefit with RD&E partners are pursued.

Deliverables and Measures of Success

- Number of information products (electronic and printed) and services (presentations and meetings) provided to industry on RD&E findings and benefits
- Number of presentations made and meetings held with industry and government to inform the development and implementation of the SRDC RD&E Plan and Annual Operational Plan.

Outcomes

- Proportion of industry levy payers accessing information products (electronic and printed) and services (presentations and meetings) provided to industry on RD&E findings and benefits
- Proportion of industry and government stakeholders attending presentations made and meetings to inform the development and implementation of the RD&E Plan and Annual Operational Plan
- A 15% increase in the Customer and Stakeholder Survey average satisfaction measure by 2017.

Strategy 4

Improve operational efficiencies

Critical Success Factors

- 'Best Operating Practice' in the design, governance, risk management and execution of RD&E programs as defined by the Australian National Audit Office (ANAO), Department of Finance and Deregulation (DOFD) and Department of Agriculture Fisheries and Forestry (DAFF) achieved
- Development and adoption of standardised economic tools in collaboration with other RDCs that demonstrate the predicted and actual returns of RD&E investments, risk profile and probability of success
- Potential improvements to further enhance the delivery of RD&E explored.

Deliverables and Measures of Success

Support non-project RD&E expenditure equivalent to average non-project expenditure of all Rural Research and Development Corporations (percentage below 2011–2012 average).

Outcome

Non-project RD&E expenditure equivalent to average non-project RD&E expenditure of all similarly sized RDCs.

Strategy 5

Targeted and Strategic SRDC Investment Portfolio

Based on priorities from our major stakeholders, SRDC identified four programs to categorise SRDC's project investments linked to government and industry priorities.

PROGRAM 1: Growing the Crop

PROGRAM 2: Milling the Crop

PROGRAM 3: Sustaining the Environment

PROGRAM 4: Skills and Capabilities

Critical Success Factors

- Annual total RD&E investment (total expenditure less non-RD&E project expenditure) is within the following ranges:
 - Research (initiation and development of hypotheses and testing of these) 35–45%
 - Development (adaptation of research into a commercial product or service) 35–45%
 - Extension (ultimate marketing of the product or service to the customer of end user) 15–25%.
- Annual total program investment (total expenditure less non-RD&E project expenditure) is within the following ranges:
 - Growing the Crop program 35–45%
 - Milling the Crop program 25–35%
 - Sustaining the Environment program 10–20%
 - Skills and Capabilities program 10–20%.

Deliverables and Measures of Success

- Annual total program investment (total expenditure less non-RD&E project expenditure) is within ranges established in the five year plan
- Establish a cost-effective and repeatable investment portfolio assessment tool to ensure funding decisions for 2013–14 and onwards deliver a greater than 4:1 average benefit cost ratio
- Determine the benefit: cost ratio of three clusters of significant projects each year using methodologies set out in the Council of Rural RDC Evaluation Guidelines.

Outcomes

- A profitable and market-driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane
- A profitable milling sector utilising new and improved technologies and processes
- Coordinate, facilitate and extend, as appropriate, existing environmental stewardship programs
- An industry committed to a culture of education, learning and innovation.

Corporate Governance

AND OPERATIONS

Enabling Legislation and Legislative Objectives

SRDC was established under the *Primary Industries and Energy Research and Development Act 1989* (the PIERD Act) on 1 October 1990. As an Australian Government Statutory Authority it is also subject to the *Commonwealth Authorities and Companies Act 1997* (the CAC Act).

Responsible Minister

SRDC is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry Senator the Hon. Joe Ludwig. The Minister and/or the Parliamentary Secretary:

- Approves the Research, Development and Extension Plan and the Annual Operational Plan
- Appoints Directors of SRDC on the recommendation of the Sugar Research and Development Corporation Selection Committee
- Appoints the Chair of SRDC Board.

Industry Representative Organisations

The PIERD Act prescribes the following Representative Bodies of SRDC:

- Australian Cane Growers' Council Limited (ACGC)
- Australian Cane Farmers' Association Limited (ACFA)
- Australian Sugar Milling Council Proprietary Limited (ASMC).

SRDC is accountable to both the Australian Government and these Representative Bodies. SRDC meets formally with Representative Bodies at least twice a year to discuss SRDC activities, and statutory reporting, levy arrangements, RD&E priorities and any other matters of mutual interest.

SRDC Research, Development and Extension Plan (2012–2017)

SRDC's current Research, Development and Extension Plan was developed during 2011–2012. The Plan has been structured to implement the National Sugarcane Industry Research, Development and Extension Strategy covering the period 2012–2017. It was developed in consultation with SRDC's Representative Bodies, the Australian Government, Department of Agriculture, Fisheries and Forestry, the Australian Sugar Industry Alliance, research providers and other sugar-cane industry stakeholders.

Corporate Governance Framework

The SRDC Board sets the Corporation's strategic direction and delegates responsibility for day-to-day management to the Executive Director. The Board is committed to governance systems that enhance performance and ensure that SRDC is operating according to accountability provisions of the PIERD Act and the Commonwealth Authorities and Companies Act 1997 (CAC Act).

SRDC Board

The role of the Board is to approve overall strategy, budgets and large financial decisions. The Executive Director leads the SRDC management team and is accountable to the Board for day-to-day operations of the Corporation.

The Board has two Committees: an Audit Committee to provide advice on accounting, financial reporting, compliance practices and risk management; and a Scholarships Committee which provides advice to the Board on policies relating to Scholarships and the awarding of Scholarships.



QUT Senior Research Fellow, Dr Ian O'Hara works within the Centre for Tropical Crops and Biocommodities. Dr O'Hara is involved with a number of SRDC funded research projects, investigating opportunities for biofuel production from ethanol. Photo courtesy of QUT – Erika Fish.

The key Board functions are:

- Establishing goals, setting strategic direction, approving the annual budget and approving large items of expenditure
- Supporting development of the SRDC Research, Development and Extension Plan 2012–2017, and the Annual Operational Plan, Portfolio Budget Statements and Annual Report each year
- Establishing and approving policies for the operation of SRDC
- Ensuring that risk assessment and management frameworks are in place to minimise business and financial risk
- Ensuring that RD&E resources are allocated to address priority issues effectively
- Ensuring compliance with applicable laws and provisions of the CAC Act
- Ensuring that Directors and staff maintain the highest ethical standards in accordance with the Code of Conduct
- Appointing, appraising, and setting the remuneration of the Executive Director
- Evaluating its own performance and that of its Committees and SRDC against agreed indicators.

SRDC Board Membership 2012–2013

The SRDC Board includes six Non-Executive Directors, led by a Chairman and supported by a Board Secretary and Executive Director. Board Directors were appointed to the SRDC Board in May 2011 for a three year term.

Chairperson

Mr Ian Causley Oct 2010 – Oct 2013

Deputy Chairperson

Mr Stephen (Steve) Guazzo May 2011 – April 2014

Directors

Mr Paul Donnelly May 2011 – April 2014
 Dr Tracy Henderson May 2011 – April 2014
 Ms Lindy Hyam May 2011 – April 2014
 Mr Julian (Jay) Venning May 2011 – April 2014
 Dr Kleantes (Anthos) Yannakou May 2011 – April 2014

Executive Director

Ms Annette Sugden May 2010 – May 2013

During a Board Meeting held on 15th June 2011, Mr Steve Guazzo was appointed Deputy Chairman and Dr Anthos Yannakou was appointed Chair of the Audit Committee.

Mr Ian Causley was appointed SRDC Chairman in October 2010 for a three year term. He has a distinguished career in politics and grassroots knowledge of the sugarcane growing and milling industry. At age 26 years, Ian was appointed to the Clarence River Canegrowers Executive and became President ten years later. Ian was an inaugural Director of the NSW Sugar Milling Co-operative in 1978 and was appointed Chairman in 2009. Mr Causley’s political career began in 1984, when he was elected to the NSW State Parliament where he served seven years in Coalition Ministries. In 1996 he entered Federal Parliament to lead several Committees before taking on the role of Deputy Speaker until he retired in 2007. As a fourth generation sugarcane farmer, Mr Causley lives in Warregah, New South Wales and has a long history of representing the interests of sugarcane growers and millers.

Mr Stephen Guazzo is a canegrower from the Herbert River region with more than 35 years experience in the industry. He has held various industry positions since 1982 and is currently a Director of CANEGROWERS Herbert River, and a Director of CANEGROWERS Queensland. He is a Director of a cane farm and harvesting business. In 1988 Stephen was awarded the Incitec Bicentennial award for agriculture. In 1996 Stephen was a graduate of the Australian Rural Leadership Program. Mr Guazzo was first appointed to SRDC as a Non-Executive Director on 28 April 2006 and appointed Deputy Chair of the SRDC Board in June 2011.

Dr Paul Donnelly has a career history in rural research, development and extension, with exposure in dairy, horticulture, and grapes and wine. He has special interests in farming systems, biotechnology, use of fibrous residues, the environment and sustainability, and in making the process of research to commercialisation more efficient. Dr Donnelly was appointed to the SRDC Board in May 2011.

Dr Tracy Henderson currently works at CSIRO as Manager for the Impact 2020 project. Dr Henderson holds a PhD in which she developed a strategic evaluation framework to manage and improve the performance of sugar research activities. Dr Henderson was appointed to the SRDC Board in May 2011.

Ms Lindy Hyam brings skills in business management gained through roles such as the General Manager of the City of Newcastle, Chief Executive Officer of Plant Health Australia, and the Executive Director of the Horticulture Research and Development Corporation. Lindy was also a Non Executive Director of the Rural Industries Research and Development Corporation and is a current Non Executive Director of C. Management Services, wholly owned by Central Queensland University. Ms Hyam was appointed to the SRDC Board in May 2011.

Mr Julian (Jay) Venning is the Group Production Engineering Manager for Sucrogen Limited based in Townsville, Queensland. Mr Venning has over 30 years experience in the sugar industry, mainly in milling operations, operations management, project development and technical management and support. Mr Venning was appointed to the SRDC Board in May 2011.

Dr Kleantes (Anthos) Yannakou is a consultant for private and government sector organisations in innovation, research and development, strategy and sustainability issues. Dr Yannakou has held senior positions including CEO of Food Science Australia, Chair of the CSIRO International Council and the Chief Scientist (Food Manufacturing) for the Department of Primary Industries, Victoria. In June 2011, Dr Yannakou was appointed Chair of the SRDC Audit Committee.

Ms Annette Sugden was appointed Executive Director of SRDC in May 2010. Annette has a strong background in program and grants management, research and stakeholder relations, and extensive experience working in primary industry agencies. She has completed three tertiary qualifications focused on natural resource management and sustainability.

SRDC Board was appointed in April 2011 by Minister Joe Ludwig. (Left to right) Dr Paul Donnelly, Dr Tracy Henderson, Mr Stephen Guazzo (Deputy Chairman), Ms Christine Ipson (Board Secretary), Dr Anthos Yannakou, Ms Lindy Hyam, Mr Ian Causley (Chairman), Ms Annette Sugden (Executive Director) and Mr Jay Venning.



Planning and Reporting

SRDC's RD&E Plan defines SRDC's core business, indicates broad priorities for RD&E and defines the corporate strategy to achieve its outputs and outcomes for a five year period.

The Annual Operational Plan (AOP) specifies the broad groupings of RD&E activities that SRDC proposes to fund during the financial year together with an estimate of income and expenditure. The AOP must be submitted to the responsible Minister for approval and a copy forwarded to each of SRDC's Representative Bodies.

The SRDC Portfolio Budget Statement summarises SRDC's outcomes, outputs, performance information and its current and projected financial position each year. It is consistent with SRDC's RD&E Plan and the AOP and is tabled in Parliament.

The SRDC Annual Report gives particulars of RD&E activities funded during the year (inputs), and a review of how SRDC has performed in relation to the objects of the PIERD Act, the SRDC RD&E Plan and its corporate outputs and outcomes. The Annual Report must be submitted to the responsible Minister for tabling in Parliament and provided to each of SRDC's Representative Bodies.

Accountability

As required by Sections 15 and 16 of the CAC Act, the Chair of SRDC advises the responsible Minister in writing of significant events affecting the operation of the Corporation, and the general operations of the Corporation. It is SRDC policy for the Chair and Executive Director to also consult personally with the Minister twice yearly, and to write to the Minister after each face-to-face Board meeting outlining key decisions taken.

The Chair and Executive Director meet at least two times each year with SRDC's three Representative Bodies to discuss SRDC's operations, investment needs and priorities.

Policy

The SRDC Business Process Management System (BPMS) folds active quality assurance and policy implementation into the daily management of SRDC. It is an essential tool in managing risk and controlling fraud and its annual audit is overseen by the Audit Committee. Policies within the BPMS are reviewed on a rolling basis to ensure currency and relevance.

Financial Control

SRDC maintains accounts and records of transactions in accordance with accepted accounting principles. Financial statements are prepared in accordance with Schedule 1 of the CAC Act and Australian Accounting Standards.

Risk Management

SRDC's risk management system is detailed in its Risk Management, Fraud Control, Protective Security and Business Continuity Plans. These cover all of SRDC's activities from portfolio to project level including transactions with external providers and contractors.

Monitoring

The SRDC RD&E Plan 2012–2017 outlines strategies and performance measures that provide a framework for monitoring activities and measuring corporate performance. At the operational level, the Business Process Management System (BPMS) details processes for monitoring and assessment of SRDC's RD&E activities, and management performance, and project management is managed via a project management system.

Corporate Structure

SRDC's Corporate and staffing structure is indicated in the following diagram.



SRDC staff members (left to right) Carolyn Martin, Kara Billsborough, Bianca Cairns, Diana Saunders, Annette Sugden and Ben Baldwin.

Operational Procedures for Investment Decisions

The SRDC Board conducts a strategic analysis of the investment portfolio, reviews progress towards achieving its corporate outcome and outputs, and considers whether the RD&E Plan requires amendment. It also reviews the performance of both the Board and Management of SRDC, and considers any changes necessary to policies and operating procedures, financial reporting, reporting systems and internal controls. These are detailed in the Business Process Management System (BPMS). Each year the SRDC Board reviews its RD&E activities and management systems as part of the Annual Operational Plan.

SRDC investments across the following types of projects:

- **Research Projects** are SRDC's core investments in RD&E and comprise the majority of project funding. SRDC calls for Expressions of Interest (EOI) in June each year for projects to commence from July of the following calendar year. Proponents of shortlisted EOIs are informed by the end of September and requested to present their proposal to a selection review panel before the November Board Meeting.
- **Scholarship Projects** support postgraduate study. Scholarships are advertised on the SRDC website and via media releases annually for projects to commence at the beginning of each calendar year. At times, additional post graduate scholarships are advertised to address specific targets.
- **Capacity Building Projects (CBP)** are small projects which support specific learning and development opportunities for individuals or groups. SRDC calls for CBPs in January and June each year for activities to be conducted in the following calendar and financial years, respectively.
- **Sponsorships and skill development programmes.** SRDC supports external skill development projects and special events through external programs such as Nuffield Australia's scholarship program, Australian Rural Leadership Foundation's Training Rural Australians In Leadership (TRAIL) courses, ABARES Young Science and Innovation Awards, SRDC's Innovation Awards through the Australian Society of Sugarcane Technologists (ASSCT) Conference, and other nationally recognised programs aimed at building capacity for rural industry leaders and researchers. SRDC also sponsors major events addressing research priorities and showcasing SRDC research.
- **Grower Group Innovation Projects (GGIP)** are research projects conducted by grower groups. SRDC calls for GGIP projects in June each year for projects to commence at the beginning of each financial year.

Scholarship proposals are assessed by the SRDC Scholarship Committee. Applications for research projects, CBPs, special skill development investments and GGIPs are assessed by selection review panels including external technical experts and industry representatives. Sponsorships are evaluated against research priorities and likely benefit to the industry and research community, in-house.

The portfolio of projects outlined in this Annual Operational Plan includes continuing projects commenced prior to 2012–2013, and new research projects approved by an assessment panel and the SRDC Board before 30 June. Commencement of new projects is subject to finalisation of the full research proposals and execution of project agreements.

Outcomes, Outputs AND RESOURCING

SRDC Outcomes, Outputs and Inputs in the RD&E Plan

The SRDC RD&E Plan outlines four investment programs on which the RD&E portfolio is based. It nominates program outcomes and deliverables, and provides target ranges for the allocation of resources to the investment programs. The following diagram illustrates the relationships between SRDC's Corporate Outcome, Program Outcomes, Deliverables and Inputs.

Corporate Outcome	A profitable and internationally competitive and sustainable Australian sugarcane industry providing economic, environmental and social benefits for rural and regional communities through targeted investment in research and development.		
Investment Program	Outcomes	Deliverables	Inputs
Growing the Crop	A profitable and market-driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane.	Number of technologies, plant varieties, practices, processes and/or systems at the research, development and extension stage to: <ul style="list-style-type: none"> ■ Limit production losses from weeds, diseases and pests, including incursion threats ■ Increase the genetic potential of sugarcane ■ Improve harvesting system relevant to the current economic drivers and requirements of the millers, growers and harvester operators. 	35–45%
Milling the Crop	A profitable milling sector utilising new and improved technologies and processes.	Number of technologies, practices and/or systems at the research, development and extension stage to: <ul style="list-style-type: none"> ■ Improve processes and materials within sugar mills ■ Support the industry capacity to produce quality sugar to meet market needs ■ Development of market appropriate and optimum performance cane transport systems ■ Maintain an awareness of, and facilitating where possible, value adding opportunities to the current use of the sugarcane plant and its co-products 	25–35%
Sustaining the Environment	Coordinate, facilitate and extend, as appropriate, existing environmental stewardship programs.	<ul style="list-style-type: none"> ■ Develop and implement an environmental stewardship program ■ Investigate product diversification/waste utilisation opportunities completed ■ Undertake a longitudinal study of industry economic, environmental and social footprint. 	10–20%
Skills and Capabilities	An industry committed to supporting a culture of education, learning and innovation.	Provide events, mentoring training, scholarships, information and industry group support (funds, guidelines and staff) to: <ul style="list-style-type: none"> ■ Increase farm and business managers and advisers' awareness, capacity and skills to identify improvements and adopt associated technologies and best practices ■ Fill identified RD&E skills gaps in the industry ■ Support people in leadership positions to enhance their capacity to drive the industry forward ■ Develop and support effective relations across the value chain to drive the industry forward. 	10–20%

OUTCOMES, OUTPUTS AND RESOURCING

Table 1 shows the total SRDC budget for 2012–2013 will be around \$8.8 million. The forecast revenue and expenditure for SRDC for 2012–2013 is shown in Table 1 and are compared against actual expenses in 2011–2012.

In 2012–2013 prices for sugar remain high and the forecast income from industry levies is expected to be around \$4.2 million. Projections of income are conservative and are based on a crop size of 30 million tonnes. In 2012–2013 the level of operating costs will remain at similar levels but is expected

in 2013 due to SRDC reducing its office space and costs with maintaining a larger office area previously. In 2012–2013 SRDC will access its reserves to ensure identified research gaps are addressed and provide support to projects delayed as a result of extreme seasonal conditions in previous years.

Project expenditure includes projects that were contracted as of 30 March 2012. Crop production and levy contributions are based on forecasts estimated on 30 March 2012.

Table 1
SRDC Budgets 2011–2012 and 2012–2013

SRDC Budget	2011–2012 Estimated budget	2011–2012 Revised Budget	2012–2013 Estimated budget
	(\$m)	(\$m)	(\$m)
Estimated crop size (cane for crush)	27 million tonnes	27.964 million tonnes	30 million tonnes
Estimated gross value of production	\$1,000m	\$1,145m	\$1,000m
Levy rate = cents/tonne	\$0.14 cents	\$0.14 cents	\$0.14 cents
Income	(\$m)	(\$m)	(\$m)
Industry contribution	\$3.780	3.914	4.200
Australian Government contribution	\$5.864	5.415	4.200
Interest and other	\$0.448	0.535	0.418
Total Income	\$10.092 m	\$9.866 m	\$8.818
Expenditure	(\$m)	(\$m)	(\$m)
Total projects ²	\$9.602	\$10.284	\$9.123
Operation of SRDC ¹	\$2.231	\$2.061	\$2.331
Total Expenditure	\$11.834 m	\$12.345 m	\$11.454 m

¹Operation of SRDC includes estimates for Section 33(1)(c) of the PIERD Act concerning remuneration of directors and committee members in 2012–2013 is \$364,000. Operation of SRDC expenses includes estimates for Section 33(1)(d) and 33(1)(da) of the

²PIERD Act concerning levy collection and management expenditure payable to the Commonwealth 2012–2013 estimated at \$10,000.

Resourcing of Outcomes and Outputs in 2012–2013

Table 2 compares the proposed allocation of resources across investment areas in 2012–2013 against the target allocation in the RD&E Plan. Table 2 also shows numbers of continuing and new projects as at 30 April 2012.

New Scholarships, Grower Group Innovation Projects and Capacity Building Projects will be considered subsequent to the submission of this Annual Operational Plan as part of the normal project

call and final expenditure will be conditional on execution of project agreements. Projects approved in April 2012 (except for Commercial-in-Confidence projects) are listed in Attachment A.

In April 2012, the Minister for Finance and Deregulation approved Operational Losses for the period of 2012–2013 to 2014–2015.

Table 2

Target and proposed allocation of resources across investment programs, and indicative numbers of continuing and new projects for 2012–2013

2012–2013	Investment Program				Total
	Growing the crop	Milling the crop	Sustaining the Environment	Skills and Capabilities	
Target allocation in RD&E Plan	35–45%	25–35%	10–20%	10–20%	100%
Monetary expenditure to date * (\$'000).	\$2,828	\$1,376	\$833	\$1,397	\$6,434
Allocation 2012–2013 (%)	44%	21%	13%	22%	100%
Project numbers					
Continuing research projects	28	16	10	12	66
New research projects*	7	5	0	1	13
Scholarships	2	4	1	0	7
Total	37	25	11	13	86

*Please note: Table 2 shows the number of continuing and new projects approved as of 18 April 2012.

Monitoring AND EVALUATION

At the Investment Level

During the term of the RD&E Plan 2012–2017, SRDC will monitor and evaluate its performance in achieving the four Investment Programs. Reports, case studies, and surveys will be conducted to document and illustrate these achievements. Key performance indicators, measures and targets for each investment program over the term of the RD&E Plan are listed in Table 3.

Completed, continuing and some new RD&E investments are expected to deliver benefits during 2012–2017 in the form of improved economic performance of sugarcane growing, harvesting, milling and marketing in regional and national economies; improved environmental outcomes on farms, mills and in downstream ecosystems; and social benefits for the people of the industry and their communities and in the broader networks in which industry people are engaged.

At the Project Level

Benefits expected from project investments in 2012–2017 are outlined in the following section which describes these investments in detail.

At the Program Level

Evaluations of achievement at the Investment Program level will be supported during 2012–2013 by monitoring and evaluation of each individual project, in terms of results measured against agreed outcomes and deliverables. Each Project will be required to conduct a baseline evaluation and assess its performance in terms of outputs and outcomes delivered against that baseline, and to clearly enunciate the pathway to delivery of outputs, thereby achieving impact.

To ensure accountability of its investment, SRDC will continue measuring the return on investment and the broader impacts of its RD&E investments through comprehensive ex-post analyses as part of the evaluation program of the Rural R&D Corporations.

At the Corporate Level

In evaluating its own performance as an R&D investment Corporation, SRDC will, in addition, consider its performance against the following three overarching questions:

- Are SRDC's RD&E investments well targeted and responsive to priority needs?
- Is SRDC delivering on industry priorities and the Australian Government's national and rural research priorities?
- Is SRDC continually improving the management of its RD&E portfolio by learning, experimenting, and influencing beneficial change?

The processes that SRDC uses in addressing these questions include a review of SRDC Performance through annual consultations on SRDC results and performance with the Representative Bodies and with industry representatives, and evaluations of the effectiveness of various groups and types of projects.

SRDC has identified that to be a high performance organisation within this industry it is important to review and improve its approach to stakeholder engagement. In 2010–2011 SRDC commissioned a review of our current processes of engagement and the development of a stakeholder engagement framework. Implementation of the results has commenced and will continue during the period 2012–2017. The improved engagement processes and strategies have been incorporated into the development of the new RD&E Plan.

SRDC Senior Investment Manager Bianca Cairns managed the SRDC trade display at the Cane-Trends Working Field Day, hosted by Bundaberg Cane growers in May 2012.

Investing in sugar
research innovation





Dr Nicole Robinson and PhD student Richard Brackin from the University of Queensland have been involved with SRDC funded projects involving soil and nitrogen uptake.

Addressing Targeted Outcomes AND STAKEHOLDER PRIORITIES IN 2012–2013

This section outlines the details of SRDC's planned investment activities in 2012–2013 and beyond. The four Investment Programs provide the basic framework within which the SRDC project investments meet the Australian Government's National and Rural RD&E Priorities and priorities identified by industry.

Australian Government RD&E Priorities

National Research Priorities are:

- **An environmentally sustainable Australia**
- **Promoting and maintaining good health**
- **Safeguarding Australia.**

Supporting priority:

- **Frontier technologies for building and transforming Australian industries**

The Australian Government's *Rural Research and Development Priorities* are framed within the National Research Priorities and focus on issues relevant to rural industries. The revised Rural RD&E Priorities which have applied since 8 May 2007 are:

- **Productivity and adding value** – Improve the productivity and profitability of existing industries and support the development of viable new industries
- **Supply chain and markets** – Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the supply chain, including to consumers
- **Natural resource management** – Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable
- **Climate variability and climate change** – Build resilience to climate variability and adapt to and mitigate the effects of climate change
- **Biosecurity** – Protect Australia's community, primary industries and environment from biosecurity threats.

Supporting the priorities:

- **Innovation skills** – Improve the skills to undertake research and apply its findings
- **Technology** – Promote the development of new and existing technologies.

Investment allocations across the National and Rural RD&E priorities are reported in Table 4 and Table 5 at the end of this section.

TABLE 3

Details of the investment programs delivered through projects in 2012–2013

Investment Program	Growing the crop
Investment Category	A1 – Plant Genetics
Deliverables and Measures of Success	<p>Number of technologies, plant varieties, practices, processes and/or systems at the research, development and extension stage to:</p> <ul style="list-style-type: none"> ■ Limit production losses from weeds, diseases and pests, including incursion threats ■ Increase the genetic potential of sugarcane ■ Improve harvesting systems relevant to the current economic drivers and requirements of the millers, growers and harvester operators.
Outcome	<p>A profitable and market-driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane through:</p> <ul style="list-style-type: none"> ■ Increased adoption of technologies, plant varieties, practices, processes and systems by growers, millers and harvester operators. ■ Pest, disease and weed management operations more finely tuned to limit biotic losses. <ul style="list-style-type: none"> – Reduce associated cane production losses by 15% by 2017. – Commercial cultivars achieve 40% of genetic potential. ■ Improved control over the success of the industry breeding program and broadening of the genetic base of the parent population. <ul style="list-style-type: none"> – Achieve greater than 85% of desired parental crosses. ■ Harvesting system that supports the commercial expectations of growers, millers and harvester operators. <ul style="list-style-type: none"> – Reduce field harvester losses by 50% by 2017.

BSS325 – SmutBuster III: accelerated breeding of smut-resistant varieties

(Funded July 2012 – July 2016)

This new BSES led research project will continue to progress selection of clones from the recently completed SmutBuster III project (BSS325) so that the gains made to date are not lost. So far SmutBuster II has produced five series of seedlings, the most advanced has just been harvested as 1st ratoon cane, the remaining four series range from three-eye sets to plant cane. SmutBuster III is primarily aimed at advancing the five series of seedlings through the full selection process.

CPI024 – Faster flowering – new opportunities for genetic improvement

(Funded July 2012 – July 2015)

This new CSIRO led research project will test the physiological and chemical induction of flowering in sugarcane and derive a method for inducing flowering in young plants. The ability to induce flowering in young plants would significantly reduce the generation to generation cycle time and speed-up several aspects of the breeding program. In addition, a better understanding of the flowering process may help identify ways to limit flowering in field-grown crops.

BSS351 – Improving the accuracy of selection in sugarcane breeding trials through accounting for site variability

(Funded July 2012 – July 2017)

This new BSES led research project aims at increasing genetic gains through increased accuracy of variety selection. Currently variety selections are made based on phenotypic performance; which is a combination of genetic and environmental factors. To try and restrict variety selections to a more genetic-based approach, this project will provide tools for selecting uniform trial sites and accounting for site variability when uniform sites are not available.

CPI025 – Development and testing of a SNP marker platform in sugarcane

(Funded July 2012 – July 2015)

This new CSIRO led research project will follow on from a pilot study conducted by CSIRO and Syngenta into the use of single nucleotide polymorphisms (SNPs) as molecular markers to generate sequence data from the parents of an Australian genetic mapping population. This new project will test and apply a SNP marker detection platform that can accurately screen a much larger number of markers than have previously been deployed in sugarcane, in the hope of identifying markers linked to traits of interest (sugar content, cane yield etc).

CPI026 – Investigation of smut resistance mechanisms in sugarcane

(Funded July 2012 – July 2015)

This new CSIRO led research project will use a combination of molecular techniques and classical pathology to explain the internal and external mechanisms of smut resistance. The aim is to identify markers that can be used to screen sugarcane seedlings at an early stage, in the hope of breeding varieties with multiple mechanisms of resistance. This project will involve the recruitment of a PhD student.

CPI020 – Sugarcane compositional analysis to enable food safety assessment of modified varieties

(Funded July 2010 – May 2013)

This continuing CSIRO led research project will collect reference information on the nutritional content of sugarcane stalk from current commercial varieties grown over three seasons across different geographic regions. The data collected will establish the 'normal' ranges within which nutritional components (e.g. fat, protein, carbohydrates etc) occur.

Food safety assessment of genetically modified crops and foods carried out by Food Standards Australia and New Zealand, requires an applicant to demonstrate that the nutritional composition of the food is "substantially equivalent" to the same food from an unmodified variety. The assessment will be based on the composition of the sugarcane stalk, since this would be the origin of the food products. The aim of this project is to provide a baseline against which the composition of genetically modified sugarcane can be compared for regulatory purposes.

In 2012–2013 the project will analyse the samples from 2012, present project findings to the project consultative panel, submit a paper to the 2013 ASSCT Conference and compile the project findings in a Final Report to SRDC. The aim is to publish the information on the ranges of nutritional components so that it can be used by both regulators and variety developers.

CPI022 – Seed dormancy and establishment: a critical gap in the knowledge to support safe deployment of GM sugarcane

(Funded July 2011 – September 2014)

This CSIRO led research project is helping to improve our understanding of sugarcane reproduction in commercial fields which will ultimately assist in the regulation of genetically modified (GM) cultivars. The project seeks to determine whether sugarcane seed exhibits dormancy (and if so what type), determine how long sugarcane seed can remain viable under field conditions, determine the abiotic limitations to sugarcane germination and establishment, and design assays that can be used in the assessment of future proposed GM cultivars to determine whether the limits of germination and establishment have been altered.

In 2012–2013 the project will execute a number of experiments with freshly collected seed. The first set will determine if sugarcane exhibits dormancy. The second set will determine longevity of seed at multiple sites/environments. These experiments will include treatments at the soil surface and will manipulate the degree of seed/soil interaction. The third set will test the ability of germinated seeds to establish and persist at several locations. The results of these experiments and plans for 2013–14 will be discussed with the project consultative committee.

BSS319 – Maximising the rate of parental improvement in the Australian sugarcane breeding program

(Funded July 2008 – March 2015)

Research already underway will build on ways to maximise rates of parental improvement and genetic gain in the Australian sugarcane breeding program. This BSES led research project will provide recommendations and tools for breeders to select parents and determine crossing combinations based on phenotypic and molecular information from different selection stages. It will ultimately result in more productive and disease resistant varieties for the Australian sugarcane industry, developed more effectively and efficiently.

In 2012–2013 the project will plant two clonal assessment trials in two regions to enable better understanding of the genetic control of sugarcane traits and consequently more efficient and effective selection of parents. The fuzz from crosses made in 2012 will be germinated and planted in a small-plot trial in 2012–2013 for a clonal assessment trial to be planted in 2013.

BSS334 – More crop per drop: Developing water-efficient and drought tolerant sugarcane cultivars for irrigated and dry land farming

(Funded July 2010 – December 2014)

A long-term goal of developing water use-efficient and drought tolerant sugarcane cultivars has been progressed through this and a previous project. The previous project (BSS305) assessed the genetic variation in currently available germplasm and identified elite clones and physiological traits that could be used for screening water use-efficient and drought tolerant cultivars.

The aim of this current project is to translate the progress made in BSS305 into the pre-commercial stage for breeding water use-efficient and drought tolerant cultivars. The project will test and validate predictions about the value of key water use efficiency and drought tolerance traits identified in BSS305 in different production environments. This project will also conduct extensive trait modelling and detailed field, glasshouse and laboratory studies to understand the mechanistic basis of drought tolerance in sugarcane. This knowledge is expected to refine the screening method to identify elite clones with desired water use efficient and drought tolerance capacity.

In 2012–2013 the project will continue the characterisation of clones and target production environments identified in BSS305. This will facilitate and refine crop model development for drought tolerance research and breeding. The best models of sugarcane physiology (APSIM, Canegro, WaterSense or their combination) will be used to explain observations made in field and glasshouse experiments in order to validate and quantify the yield impact of different water stress tolerance traits under varying levels of stress, soil types and growing conditions. New knowledge generated in other sugarcane physiology research (CSE014, CSE023) will also be used in this evaluation of traits and selection targets (regions, soils).

BSS343 – Maximising genetic gain from family and within family selection

(Funded July 2011 – May 2016)

This BSES led research project aims to investigate changes to current selection methods in an effort to improve the effectiveness and efficiency in early stages of selection. It is expected that these changes will result in increased rates of genetic gain and the release of more productive varieties for the Australian sugarcane industry.

More specifically the project will develop a statistical model to account for competition among families in progeny assessment trials and therefore optimise among-family selection processes. The project will also optimise within-family selection processes by modifying field selection schemes, selecting individuals for their CCS level and smut resistance.

In 2012–2013 the project will sample, harvest and weigh the family trials at the two trial locations, analyse the trial data and select families with and without the aid of the competition model.

BSS344 – New germplasm to develop more productive varieties with enhanced resistance to nematodes, Pachymetra root rot and smut

(Funded July 2011 – May 2015)

The genetic base of commercial sugarcane varieties is very narrow, and a large effort in Australia, with Chinese collaboration, over the last nine years has been addressing this problem. This BSES led research project will build on the considerable effort made over the last nine years to develop germplasm from wild relatives of sugarcane, and incorporate this into the core breeding program. The related genus *Erianthus* has been shown to have immunity to *Pachymetra* root rot and contain some useful levels of resistance to nematodes. The intent of the project is to produce breeding parents and/or commercial cultivars with improved traits (cane yield, CCS, fibre, pest and disease resistance).

In 2012–2013, the project will make new crosses between the most promising introgression clones and commercial varieties. These new crosses will be planted in an experiment to test selection methods for introgression families. The promising introgression clones will also be propagated for inclusion in final stage assessment trials. Screening of a wider range of introgression families for resistance to the diseases will continue.

CPI017 – Developing sugarcane for production systems utilising total biomass

(Funded July 2009 – December 2013)

This CSIRO led research project will facilitate the development of cultivars for the Australian sugarcane industry to maximise benefits if fibre and non-sucrose fermentable sugars have more value at some time in the future than currently, because of technology developments or increased energy prices. Preparation for uncertain future opportunities in sugarcane improvement is important considering the long time (>10 years) to develop new varieties. Such preparation may include (for example) identifying very high yielding clones within existing breeding programs that would normally be discarded because of low or marginal CCS, and maintaining these in case future opportunities arise.

The project is characterising the genetic variation within germplasm available to Australian sugarcane breeding programs for traits including sucrose

content, total fermentable sugars, fibre content and composition, and total biomass yields. In 2010 about 200 clones from past introgression breeding programs and commercial breeding programs were selected and propagated, including some which appeared to have high yields but which would not normally be selected according to current breeding program selection criteria. In 2011 these were planted in trials at four sites (Herbert, two in Burdekin, Plane Creek).

In 2012–2013 the project will make measurements on the field trials and determine the potential for genetic improvement through breeding and selection for all traits of interest. Based on the results, it will then develop recommendations to Australian sugarcane breeding programs in terms of the most cost effective ways to prepare for potential future scenarios where fibre and non sucrose sugars have greater value.

CPI018 – Climate ready sugarcane: Traits for adaption to high CO₂ levels

(Funded July 2009 – December 2013)

This research project led by CSIRO will continue to investigate plant physiological adaptation to climate as a result of inevitably elevated CO₂ conditions. The aim of this project is to contribute to the sugar industry's adaption to climate change by providing strategies that will maximise the benefits of increasing CO₂ levels, ultimately through more effective varieties. The project will reassess the impact of climate change on the industry by establishing the physiology of sugarcane growing in elevated CO₂. It will also assess adaptive strategies for the sugarcane plant in terms of improved water use efficiency and photosynthesis and assess the opportunity for selecting for greater response to elevated CO₂.

In 2012–2013 the project will complete two more experiments investigating about 12 more clones for responsiveness to elevated CO₂, using a rapid screening method developed from findings of the initial experiment.

CPI019 – Towards a complete genome sequence of sugarcane: generation of data and development of bio-informatics resources.

(Funded July 2010 – June 2013)

This CSIRO led research project will support the Australian component of an international consortium that has commenced work on the generation of the sugarcane genome sequence. The project will generate a sugarcane genomic sequence relevant to traits important in the Australian sugar industry, generate a genetic map of cane variety Q165 with significantly greater marker density and coverage across the genome, and develop a web-based platform to integrate the sugarcane genetic map data and the sugarcane genome sequence.

In 2012–2013 markers identified from these Bacterial Artificial Chromosome (BAC) clones will be mapped to confirm that they are linked to Quantitative Trait Loci (QTL). Further BAC clones will be sequenced and the information combined with other sequence data to start to generate the first monoploid sugarcane genome sequence. Development of the web-based bioinformatic platform will be completed.

ICSB02 – Australian support of the International Consortium for Sugarcane Biotechnology (ICSB)

(Funded January 2011 – May 2013)

The project provides the mechanism for Australian sugarcane biotechnology expertise to engage in a range of wider international sugarcane biotechnology activities under the auspices of the International Consortium of Sugarcane Biotechnology (ICSB). The small investment in internationally recognised collaborative pre-competitive generic sugarcane biotechnology projects will provide Australian researchers with an advantage not available to them through any other forum. Specifically the project will enable Australia to be represented at the international forum, distribute ICSB project reports to Australian groups and to encourage the development of appropriate local project concepts for support by ICSB.

In 2012–2013 the project will maintain surveillance of opportunities for international collaborations in sugarcane biotechnology, focussing mainly on the opportunities for collaboration between India and Australia.

STU072 – Anthony Brinin – Enhancing sugarcane for decreased water content and increased sugar content at harvest

(Funded January 2011 – July 2014)

This Queensland University of Technology PhD project aims to genetically enhance sugarcane to have a reduced water content and increased sugar content at harvest. Sugarcane that has lower water content at harvest would substantially reduce the costs associated with processing and transport of the harvested crop. Increasing the sugar content of sugarcane would also directly add substantial economic value to sugarcane.

In 2012–2013 this project will progress through the stages of verifying transgenic plants for transgene presence, determining transgene expression levels in the transgenic plants and characterisation of the transgenic plants to determine the potential for inducible control of stomatal function in sugarcane. Inducible control of stomata in sugarcane may lead to the ability to induce a drought stress response in the sugarcane close to harvest time and thus decrease water content and increase sugar content of sugarcane at harvest. Should this project demonstrate successful inducible control of stomata in sugarcane within this time frame, the project may progress through to characterising inducibly drought stressed transgenic sugarcane for overall plant biomass as well as water and sugar content during 2012–2013.

Investment Program	Growing the crop
Investment Category	A2 – Pest Control
Deliverables and Measures of Success	Number of technologies, plant varieties, practices, processes and/or systems at the research, development and extension stage to: <ul style="list-style-type: none"> ■ Limit production losses from weeds, diseases and pests, including incursion threats ■ Increase the genetic potential of sugarcane ■ Improve harvesting systems relevant to the current economic drivers and requirements of the millers, growers and harvester operators.
Outcome	A profitable and market-driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane through: <ul style="list-style-type: none"> ■ Increased adoption of technologies, plant varieties, practices, processes and systems by growers, millers and harvest operators. ■ Pest, disease and weed management operations more finely tuned to limit biotic losses. <ul style="list-style-type: none"> – Reduce associated cane production losses by 15% of 2017. – Commercial cultivars achieve 40% of genetic potential. ■ Improved control over success of the industry breeding program and broaden the genetic base of the parent population. <ul style="list-style-type: none"> – Achieve greater than 85% of desired parental crosses. ■ Harvesting system that supports the commercial expectations of growers, millers and harvester operators. <ul style="list-style-type: none"> – Reduce field harvester losses by 50% by 2017.

BSS331 – Preparing the Australian sugar industry for threats from exotic pests and diseases

(Funded July 2009 – July 2015)

To help protect the industry from exotic pests and diseases, this BSES led research project will develop and validate specific molecular diagnostic tests for known major diseases in Papua New Guinea. Another objective is to develop rapid resistance screening tests for major pests and diseases so that pest and disease resistance ratings can be obtained for the most important Australian commercial varieties. Pest and disease incursion management plans will also be refined as project results dictate.

During 2012–2013 the project will collect and analyse the results of the second year (first ratoon) Ramu stunt and downy mildew field-based resistance trials, the contingency plans for these diseases will be updated (with new information), varietal resistance ratings will be made accessible to industry via the QCANESelect tool, and Sesamia field trials will continue. Research into the rapid resistance test for downy mildew will also be pursued.

BSS342 – Remote sensing to implement an effective pest management strategy for canegrubs

(Funded July 2011 – March 2015)

Canegrubs remain the most significant insect pests of sugarcane in Australia. Effective insecticides are available but their efficient use requires information on the location of canegrub infestations each year. Remote sensing has been used in other agricultural and forestry systems to detect pest infestations over large areas. This BSES led research project is funded to develop a remote-sensing system that can identify canegrub infestations, develop a web-based system to deliver early-warning information; and facilitate outputs of concurrent projects on risk assessment, cane beetle behaviour and predictive modelling.

Each year, the project will obtain high-resolution satellite images that will be subjected to a combination of analyses to detect canegrub infestations and distinguish them from other disorders. Web-based infestation maps will be provided to related projects and to collaborating growers and productivity services to obtain feedback, demonstrate the value of the system and encourage its adoption.

In 2012–2013, the project will complete analysis of the 2011–2012 data, report findings at each location, refine methodology and begin another cycle of image capture, validation and analysis.

GGP054 – Herbert canegrowers strategic grub management using BSES Limited decision making tools

(Funded May 2010 – January 2013)

The Herbert CaneGrub Management Group will enhance grower adoption of systems and tools designed by BSES to manage greyback canegrub outbreaks. This project will also develop means to integrate control of the greyback canegrub into the improved farming systems developed through the Sugar Yield Decline Joint Venture.

In 2012–2013 this project will deliver enhanced capacity for improved decision making from a canegrub management tool perspective.

GGP056 – A monitoring-based system to enhance canegrub control best management practice for Isis sugarcane growers

(Funded February 2010 – January 2013)

The Isis Productivity Limited Grower Grub Group is building the capacity of its members to annually collect relevant information, and to prepare timely, cost-effective and sustainable canegrub management strategies. The grower group project aims to validate systems to monitor grub trends and to use the data in annual grub management planning. The Isis GIS-based database will be modified to record grub infestation and other relevant data for future modelling.

This project is a pilot scheme for the region to gauge if, and in what form, to include grub monitoring in the commercial core business of a local industry service-provider. Group members will carry out key processes, with coaching and/or assistance from skilled persons contracted from BSES, Isis Central Mill, Isis Productivity Limited and Isis Canegrowers.

In 2012–2013 the group will collate all of the project information in a project final report that will be accessible via the SRDC website.

GGP064 – Improved Pachymetra Management in NSW

(Funded May 2012 – December 2014)

Pachymetra root rot is known to reduce yields by up to 40%, and even greater yield reductions have been seen at Condong. This new grower group project led by growers from the Condong mill region in NSW aims to use innovative approaches to demonstrate the potential benefits of, and motivate, improved Pachymetra management on-farm. This project will build capacity in growers to better manage Pachymetra on their cane farms.

In 2012–2013 the group will establish three demonstration trial sites in the Condong region that will involve a variety of cane varieties with varying levels of resistance to Pachymetra. It is expected that these trials will demonstrate how susceptible varieties on infected soils result in stool tipping and reduce yield.

GGP066 – Integrated feral pig management in the Wet Tropics cane region

(Funded May 2012 – August 2014)

This new Grower Group project from the Herbert seeks to bring together growers to focus on managing a feral pig population through collective action and developing a regional specific integrated pest management program. This will involve assessing “Hog Gone” (sodium nitrite) baits as an alternative to 1080 baiting, and investigating feral pig genetics to determine the structure of feral pig populations and whether there are source areas of feral pig populations.

This will lead to possible registration of an alternative feral pig bait for the Wet Tropics, a better understanding of the impact of cane varieties, adjacent habitats, habitat management and land uses on feral pig population dynamics, and the development of a feral pig integrated pest management program for cane lands in the Wet Tropics.

Investment Program	Growing the Crop
Investment Category	A3 Soil – Plant interactions
Deliverables and Measures of Success	<p>Number of technologies, plant varieties, practices, processes and/or systems at the research, development and extension stage to:</p> <ul style="list-style-type: none"> ■ Limit production losses from weeds, diseases and pests, including incursion threats ■ Increase the genetic potential of sugarcane ■ Improve harvesting systems relevant to the current economic drivers and requirements of the millers, growers and harvester operators.
Outcome	<p>A profitable and market-driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane through:</p> <ul style="list-style-type: none"> ■ Increased adoption of technologies, plant varieties, practices, processes and systems by growers, millers and harvest operators. ■ Pest, disease and weed management operations more finely tuned to limit biotic losses. <ul style="list-style-type: none"> – Reduce associated cane production losses by 15% of 2017. – Commercial cultivars achieve 40% of genetic potential. ■ Improved control over success of the industry breeding program and broaden the genetic base of the parent population. <ul style="list-style-type: none"> – Achieve greater than 85% of desired parental crosses. ■ Harvesting system that supports the commercial expectations of growers, millers and harvester operators. <ul style="list-style-type: none"> – Reduce field harvester losses by 50% by 2017.

NCA012 – UV absorption as a tool for growers to benchmark humified organic carbon in soil

(Funded July 2012 – January 2014)

This new research project led by the National Centre for Engineering in Agriculture will assess the ability of UV absorbance to be used as a method to measure the humified organic carbon fraction in soil. This may be a useful low-cost addition to a soil health tool kit to help growers benchmark changes in soil health.

DPI020 – Management solutions to optimise performance of new farming systems in southern cane lands

(Funded July 2008 – October 2012)

This research project is led by the University of Queensland QAAFI Institute (Queensland Alliance for Agriculture and Food Innovation) and jointly funded with the Grains Research and Development Corporation. The project focuses on the integration of grain legumes (mainly soybeans and peanuts) into the sugarcane farming system of southern cane lands.

This involves investigation of:

- How to optimise performance of the legume when you transition out of sugarcane – the affect of tillage (or lack of it) on legume growth, nitrogen fixation and grain quality; and methods of legume inoculation, generally in interaction with tillage/ trash management, to ensure adequate nitrogen fixation.
- How to maximise the benefits of the legume fallows (pathogen regulation, disease suppression, residual nitrogen) for the subsequent cane crop cycle – quantifying nitrogen and pathogen dynamics during the cane cycle following different types and durations of breaks, and comparing the legume fallows to other rotation options.
- How to optimise the whole farming system to enhance profitability without sacrificing sugar production – this involves looking at break duration, crop choice and cane planting time.

The project has three long term trial sites and is also monitoring nodulation and N₂ fixation in commercial peanut and soybean crops across the region:

1. The first trial is a crop sequence trial examining the impact of break species, break duration and liming strategies on nematode populations, nitrogen and carbon dynamics, soil biology and cane productivity.
2. A second trial examines the impact of tillage, inoculation and trash management on soybean productivity, nitrogen fixation and nitrogen return to the cropping system.
3. The final site has been established to look at the effects of tillage and trash management on growth and nitrogen fixation by fallow peanut crops.

In 2012–2013 the project will:

- Complete the ¹⁵N nitrogen assessment of peanut and soybean biomass from previous studies at the successive trash by tillage experiments (peanuts and soybeans), to determine the impact of soil nitrogen dynamics on net legume nitrogen additions to the cropping system.
- A survey of peanut and soybean crops in the Bundaberg and Isis areas has been undertaken to determine the proportion of crop nitrogen from fixation under commercial production systems. These data will be of considerable value to future nutrient management guidelines in sugarcane systems using fallow legume crops.
- The three long term experimental sites have been sampled for biomass in the first ratoon (crop sequence and 1st trash by tillage site) and plant (2nd trash by tillage site) crops, and we hope to mechanically harvest crop yield later in 2012, before the sites are returned to the collaborating growers. The project is scheduled to finish in mid 2012, but it is hoped that an extension of time will allow at least a final yield to be collected using existing project funds. This will not, however, allow for assessments of residual nitrogen benefits and carryover pathogen dynamics.

DPI022 – Integration of sugarcane, grains, grain legumes and cotton in sustainable irrigated cropping systems in the Burdekin

(Funded June 2011 – June 2015)

This research project will complete an integrated study of Burdekin farming systems involving sugarcane, grains, grain legumes and cotton. The project is led by the Queensland Department of Employment, Economic Development and Innovation (DEEDI) and is jointly funded by SRDC and Grains Research and Development Corporation with additional in kind support provided by BSES and CSIRO. The project will conduct baseline studies to determine the feasibility and likely productivity issues associated with developing an integrated farming system involving sugarcane, with possible rotation crops such as maize, grain legumes and others in the Burdekin Irrigation area.

This project will develop much needed data that will clearly define the impact of planting date on cane productivity and profitability and how this is influenced by different break crop species and duration. Importantly, this project will also seek to optimise agronomic production packages for grain legumes and maize within these defined seasonal windows.

Currently there is a lack of information, particularly for the soils of the Burdekin River Irrigation Area on integration of sugarcane farming systems developed from the Sugar Yield Decline Joint Venture using legume and cotton rotations. The expected outcome of this project will be that growers will be able to make informed decisions on the likely impact that crop diversification may have on enterprise profitability and cane productivity, with the resulting benefit of improved farming system flexibility and industry resilience in periods of fluctuating seasonal conditions and commodity prices.

In 2012–2013 the project will investigate these interactions on a large, complex field trial in the Burdekin Irrigation Area. A trial site has been established on a grower co-operator farm at Mona Park (near Clare). This site was planted to fallow break crop treatments of soybeans, cowpeas and cotton in December 2011. It is intended to plant cane in March, May, August and October at the Mona Park site, however the late wet season of 2012 is causing delays to the desired program.

Experiments in grain agronomy in soybeans, maize and mungbeans will also be established at the DEEDI Ayr Research Station and possibly other sites in the Burdekin over the 2012–2013 year.

DPI023 – Better integration of peanuts into a precision controlled traffic sugarcane farming system – study tour

(Funded 1 May 2012 – 1 October 2012)

Peanuts have played an integral role in underpinning the sustainability of sugarcane farming systems in the Childers/Bundaberg area. This capacity building project will enable two representatives from the local area (DEEDI Agronomist and a local cane grower) to tour the American peanut industry to investigate American production techniques and farming systems. The intent is to identify aspects of the farming system that can be transferred to an Australian setting to improve profitability. The participants also plan to meet with peanut harvesting equipment specialists AMADS to look at potential modifications of equipment so that wheel spacing is matched to Australian cane row spacings.

GGP047 – Maximising soys in Central Queensland

(Funded March 2009 – October 2012)

This grower group project led by the Mackay Soybean Study Group is testing soybean varieties (up to six varieties, including two experimental lines) to establish how well suited the selected varieties are to the central region and its climatic conditions. The project trials aim to identify optimum plant date and density, compare flat planting versus mound planting and evaluate different row spacing. The group will also investigate what parameters determine whether a soybean crop is utilised for green manure or for grain. The project is conducting the research and development in the central region and thus producing reliable information for local growers.

In 2012–2013 the grower group project will continue to manage the second year trial sites, harvest sites and analyse the data to determine results. In addition to the final report which is due in late 2012, the project will also develop a variety information leaflet for the central region.

GGP053 – Improvement of internal soil drainage and yield on heavy clay soils in the Herbert

(Funded January 2010 – December 2014)

The Molonga Grower Group of Ingham is undertaking this project with the aim of addressing drainage issues in areas of clay soils in the Herbert region. The group is investigating three methods (zonal application of mill ash below the soil surface, GPS positioned mole drainage, and single leg deep ripping below the cane row using zonal tillage), to potentially increase internal soil drainage and cane yields. Information will be extended to other farms within the region with similar problems.

This project was only able to establish trial sites last season because of adverse weather conditions, however 2012–2013 will see the beginning of the delivery of results from these trial sites.

GGP059 – Developing prescription compost to suit specific soils in Maryborough

(Funded February 2010 – December 2013)

The Driving Agricultural Goals Grower Group in Maryborough has been creating their own compost and has constructed a novel machine that drills compost through a trash blanket for side dressing cane and soybeans. This project is assisting the group to take the next step and develop methods to tailor the nutrient composition of the compost to soil requirements. This will allow compost to be a complete nutrient source for cane and soybeans.

The group need to understand the effect that various feed stocks (animal manures, bio-solids and saw dust) have on the nutrient composition of their compost and where needed, mix-in additional fertiliser nutrients thus providing a prescription compost that addresses the particular paddock nutrient requirements.

In 2012–2013 the grower group project will harvest the field trial and analyse the results.

GGP060 – Developing a robust soybean industry in Central and Northern Queensland

(Funded January 2011 – December 2013)

This Grower Group project led by the United Soybean Growers Group and collaborators HCPSL and Farmacist builds upon the work being conducted by other related SRDC funded projects. This project aims to evaluate new Australian soybean varieties as well as import internationally sourced non-GM soybean varieties into Australia to develop a robust soybean industry suited to the climatic conditions of North Queensland.

In 2012–2013 the project will report on soybean variety characteristics which will provide valuable information for the selection of soybean varieties and market options for each variety. Three trial sites have been established in Mackay, Burdekin and Ingham regions which is a first for the Grower Group Innovation Program and demonstrates the benefits of collaboration for the benefit of the sugar industry.

GGP062 – Evaluation of longer term responses to compost when using nutrient accumulating crops and weeds as feedstocks

(Funded August 2011 – December 2012)

The Advanced Nutrient Solutions Grower Group from Mackay has been producing compost using sugarcane industry residues and waste products based on the Lubke controlled microbial compost technique. However many composting practitioners report an increased loss of compost nutrients and beneficial soil micro-organisms using this technique. As such the group will now investigate the use of a new technique, static pile composting, to generate several small compost piles of approximately 3–10 tonnes.

This grower group project will also investigate the use of nutrient accumulating plants rather than only industry waste products as the raw compost feedstock. The hope is that nutrient rich feedstocks will improve the nutritional profile of the compost and that by manipulating the ratio of these feedstocks, composts of differing nutritional value can be created.

In 2012–2013 the Project Steering Committee will meet in order to review project results and determine future directions. The project results achieved to date will be shared with the local and broader industry where possible.

GGP065 – Using distribution & changes in soil organic carbon as a basis for adjusting in field N application rates and valuing carbon changes
(Funded May 2012 – March 2015)

Organic carbon content can vary significantly in sugarcane soils and research has shown soil organic carbon levels anywhere between 0.4% to over 2%. As such, the Homebush Innovative Grower Group from Mackay is interested in trialling equipment imported from the USA that is capable of mapping organic carbon distribution in soils. The new grower group project will use this soil organic carbon variability information to then tailor their nitrogen application rates accordingly.

In 2012–2013 the group plans to establish six trial sites, each approximately ten hectares in size, across the Mackay district. The trial sites will assess the yield effect of variable nitrogen application in contrast to the standard one-rate application method commonly used throughout the industry.

GGP067 – Assessing the impact of biochar in the Herbert cane industry
(Funded May 2012 – August 2014)

The Biochar Grower Group of Lannercost lead this new Grower Group project that will assess the impact of compost and biochar amendment on low cation exchange capacity soils that are subject to significant potential nitrogen losses and are generally low in general soil nutrition. This project will be the first time a trial has been established to quantify and validate the use of biochar and compost in combination in tropical sugarcane production.

STU070 – Richard Brackin – Microbiology of sugarcane soils. University of Queensland
(Funded January 2010 – July 2013)

This PhD project will continue to further gain knowledge and understanding about how management strategies can be used to promote healthy soil through soil biology, while assessing the potential of a variety of ‘new’ soil additives in terms of their effect upon soil biology and soil health. These results will aid in developing new “best practice” management guidelines.

This year this project will examine the impacts of soil compaction upon soil biological communities and their function, and assess a range of industry organic waste products for their potential to increase soil microbial populations and soil organic carbon levels.

UQ044 – SaveN Cane: Developing selection tools for nitrogen efficient sugarcane
(Funded July 2009 – December 2013)

This continuing research project, led by the University of Queensland and BSES, aims to advance knowledge of traits that make sugarcane more nitrogen efficient. Such traits will assist in developing tools for breeding nitrogen use-efficient varieties, thus lowering the demand for fertiliser.

In 2012–2013 the project will evaluate the performance of a first ratoon crop (Burdekin) and a plant crop at a second site (Mackay). Accompanying the field trials are glasshouse-based experiments that examine genotypes which display contrasting behaviour in the field. Current experiments are investigating nitrogen use in the context of tillering, early root growth and water availability. Two experiments have been completed in early 2012 and are being prepared for publication.

Investment Program	Growing the Crop
Investment Category	A4 – Harvesting
Deliverables and Measures of Success	<p>Number of technologies, plant varieties, practices, processes and/or systems at the research, development and extension stage to:</p> <ul style="list-style-type: none"> ■ Limit production losses from weeds, diseases and pests, including incursion threats ■ Increase the genetic potential of sugarcane ■ Improve harvesting system relevant to the current economic drivers and requirements of the millers, growers and harvester operators.
Outcome	<p>A profitable and market-driven industry underpinned by advanced technology producing a reliable and increasing supply of sugarcane through:</p> <ul style="list-style-type: none"> ■ Increased adoption of technologies, plant varieties, practices, processes and systems by growers, millers and harvest operators. <ul style="list-style-type: none"> – Reduce associated cane production losses by 15% of 2017. – Commercial cultivars achieve 40% of genetic potential. ■ Improved control over success of the industry breeding program and broaden the genetic base of the parent population. <ul style="list-style-type: none"> – Achieve greater than 85% of desired parental crosses. ■ Harvesting system that supports the commercial expectations of growers, millers and harvester operators. <ul style="list-style-type: none"> – Reduce field harvester losses by 50% by 2017.

NET001 – Quantification of the potential to reduce harvesting losses by utilisation of field edge trash separation technology
(Funded July 2012 – July 2013)

This new research project led by Norris Energy Crop Technologies will use field-edge trash separation technology to quantify the impact of different trash extraction and billet length strategies on overall sucrose recovery. A series of replicated field demonstration trials will be used to study the impact of supplementary cleaning on harvesting, transport and milling losses/recoveries.

BSS318 – Measurement of in-field sucrose loss by mobile refractometry
(Funded July 2008 – August 2012)

Adoption of harvesting best practice has been constrained by the difficulty of demonstrating sugar losses from sub-optimal harvesting. This four year research project, led by BSES, will build on previous work which developed a method of rapid sugar measurement, to develop a mobile system which enables industry staff to quickly test sugar loss levels in the field. The project has been testing whether Brix refractometry is a reliable method for determining the sucrose content of harvest residue.

In 2012 the focus of this project will be to develop a final report that delivers a summary of the field trials and the overall effectiveness of this mobile system as a tool for harvester performance assessment.

Investment Program	Milling the Crop
Investment Category	B1 – Mill capital use and operating efficiency
Deliverables and Measures of Success	Number of technologies, practices and/or systems at the research, development and extension stage to: <ul style="list-style-type: none"> ■ Improve processes and materials within sugar mills ■ Support the industry capacity to produce quality sugar to meet market needs ■ Development of market appropriate and optimum performance cane transport systems ■ Maintain an awareness of, and facilitating where possible, value adding opportunities to the current use of the sugarcane plant and its co-products.
Outcome	A profitable milling sector utilising improved technologies and processes through: <ul style="list-style-type: none"> ■ Increased adoption of technologies, practices and/or systems ■ Improved technical and commercial efficiency of the milling operation ■ Raw sugar quality measures supporting market demands ■ Mill transport systems capable of operating at optimum performance ■ Decreasing unit cost of transport and milling operations ■ Greater value derived from sugarcane products.

QUT054 – Determine the optimum tube dimensions for Robert evaporators through experimental investigations and CFD modelling
(Funded July 2012 – July 2015)

This new research project led by Queensland University of Technology seeks to determine the optimum tube dimensions for Robert evaporators under a variety of juice processing conditions. Substantial savings in capital cost, installation cost and floor space in factories can be made if tubes of smaller diameter and greater length can be used and still provide sufficient heat transfer performance. An experimental rig would be relocated to Rocky Point Mill for testing and the project would involve the recruitment of a PhD student.

QUT055 – Improved modelling of wet scrubbers
(Funded July 2012 – July 2015)

This new Research Project led by Queensland University of Technology seeks to identify the most advanced sub-models available for predicting the various flow processes in wet scrubbers, and to incorporate these models into a Computational Fluid Dynamics code. Wet scrubbers are an effective means of removing dust from boiler flue gas and are currently used in 50% of the industry's boilers. There are several operational issues associated with wet scrubbers that require optimisation.

BSS352 – Developing measurement tools for nutrients and heavy metals in mill by-products
(Funded July 2012 – July 2014)

This new BSES led research project aims to use NIR technology to develop rapid, easy to use tools for measurement and monitoring of major nutrient elements and heavy metal pollutants in sugar mill by-products. NIR based tools will be developed and will be available to milling and farming groups as a product characterisation package.

QUT056 – Flocculation and sedimentation of slow settling mud and mud cake conditioning

(Funded July 2012 – January 2015)

This new Queensland University of Technology led research project will characterise the soil types responsible for slow settling mud in the mill clarifiers and examine additives which will improve coagulation/ flocculation. Mills from time to time experience periods of poor clarification due to the soil and clay types coming in with the cane supply. The project will examine conditioning parameters for mud cake, measuring permeability and assessing methods to best recover residual sugars.

GGP063 – Investigating renewable feedstocks such as Kenaf and Sunn Hemp for cogeneration

(Funded April 2011 – May 2013)

The Mackay Fibre Producers grower group are investigating the combustion properties of two fibre crops (Kenaf and Sunn hemp) to assess their suitability as a co-generation feedstock at a Mackay sugarcane mill. The project will assess the combustion properties and the transport and handling requirements of the fibre crops. The hope is that these fibre crops may be utilised during parts of the year when sugarcane bagasse is unavailable and coal is used as a supplementary feedstock.

In 2012–2013 the project will develop a harvest plan for the sites, will construct a modified chopper drum to fit a cane harvester and will investigate the logistics of transporting the fibre crops. The economics of both growing and then transporting fibre crops to the mill will be assessed. Combustion tests for both Kenaf and Sunn hemp will be conducted and results will be compared to those available in published literature. All of this information will then be used to develop a business case to determine the feasibility of replacing coal feedstocks with fibre crops. The project is due for completion in May 2013 and all results will be reported in the project final report.

QUT014 – Recovery of sucrose Project 2

(Funded July 2010 – December 2012)

One of the current issues facing sugar millers is the inability to reduce the steam consumption of the factory to improve the returns in cogeneration or to produce excess bagasse, which can be used as a feedstock for value adding products. Likewise there are additional value adding components contained in sugar juice solutions that cannot be recovered using conventional sugar recovery processes. This research project led by the Queensland University of Technology will focus on optimising a new sugar recovery process to extract high purity sugar with the use of a pilot plant rig.

In 2012–2013 the project will conduct experiments to recover sugar from sugar juice solutions, and assess the financial incentives of the new sugar recovery process. Experimental conditions for the new sugar recovery process will be optimised in order ensure a high grade product is recovered. Process modeling using HYSYS will determine the mass and energy balances of the overall process for full scale operations so that power generation, operating costs and sugar recovery can be detailed and financial returns investigated for this new sugar recovery process.

QUT032 – Developing a new methodology for competency based training courses for shift supervisors in sugar factories

(Funded November 2008 – May 2013)

This Queensland University of Technology led research project continues to develop a new training methodology designed to better integrate learning within the workplace using authentic tasks and identified competency standards. The outputs from this project will include supervisors of a higher calibre, and with a higher degree of job and career satisfaction. Factories will benefit from the increased skill level of supervisory staff and through a long term commitment by these key staff to the industry. The course material will also be suitable for operator training.

In 2012–2013 this project aims to complete the development of the eight training modules and have mill staff accessing these modules for 'on the job training' via the QUT website.

QUT038 – Implement supervisory/advisory control and pan and fugal stations

(Funded July 2010 – December 2013)

This Queensland University of Technology led research project involves the implementation of a smart supervisory/advisory control system (SSCS) for pan and fugal station operations and to demonstrate and evaluate its effectiveness and acceptability by factory operators, supervisors and management. The SSCS will provide advice to supervisors and operators so that early decisions, such as changes to steam rates or allocation of pans to different duties, result in improved outcomes with respect to avoiding production rate difficulties, and maintaining good operational performance with respect to sugar quality, sugar recovery and minimisation and smoothing of steam consumption on the pan stage.

In 2012–2013 the project will install the SSCS in preliminary form onto the pan stage at a factory and link it with the factory’s databases for the cane receivables and control systems. The operators will be encouraged to utilise the system to obtain recommendations in terms of processing decisions.

QUT040 – Advanced computer simulation of sugar factories SysCAD

(Funded July 2010 – May 2013)

This research project led by the Queensland University of Technology will continue to develop a highly adaptable ‘whole of sugar factory’ process model for ‘whole of plant’ assessments of sugar factories with the option to use either generic models or specific complex models for individual unit operations.

In 2012–2013 the project will continue the development of the SysCAD models for the individual unit operations, link these to provide models for areas of the plant and, once validated, link these models to produce the ‘whole of sugar factory model’. The models will be validated against factory data.

QUT046 – Evaluation of mud filtrate clarification options to improve factory performance

(Funded July 2011 – May 2013)

This research project led by the Queensland University of Technology builds on a previous SRDC funded project (TSL001), which found that the quality of the mud filtrate could be improved through a simple clarification step. This project aims to expand on this initial finding by identifying the optimum conditions for the clarification of mud filtrate; evaluating and quantifying the improvements to factory operation that can be obtained; and determining the economic feasibility of filtrate clarification for various installation scenarios in Australian factories.

Laboratory trials have been completed and show that a simple sedimentation process rather than a flotation process results in effective clarification of mud filtrate. In 2012–2013 a small-scale sedimentation clarifier will be modified so that pilot filtrate clarification trials will be conducted.

QUT048 – Evaluate Brazilian mud filtration technology to benefit Australian factories

(Funded July 2011 – June 2012)

This Queensland University of Technology led research project aims to evaluate the performance and operational characteristics of a Brazilian mud filtration system for use in Australian factories (based on data sourced remotely from appropriate contacts in mills with the Brazilian filter). It is expected that an Australian factory will install a commercial scale mud filter of this technology in 2012 or 2013. Queensland University of Technology staff will assist the factory in planning the installation and evaluating the performance of the filter. A financial analysis will be undertaken in terms of pol recovery, capital, maintenance and operating costs when compared with a similar assessment for a conventional rotary vacuum filter. The operating costs will include transportation costs for delivering the filter cake to sugarcane fields.

During 2012–2013 this project will evaluate the performance of the Brazilian Technopulp filter unit subject to it being installed at an Australian mill.

QUT050 – Improving the performance and specification of evaporator stations

(Funded July 2011 – August 2013)

This research project led by Queensland University of Technology aims to improve the performance and specification of evaporator stations by investigating changes in heat transfer efficiencies as a result of changed vapour rates to individual vessels and the effects of retrofitted changes to the evaporator stations. The major outputs from this project will include recommendations on how to achieve increased juice processing capacity for the evaporators.

In 2012–2013 this project will obtain heat transfer performance data from several factories during trials in which the vapour rates to specific vessels are changed. The heat transfer coefficients for the different operating conditions will be determined. As well, heat transfer performance data will be obtained at two factories where modifications to Robert evaporator vessels are being made.

Investment Program	Milling the Crop
Investment Category	B2 Enhancing the value of existing products
Deliverables and Measures of Success	<p>Number of technologies, practices and/or systems at the research, development and extension stage to:</p> <ul style="list-style-type: none"> ■ Improve processes and materials within sugar mills ■ Support the industry capacity to produce quality sugar to meet market needs ■ Development of market appropriate and optimum performance cane transport systems ■ Maintain an awareness of, and facilitating where possible, value adding opportunities to the current use of the sugarcane plant and its co-products.
Outcome	<p>A profitable milling sector utilising improved technologies and processes through:</p> <ul style="list-style-type: none"> ■ Increased adoption of technologies, practices and/or systems ■ Improved technical and commercial efficiency of the milling operation ■ Raw sugar quality measures supporting market demands ■ Mill transport systems capable of operating at optimum performance ■ Decreasing unit cost of transport and milling operations ■ Greater value derived from sugarcane products.

QUT053 – Process for making bagasse paper pulp
(Funded May 2012 – April 2016)

This Queensland University of Technology led research project is working closely with EnviroFibre, an industry-based group from Babinda, North Queensland, to evaluate and demonstrate an economical small scale process for producing high value market pulp and good quality fertiliser from bagasse. In recent years, the Australian sugar industry has experienced high variability in commodity prices and weather conditions. Diversification of the income stream will assist to protect the industry during periods of low financial returns of sugar products.

A laboratory evaluation will be conducted to determine optimum pulping processing conditions for bagasse, followed by pilot scale trials. The project aims to create tonnage quantities of pulp which will be evaluated to determine whether the pulp can replace imported bagasse pulp.

In 2012–2013 the project will establish a Project Steering Committee, conduct a literature review and will begin laboratory based pulping experiments.

NSC020 – Commercialisation of low cost trash separation plant
(Funded July 2010 – May 2014)

This NSW Sugar Milling Co-operative led research project is based on the design, construction and optimisation of a low cost, factory based trash separation plant at Condong Sugar Mill. A separation plant is of interest to the Co-operative to enable growers to harvest whole-crop cane (i.e. includes stalk, trash and tops) to eliminate field burning of cane and increase the mass of fibre available for cogeneration activities.

In 2012–2013 the project will complete a financial analysis of the plant and the overall economics of trash supply, upon which a stop/go decision will be made. If the project is to proceed, orders will be placed for equipment and a construction contractor will be engaged. It is anticipated that construction of the trash separation plant will be complete by the end of 2012–2013 and commissioning of the plant will have begun.

QUT036 – Production of biofuels and value added co-products from thermo-chemical processing of sugarcane bagasse
(Funded July 2009 – May 2014)

This Queensland University of Technology led research project will continue to develop economically viable technologies for the production of biofuels, platform chemicals and other value added products from bagasse using thermo-chemical processing.

The main outputs are the development of new pre-treatment, hydrothermal liquefaction, fractionation and upgrading processes to manufacture fuels or supply a bio-oil feedstock suitable for processing to hydrocarbon fuels at conventional oil refineries. It also aims to further develop the production methodology for platform or commodity chemicals e.g. levulinic acid and phenolic compounds and their derivatives from the fractionated cellulose and lignin components of bagasse.

In 2012–2013 the project will complete experimental trials aimed at optimising process conditions for a proposed hydrothermal liquefaction based thermochemical concept.

QUT049 – Biomass characterisation facility for extended stockpile model accuracy and capability
(Funded July 2011 – June 2014)

This research project is led by the Sugar Research and Innovation group at Queensland University of Technology and aims to deliver the experimental means, data and model refinements necessary to advance the capabilities of an existing model to the stage of being a practical stockpile design and management tool for the sugarcane industry. The benefits of the existing model with these proposed enhancements will be an increase in the accuracy of prediction of heating effects in biomass stockpiles and the impact of long term storage on fuel quality.

In 2012–2013 a purpose built experimental facility for the direct measurement of flow and heat generation within specific biomass samples will be built and commissioned. Measured data from this facility provides the model inputs required for accurate prediction of large scale, long term storage of the experimentally characterised biomass.

QUT051 – Revenue diversification from sugarcane fibre: novel technologies for the processing of bagasse for low-cost biofuels production
(Funded July 2011 – August 2014)

This research project led by the Queensland University of Technology aims to develop and demonstrate novel low cost technologies for the pre-treatment of sugarcane bagasse. Effective pre-treatment of bagasse is required for the conversion of fibre carbohydrates into biofuels or green chemicals via fermentation pathways. Chemical and biofuel products offer significant potential for the sugar industry to diversify and gain new sources of revenue.

In 2012–2013 this project will continue the process of optimising novel processing technologies for biomass and demonstrating the production at pilot scale at the Mackay Renewable Biocommodities Pilot Plant. Preliminary techno-economic analyses of the processes will be reviewed based on updated pilot scale process information.

STU066 – Darryn Rackemann – Production of levulinic acid and its derivatives from sugarcane biomass
(Funded July 2009 – July 2013)

This PhD project at the Queensland University of Technology is investigating how to optimise and integrate the thermo-chemical production and recovery of levulinic acid and its derivatives from sugarcane bagasse in sugar factories. Initial results have shown that strong biodegradable sulfonic acids are able to produce similar chemical yields to conventional technology without the drawbacks of using corrosive mineral acids.

In 2012–2013 this project will examine the use of green co-solvents within the process to assist with product recovery and detail the integration into a sugar factory.

STU067 – Kameron Dunn – Conversion of lignin to industrial fuels and chemicals
(Funded July 2009 – July 2013)

This PhD project at the Queensland University of Technology aims to develop a sustainable economically viable process for the conversion of sugar cane lignin via hydrolysis into oils, and the fractionation of these oils into various compounds for industrial applications. The targeted products are biofuel and higher value platform chemicals such as phenolics. To date this project has identified the influence of pre-treatment techniques on the recovered lignin structure and on the subsequent oil yields recovered from the hydrolysis of sugar cane lignin. Likewise the choice of catalysts and concentrations, and reaction times has been assessed. Optimum conditions have been determined for targeted chemical compounds and chemical structures.

During 2012–2013 this project will complete the optimisation of the hydrolysis of sugar cane lignin by investigating the impact of temperature to recovered oil yields and to the products produced. Reaction techniques to minimise repolymerisation of monomer structures will also be assessed. Fractionation and purification trials will be undertaken to isolate desirable products, and develop HYSYS models of the lignin hydrolysis process when integrated into an existing sugar milling process.

STU068 – Patrick Bewg – Modification of lignin biosynthesis in sugarcane for the production of cellulosic ethanol
(Funded February 2010 – July 2013)

This PhD project at the Queensland University of Technology involves transforming sugarcane with either maize or sugarcane gene sequences known to down-regulate lignin biosynthesis. This will allow for an increase in the cost-efficiency of bioethanol production from the sugarcane bagasse without negatively impacting growth and sugar production. Concurrently, a developmental profile of lignin biosynthesis and deposition in sugarcane as it matures is also underway.

As the sugarcane transformed with maize genes has recently been confirmed to have significant reductions in lignin content, 2012–2013 will involve

further analysis and characterisation of these plants including small-scale enzymatic hydrolysis to confirm the lignin reduction can improve the production of bioethanol from these plants.

During 2012–2013 the remaining transformed sugarcane will be assessed, firstly measuring lignin biosynthesis and content with further analyses based on these initial results. It is also expected to see the conclusion of the lignin development profile comparing biosynthesis gene transcription levels with cell wall formation.

STU071 – William Gilfillan – Biodegradable polymer nanocomposites derived from natural fibre and starch

(Funded January 2011 – July 2014)

This PhD project at the Queensland University of Technology aims to develop starch based biodegradable composites by blending nanofibres derived from sugar cane bagasse and starch. Work so far has shown that the addition of bagasse fibre to starch reduced moisture uptake and increased the mechanical properties of the films.

During 2012–2013, work will extend to cross-linking the films with the addition of additives and sugar cane bagasse nanofibres. This is expected to significantly improve moisture uptake and the mechanical properties of bagasse-starch films.

UQ048 – Sugar cane feedstock into fuel additives and chemicals: Conversion to furan derivatives by catalytic processes

(Funded July 2011 – May 2014)

This University of Queensland led research project aims to develop novel materials to be used as catalysts for the production of furan derivatives from sugar waste components. Furan derivatives are one of the most exciting products because they aid in achieving secure energy supply through production of gasoline additives and chemicals from renewable biomass.

The project will develop new catalysts and processes to convert cellulose directly into levulinic acid which can be converted to 2-methyl-tetrahydrofuran which can be used as a gasoline additive with up to 70% blend in current engines.

Investment Program	Milling the Crop
Investment Category	B3 Transport efficiency
Deliverables and Measures of Success	<p>Number of technologies, practices and/or systems at the research, development and extension stage to:</p> <ul style="list-style-type: none"> ■ Improve processes and materials within sugar mills ■ Support the industry capacity to produce quality sugar to meet market needs ■ Development of market appropriate and optimum performance cane transport systems ■ Maintain an awareness of, and facilitating where possible, value adding opportunities to the current use of the sugarcane plant and its co-products.
Outcome	<p>A profitable milling sector utilising improved technologies and processes through:</p> <ul style="list-style-type: none"> ■ Increased adoption of technologies, practices and/or systems ■ Improved technical and commercial efficiency of the milling operation ■ Raw sugar quality measures supporting market demands ■ Mill transport systems capable of operating at optimum performance ■ Decreasing unit cost of transport and milling operations ■ Greater value derived from sugarcane products.

QUT033 – Improving the efficiency of traffic office operations through improved traffic officer training
(Funded November 2008 – August 2014)

This Queensland University of Technology led research project continues to provide a new structured training package for cane transport staff using innovative methods to efficiently get new staff trained to a defined standard. The project focuses on needs of transport schedulers and planners who ensure the timely delivery of cane bins to harvesters and the factory and minimise cane age given system constraints. In 2012–2013 the project will deliver three additional training modules. The topics for these modules are *Scheduling, Supervision and leadership and Contractor and staff relationships*.

QUT047 – Increasing harvest and transport efficiency through the use of locomotive GPS
(Funded July 2011 – August 2014)

This Queensland University of Technology led research project will process locomotive GPS data and produce summaries showing average times and the range of times of trips and shunts so that this real data can be used in schedule development and simulation to produce better schedules. The outputs of this project will include increased functionality of the current TOTools software that is used for rail transport scheduling by mills within the Australian Sugarcane industry, increasing efficiencies in harvesting and milling processes.

During 2012–2013 this project will employ or develop algorithms to match activities defined in TOTools with the movements of locomotives recorded by GPS. The algorithms will be tested against manual interpretation of the GPS records to determine their accuracy. Once validated, the algorithms will be added to the TOTools software and reports will be developed to summarise the GPS data.

Investment Program	Milling the Crop
Investment Category	B4 – Raw Sugar Quality
Deliverables and Measures of Success	Number of technologies, practices and/or systems at the research, development and extension stage to: <ul style="list-style-type: none"> ■ Improve processes and materials within sugar mills ■ Support the industry capacity to produce quality sugar to meet market needs ■ Development of market appropriate and optimum performance cane transport systems ■ Maintain an awareness of, and facilitating where possible, value adding opportunities to the current use of the sugarcane plant and its co-products.
Outcome	A profitable milling sector utilising improved technologies and processes through: <ul style="list-style-type: none"> ■ Increased adoption of technologies, practices and/or systems ■ Improved technical and commercial efficiency of the milling operation ■ Raw sugar quality measures supporting market demands ■ Mill transport systems capable of operating at optimum performance ■ Decreasing unit cost of transport and milling operations ■ Greater value derived from sugarcane products.

No commercial SRDC funded projects relating directly to B4 Raw Sugar Quality will commence in 2012–2013. However new projects may be approved in future years.

Investment Program	Environment
Investment Category	C1 – Positioning industry as a leader in environmental responsibility
Deliverables and Measures of Success	<ul style="list-style-type: none"> ■ Develop and implement an environmental stewardship program ■ Investigation of product diversification/waste utilisation opportunities completed ■ A longitudinal study of industry economic, environmental and social footprint.
Outcome	<p>A sugar industry maintaining an awareness of and implementing best practices to ensure the impact of the industry's operation on neighbouring environments is reduced as indicated by:</p> <ul style="list-style-type: none"> ■ Industry participation in the environmental stewardship programs and increased adoption of associated best practices ■ Government and public acknowledgement of sugar industry's environmental performance ■ Business development based on utilisation of cane by products ■ Cropping and milling technologies and processes based on more sustainable inputs.

CGH003 – Herbert catchment water quality monitoring – Sugar industry and catchment partnership

(Funded May 2011 – September 2014)

Initiated by Herbert River Canegrowers this research project is led by Terrain Natural Resource Management who have brought a range of industry and Government partners together to identify sources of reef pollutants (such as sediments, nutrients and pesticides) which may exist in the region. Partners include representatives from the Queensland Department of Environment and Resource Management (DERM), the Department of Employment, Economic Development and Innovation (DEEDI), local Governments and Councils, and grazing, mining and conservation industry representatives.

The project aims to develop and implement an integrated monitoring program to inform landholders and extension staff involved in improving land management practices associated with water quality. The regional monitoring program forms a part of a Great Barrier Reef Wide integrated monitoring, modelling and reporting program, the 'Paddock to Reef Program'.

Year one of the project will provide relevant baseline on water quality for many sub-catchments, to reflect changes that have occurred in the catchment over the past 20 years for water quality in Herbert River, while the project's annual review process will look to identify any, hotspots, gaps or opportunities to modify or add value to the current program in order to better inform the Paddock to Reef Program to improve the sustainability of the sugar and other industries in the Herbert.

The project is currently monitoring sediments, including total suspended solids and particle size analysis; nutrients (total nitrogen and phosphorus), as well as PSII pesticides, which are all thought to have detrimental effects on the health of the Great Barrier Reef, and are being collected at 16 sites across the Upper and Lower Herbert Catchment. Analysis of the samples will be coordinated by the Australian Centre for Tropical Freshwater Research (James Cook University), while a team of suitably qualified water scientists will be involved in reviewing the data and making any necessary interpretations.

In 2012–2013 the data from year one will be provided to the Paddock to Reef program in order to calibrate the source catchment modelling being used to measure relative changes in water quality.

Any knowledge gaps that may exist can be identified before the next wet season in order to modify sampling regimes and protocols if necessary. This program is currently intended to run for 3 years, with this adaptive management approach, to provide adequate data over seasonal variations to improve the reliability of the data and better inform the subsequent management scenarios modelling can provide.

CVA003 – Managing Climate Variability Program
(Funded December 2007 – September 2013)

SRDC will continue its support to improve seasonal forecasting and provide tools and services to manage climate risk on farm through its investment in the Managing Climate Variability Joint Venture. This joint venture (JV) is managed by the Grains Research and Development Corporation on behalf of the JV partners (Grains Research and Development Corporation, Meat and Livestock Australia, Rural Industries Research and Development Corporation, and SRDC). For 2010–2013 the aim of the JV is to continue investment in the following four areas:

- *Climate forecasting research* – Climate science projects aimed at improving the skill of forecasts, from multi-week to seasonal, and improving the prediction of extreme events. Most of this investment is in partnership with the Bureau of Meteorology and includes delivery of products through Water and the Land (WATL).
- *Climate forecasting development and services* – Translating climate forecasting research outputs into climate forecasting products such as soil moisture and run-off for Australian agriculture.
- *Climate risk management for agriculture* – in particular decision-support applications.
- *Climate knowledge, adoption and communication* – Fostering increased adoption of climate-risk management tools on farm through, for example, the *Climate Champion* program and *Climate Kelpie*. The Climate Champion program is made up of 34 innovative farmers using climate forecasts and considering climate risk as major inputs to their enterprise management strategies. The Climate Kelpie website provides a range of climate information, links to tools and resources for farmers and agricultural industries.

Forecasting improvements: Investment in improved seasonal forecasts will increase the accuracy of forecasts of variables such as solar radiation, evaporation, wind etc. on time scales from a few days out to climate change time frames. For example, the models can now provide forecasts at seven days that are approaching the skill of the three day outlook and this is helping with on-farm decisions such as fertiliser applications. Bureau of Meteorology projects funded by the Managing Climate Variability Program have resulted in the Madden Julian Oscillation being incorporated into the climate model, POAMA, and routine forecasts and have led to improved skill through a better representation of tropical convection in the models.

Several projects to be completed in 2012–2013 will provide broad benefits for sugar producers. These include:

- Further development of forecasting skill for regional rainfall and temperature on multi-week timescales, through improved simulation in POAMA and translation of these forecasts into multi-week products on the WATL website, will allow farmers to respond to climate variability through more flexibility in their practices and a tactical response to forecast weather five to 20 days out.
- Development of improved climate products for northern Australia through characterisation of aspects of the monsoon and northern wet season in POAMA with the objective of delivering products such as timing of wet season onset, likely breaks and bursts in monsoonal weather, and basic climate attributes such as predicted rainfall, wind and temperature.
- Evaluation of climate indices and critical temperature thresholds for horticulture crops to examine the impact of climate change on businesses and cropping systems in specific regions. This project builds on a very successful initial project for selected crops.
- Assessing and managing the impacts of heat stress on cereals.
- Continued support for and growth of communication products and the Climate Champions Program.

NCA011 – Development of precision spray technologies for the Australian sugarcane industry

(Funded July 2010 – August 2013)

This research project led by the National Centre for Engineering in Agriculture (NCEA) will continue to develop both new target-oriented precision weed spraying technologies (weeds in crop – Green from Green) and assist with the implementation of existing technologies (Green from Brown) to more finely manage herbicide use. The application of these technologies will improve productivity, reduce offsite movement of herbicides and impacts, reinforce minimum tillage and provide greater flexibility in weed management strategies.

In 2012–2013 NCEA will work with Bundaberg Sugar Ltd to evaluate new (green from green) technologies in a semi commercial format. The green from green spot spray system will be evaluated over a range of conditions before trialling with herbicide to selectively control weeds within the crop. The NCEA project team will also investigate commercialisation opportunities. BSES will undertake trials which will fine tune machine settings and compare traditional weed control strategies with those based on the use of commercially available precision weed spraying technology (green from brown). This work will extend to trial sites located in the Burdekin, Mackay and Bundaberg districts. The BSES team will also engage with spray contractors currently utilising commercial precision spray technology to assess performance at a field scale and to quantify herbicide savings. The NCEA and BSES teams will also undertake runoff studies to assess the potential reduction in herbicide runoff from precision weed spraying technologies.

STU073 – Danielle Skocaj – Climate forecasting to improve sugarcane nitrogen management in the wet tropics

(Funded January 2011 – July 2014)

This James Cook University PhD project aims to validate nitrogen fertiliser requirements for ratoon crops of sugarcane grown in the Wet Tropics region, determine the ability of crop models to predict sugarcane yield responses to different Nitrogen fertiliser application rates under different climatic scenarios, and investigate the impact of natural climate variability on sugarcane nitrogen fertiliser requirements in the Wet Tropics region.

During 2012–2013 this project will be investigating answers to questions such as: Are current nitrogen requirement factors (i.e. as used in the SIX EASY STEPS and N Replacement systems) suitable for sugarcane grown in the Wet Tropics; can the sugarcane yield response to different nitrogen fertiliser application rates be modelled? Also what is the impact of natural climate variability on nitrogen fertiliser requirements for ratoon sugarcane crops in the wet tropics region of the Australian sugar industry?

Investment Program	Environment
Investment Category	C2 – Waste minimisation and utilisation
Deliverables and Measures of Success	<ul style="list-style-type: none"> ■ Develop and implement an environmental stewardship program ■ Investigation of product diversification/waste utilisation opportunities completed ■ A longitudinal study of industry economic, environmental and social footprint.
Outcome	<p>A sugar industry maintaining an awareness of and implementing best practices to ensure the impact of the industry’s operation on neighbouring environments is reduced as indicated by:</p> <ul style="list-style-type: none"> ■ Industry participation in the environmental stewardship programs and increased adoption of associated best practices ■ Government and public acknowledgement of sugar industry’s environmental performance ■ Business development based on utilisation of cane by products ■ Cropping and milling technologies and processes based on more sustainable inputs.

GGP061 – Effective use of lower mill mud rates in the nutrition program

(Funded April 2011 – May 2014)

The Mount Catherine Cooperative Grower Group is assessing the effectiveness of banded mill mud (at rates lower than conventional practice) to provide enough phosphorous for the entire crop cycle. The group is also investigating whether the mill mud needs to be incorporated pre-planting to enable sufficient nutrient access and whether this new application method will result in improved runoff water quality.

In 2012–2013 the group will report on the harvest of the trial sites and apply the second year treatments.

SCU003 – Development of value-added products from sugar cane boiler ash

(Funded July 2011 – May 2014)

This research project led by Southern Cross University aims to develop processes for the synthesis of synthetic zeolites and geopolymers from sugar mill bagasse ash. Zeolite minerals are used as catalysts, environmental remediation products, desiccants, detergent builders, molecular sieves and soil additives in supplying plant micronutrients not freely available. Geopolymers are inorganic silica-based-polymers that may be suitable as a concrete

or cement replacement. Thus this project aims to convert a factory by-product into an additional profitable product stream.

The project investigates the composition of three local sugar mill fly ashes, determining the geochemical composition of the ash during the crushing season and as boiler fuel mix changes. The project will further determine what hydrothermal conditions are optimal for the production of useful zeolites and geopolymer products. Moreover, it will then characterise these materials with a view to define potential applications and determine economic benefits of production.

In 2012–2013 the project will continue to sample and characterise fly ash, optimise geopolymer and zeolite characteristics and undertake a market and economic analysis to assess the commercial and technical feasibility of the products. The zeolitisation process will be optimised and zeolites produced will be characterised. Similarly, the geopolymers production process will be optimised and resultant geopolymers characterised. The PhD students appointed to the project will contribute significantly to the 2012–2013 activities, where these activities will provide them with the research training necessary to attain their degrees.

Investment Program	Environment
Investment Category	C3 – Preparing for a global environment with difference resource availability and values
Deliverables and Measures of Success	<ul style="list-style-type: none"> ■ Develop and implement an environmental stewardship program ■ Investigation of product diversification/waste utilisation opportunities completed ■ A longitudinal study of industry economic, environmental and social footprint.
Outcome	<p>A sugar industry maintaining an awareness of and implementing best practices to ensure the impact of the industry's operation on neighbouring environments is reduced as indicated by:</p> <ul style="list-style-type: none"> ■ Industry participation in the environmental stewardship programs and increased adoption of associated best practices ■ Government and public acknowledgement of sugar industry's environmental performance ■ Business development based on utilisation of cane by products ■ Cropping and milling technologies and processes based on more sustainable inputs.

CSE022 – A collaborative approach to precision agriculture for the Australian sugarcane industry
(Funded July 2008 – September 2014)

This CSIRO led project is coordinating and integrating an evaluation of precision agriculture technologies in collaboration with leading farmers. This project brings together investigators from three leading research organisations (CSIRO, BSES and National Centre for Engineering in Agriculture) to provide growers with confidence in managing on-farm variability. The project has established experimental sites in Bundaberg, Herbert and Burdekin regions and collated available data.

In 2012–2013 the project will continue with this work, placing particular emphasis on the data handling processes required to convert sensor data into calibrated measures of yield for mapping. We will also continue to map spatial variation in indicators of agronomic performance and, in particular, expand our efforts in examining within-block variation in CCS. Of particular interest is assessment of whether CCS variation follows similar spatial patterns as other key attributes such as yield and soil properties. Particular effort will therefore also be placed on multi-layer analysis of spatial data for the establishment of management zones in cane blocks.

Opportunities for incorporating variable rate technologies into sugarcane production systems will also be considered, as will a possible role for new, spatially distributed approaches for field experimentation in which within-block variation is used as an experimental tool. The project team will use this and earlier work as a core basis for input to the ISSCT Agronomy workshop to be held in Townsville in September 2012 and the continuing series of precision agriculture extension articles being published in the BSES Bulletin, Canegrowers and SRDC publications.

DPI021 – Remote sensing based Precision Agriculture tools for the sugar industry
(Funded July 2009 – December 2012)

This research project led by the Department of Employment, Economic Development and Innovation aims to assess remote sensing technologies with imagery that will accurately depict mid-season crop information to direct mid-season management. The project will assess the utility of this imagery for explaining yield variability; implement optimal image processing; deliver protocols for rapid distribution of technology; and provide guidance to industry on remote sensing technology. It will also provide a cost benefit analysis for implementation.

During 2012 the project will further validate algorithms derived from satellite imagery for their accuracy in predicting crop and regional yields across three Australian cane growing regions; provide variability maps that support improved management strategies that maximise production whilst minimise crop inputs; conduct training, attend relevant industry forums and produce a final project report that will support the adoption of remote sensing technologies by the Australian cane industry.

GGP051 – Maximising centre pivot efficiencies
(Funded April 2009 – August 2012)

The Precise Pivot Management Grower Group of Mackay is investigating whether centre pivot irrigators can be made more efficient. The group is specifically interested in being able to switch

on and off sections of sprinklers and thereby control which paddock segments, traversed by the pivot, are to be irrigated and which are to be left dry. The group is using a computer controller to turn sprinkler valves off in sections of the pivot as it travels over areas not to be irrigated. The aim is to make the controller user friendly and able to be retrofitted to existing centre pivots.

In 2012–2013 the grower group hopes to fully assess the effectiveness of their modified pivot control system. The group will perform a cost-benefit analysis of the control system, taking into account the installation costs, running costs and water use. The project’s final report is due in August 2012.

Investment Program	Skills and Capabilities
Investment Category	D1 – Innovation Skills
<p>Deliverables and Measures of Success</p>	<p>Provide events, mentoring training, scholarships, information and industry group support (funds, guidelines and staff) to:</p> <ul style="list-style-type: none"> ■ Increase farm and business managers and advisers’ awareness, capacity and skills to identify improvements and adopt associated technologies and best practices ■ Fill identified RD&E skills gaps in the industry ■ Support people in leadership positions to enhance their capacity to drive the industry forward ■ Develop and support effective relations across the value chain to drive the industry forward.
<p>Outcome</p>	<p>People within the sugar industry committed to a culture of education, learning and innovativeness and creating a sustainable sugar industry through:</p> <ul style="list-style-type: none"> ■ Increased innovation and adoption of viable technologies and best practices by farm and business managers and advisers ■ Stronger value chain relations increasing resource use efficiency and maximising revenue ■ Improved industry leadership through greater participation, skills and capacity ■ RD&E capabilities available to fulfil future needs of the industry.

AFF002 – Science and Innovation awards for Young People

(July 2012 – June 2013)

SRDC will continue to contribute to the Department of Agriculture, Fisheries and Forestry's Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. This award is part of a joint Rural Research and Development Corporation program coordinated by Department of Agriculture, Fisheries and Forestry and Australian Bureau of Agricultural and Resource Economics and Sciences.

RDA005 – Rewarding an innovation culture in the Australian sugar

(Funded July 2012 – June 2017)

SRDC's Research Innovation Awards promote excellence in innovation by researchers from the sugarcane industry. The categories offered are:

- Research Group Innovation Award – This award recognises the contribution a team has delivered to provide a significant benefit for the Australian sugarcane industry.
- Research Scientist Award – This award recognises an outstanding achievement by an individual in research or development.
- Research Technician Award – This award acknowledges the commitment an individual has made towards a research project, team or institution.
- Long Service Award – This award recognises long term service and commitment to advancing innovative research within the Australian sugarcane industry.

The winners of these Awards are determined by an independent selection panel and announced at the annual Australian Society of Sugar Cane Technologists (ASSCT) Conference.

SRDC's Grower Innovation Awards profile and acknowledge growers with a real commitment to fostering change within the sugarcane industry. These Awards recognise the contribution a group of growers or an individual grower has achieved by completing a RD&E project of benefit to the industry. Winners of the awards are announced during the Grower Innovation Virtual Expo (GIVE) held bi-annually in a regional area. The categories offered are:

- Grower Group Innovation Award – This award recognises the outstanding achievements of a grower group who have completed an innovative research project.
- Grower Group Progress Award – This award recognises the progress a group of growers have achieved during the preliminary stages of a project that is not yet complete.
- Grower Service to Industry Award – This award recognises an individual cane grower who provides outstanding leadership and service to the sugarcane industry.
- Project Supporter Award – This award acknowledges the strong commitment to development and extension services an individual has provided to a group of growers to complete a project.

These awards are designed to provide the winners with an opportunity to continue their research on farm or to invest in a professional development activity.

Investment Program	Skills and Capabilities
Investment Category	D2 – Leadership and decision making skilling
Deliverables and Measures of Success	<p>Provide events, mentoring training, scholarships, information and industry group support (funds, guidelines and staff) to:</p> <ul style="list-style-type: none"> ■ Increase farm and business managers and advisers’ awareness, capacity and skills to identify improvements and adopt associated technologies and best practices ■ Fill identified RD&E skills gaps in the industry ■ Support people in leadership positions to enhance their capacity to drive the industry forward ■ Develop and support effective relations across the value chain to drive the industry forward.
Outcome	<p>People within the sugar industry committed to a culture of education, learning and innovativeness and creating a sustainable sugar industry through:</p> <ul style="list-style-type: none"> ■ Increased innovation and adoption of viable technologies and best practices by farm and business managers and advisers ■ Stronger value chain relations increasing resource use efficiency and maximising revenue ■ Improved industry leadership through greater participation, skills and capacity ■ RD&E capabilities available to fulfil future needs of the industry.

CG022 – Mentoring for industry succession and growth

(Funded July 2011 – July 2014)

This research project led by Canegrowers seeks to address the lack of succession planning by developing a ‘mentoring for industry succession planning and growth’ model that meets the current and future needs of the Queensland sugarcane industry by supporting sustainable individual businesses, whole of industry expansion, growth and productivity.

The project will also implement the model in three of the fastest growing regions in Queensland and evaluate its impact. This project builds on a pilot mentoring project conducted last year with a grant from the Department of Agriculture, Fisheries and Forestry (DAFF), which showed a willingness of young industry members to be mentored.

In 2012–2013 this project will review the project plan; identify and address any implementation issues; conduct a literature review; develop and document a draft mentoring program ready for regional consultation including the program framework,

program outputs (as agreed by the project team); a communication strategy, implementation and evaluation plans.

JCU032 – How will climate change impact climate variability in sugarcane growing regions?

(Funded July 2009 – October 2012)

Complementing our investment in climate forecasting and climate change, this research project led by James Cook University aims at estimating how climate change will affect the statistical distributions of key atmospheric variables relevant to crop production for selected sugarcane growing regions. This knowledge will be integrated into cropping simulation systems to estimate the climate impact on crop productivity and enhance understanding of the year to year variability in crop production. With this knowledge, then the project will attempt to investigate the impact climate change will have on harvest disruption.

The project will link project findings with findings from other research and contribute to sensible pathways forward that will help the Australian sugar industry adapt to a changing and variable environment.

During 2012–2013, the project will report key findings to industry and document future pathways for adapting to a changing and variable climate.

SRD019 – Building the presentation and media skills of SRDC Scholarship students

(Funded July 2006 – February 2013)

Each year SRDC invests in activities to enhance the capacity of our scholarship students. These activities can include presentation workshops, media training and networking opportunities. The training and activities scheduled for delivery during 2012–2013 is still under development.

SRD035 – Nuffield Scholarship

(Funded July 2011 – June 2014)

SRDC funds one scholarship placement for a sugarcane grower to participate in the Nuffield program each year. The objective of the Nuffield Scholarship is to increase practical farming knowledge and management skills and techniques generally. These scholarships give Australian citizens the opportunity to study farming practices in New Zealand, Europe, Asia and the Americas and those countries best suited to the scholar. They will also promote a closer understanding between farmers in the countries visited.

Upon returning to Australia it is expected that scholars will be able to actively spread the knowledge and understanding they have gained among their fellow farmers and others.

Nuffield Scholarships give a unique opportunity to stand back from their day-to-day occupation, and to study a subject of interest to the sugarcane industry.

SRD042 – TRAILBlazers leadership course for established leaders

(Funded March 2012 – June 2014)

Coordinated by the Australian Rural Leadership Foundation, SRDC will sponsor one placement for an established leader to attend the TRAIL Blazers course. TRAIL Blazers is an eight day program designed specifically for established leaders. It is for leaders who have been engaged in a range of roles for a significant period of time and who have worked in complex contexts. It provides an opportunity for these leaders to expand their leadership frameworks, concepts and strategies for a more resilient and robust approach to handling complex issues; establish new relationships and networks with other leaders across sectors and regions; and develop a fresh perspective and focus for their ongoing professional development and contribution to rural Australia.

SRD032 – Training Rural Australians In Leadership (TRAIL) course for emerging leaders

(Funded September 2010 – June 2013)

The TRAIL course is an eight day residential leadership program for emerging leaders offered by the Australian Rural Leadership Foundation. The program develops a strong platform of skills, attributes, and knowledge for emerging leaders to engage their organisations, communities, and industry in proactive solutions to long-term issues in rural Australia. TRAIL provides a solid basis from which to grow as more effective, experienced leaders. SRDC will sponsor one placement for an emerging leader to attend the TRAIL course annually.

Investment Program	Skills and Capabilities
Investment Category	D3 Business practices and value chain improvements
Deliverables and Measures of Success	<p>Provide events, mentoring training, scholarships, information and industry group support (funds, guidelines and staff) to:</p> <ul style="list-style-type: none"> ■ Increase farm and business managers and advisers’ awareness, capacity and skills to identify improvements and adopt associated technologies and best practices ■ Fill identified RD&E skills gaps in the industry ■ Support people in leadership positions to enhance their capacity to drive the industry forward ■ Develop and support effective relations across the value chain to drive the industry forward.
Outcome	<p>People within the sugar industry committed to a culture of education, learning and innovativeness and creating a sustainable sugar industry through:</p> <ul style="list-style-type: none"> ■ Increased innovation and adoption of viable technologies and best practices by farm and business managers and advisers ■ Stronger value chain relations increasing resource use efficiency and maximising revenue ■ Improved industry leadership through greater participation, skills and capacity ■ RD&E capabilities available to fulfil future needs of the industry.

NCA013 – Implementing a framework for farmers to engage in the use of Precision Technologies
(Funded July 2012 – July 2015)

This new research project led by the National Centre for Engineering in Agriculture aims to offer training in the fundamentals of precision agriculture and the development of a framework to ensure the highest benefits available flow to a grower upon implementation of a technology. The framework will use well defined quality control and continuous improvement methods based on Hazard Analysis Critical Control Point to determine critical areas of potential improvement in current practices.

OHS003 – Farming and Fishing Health and Safety Collaborative Partnership
(Funded March 2008 – September 2013)

SRDC will continue to participate in the cross Research and Development Corporation’s program ‘*Collaborative Partnership for Farming and Fishing Health and Safety*’. The Program is managed by the Rural Industries Research and Development Corporation (RIRDC) on behalf of program partners; the Department of Health and Ageing, Cotton Research and Development Corporation, Fisheries Research and Development Corporation, Grains Research and Development Corporation and SRDC.

The Program is a key investor in research that informs farming and fishing health and safety. The current program of investments is due to finish at the end of June 2012 and as such RIRDC is working with existing and new collaborative partners to set the strategic direction for the program beyond 1 July 2012.

During 2012–2013 the following projects will continue to be funded by the Collaborative Partnership:

■ *Cross contamination by chemicals of farming family members*

The South East Premium Wheat Growers' Association is leading this project in collaboration with the Combined Universities Centre for Rural Health. Exposure to chemicals is one of the biggest risks of farmers, their families and employees. The overall aim of the project is to encourage people to be more aware of how they are handling chemicals to reduce the risk of preventable diseases. This project is a pilot study with the vision that it will be replicated in other parts of Australia and industries outside grains such as cotton and sugar. The final report of the project is due at the end of 2012.

■ *Drug and alcohol use by farming and fishing workers*

This project led by the Lyndon Community is investigating farm and fishing workers' use of drugs and alcohol, the effects on their physical and mental health and how this relates to workplace health and safety. The project has two stages. The first is identifying farm and fishing workers' knowledge, perceptions and use of drugs and alcohol, their experiences of drug and alcohol related harms (physical and mental) and the influence of workplace culture on drug and alcohol use. A second stage will trial the implementation of a multi-component intervention package to reduce alcohol and drug-related harms among farm and fishing workers and improve workplace health and safety. A final report on Stage 1 will be completed in July 2012 and funding for Stage 2 will be sought in 2012.

RIR002 – Developing a LCI database for Australian agriculture

(Funded January 2012 – February 2013)

The demand for information regarding the environmental impacts of agricultural industries is increasing, and Life Cycle Assessment (LCA) is a fundamental tool used to understand these impacts. An LCA takes into account all the environmental impacts that occur from 'cradle-to-grave' – from resource extraction, production and use, to disposal of a product. It commences with the raw ingredients drawn from nature and goes through to end-of-life waste flows back to the environment. The LCA draws on basic inventory data that describes each process in the supply of a product or service.

While there is a broad range of Australian data in existence, it is uneven in quality and in coverage across (and within) commodities. While much of it may be 'public' it can be difficult to find and significant data sets may be unpublished and with individual researchers. Consequently, inappropriate overseas data is often used to represent Australian agriculture.

This project aims to create an Australian Agriculture Life Cycle Inventory (AusAgLCI). This LCI would act as a repository of data relevant to Australian production systems. The AusAgLCI will be based on sound data that has been collected with a standard methodology, is peer reviewed, is transparent and from well documented sources. The development of AusAgLCI will significantly support a better informed business and policy environment for Australian agriculture, due to the increased availability of quality information that fairly represents the sector.

This is a collaborative project, conducted by the CSIRO, managed by the Rural Industries Research and Development corporation (RIRDC) and receiving funding from SRDC, Australian Food and Grocery Council and a further seven Research and Development Corporations. All stakeholders will remain engaged with the project throughout its life to ensure stakeholder requirements are met.

In 2012–2013 the project will collate existing LCI data into the LCI database and present this to LCA stakeholders for review. The Final Report is due to be complete by the end of 2013.

Investment Program	Skills and Capabilities
Investment Category	D4 Extension and adoption of research
Deliverables and Measures of Success	<p>Provide events, mentoring training, scholarships, information and industry group support (funds, guidelines and staff) to:</p> <ul style="list-style-type: none"> ■ Increase farm and business managers and advisers’ awareness, capacity and skills to identify improvements and adopt associated technologies and best practices ■ Fill identified RD&E skills gaps in the industry ■ Support people in leadership positions to enhance their capacity to drive the industry forward ■ Develop and support effective relations across the value chain to drive the industry forward.
Outcome	<p>People within the sugar industry committed to a culture of education, learning and innovativeness and creating a sustainable sugar industry through:</p> <ul style="list-style-type: none"> ■ Increased innovation and adoption of viable technologies and best practices by farm and business managers and advisers ■ Stronger value chain relations increasing resource use efficiency and maximising revenue ■ Improved industry leadership through greater participation, skills and capacity ■ RD&E capabilities available to fulfil future needs of the industry.

BCA002 – Performance evaluation of SRDC R&D investments

(Funded July 2007 – September 2013)

SRDC and other Research and Development Corporations undertake an annual review of investments. Each Corporation has agreed to identify the outcomes and benefits that have emerged or are likely to emerge from their investment in research, development and extension through a standardised sampling and reporting framework.

In 2011–2012 the review found on average a 2.5 benefit: cost ratio for four randomly selected clusters of SRDC funded projects completed over the period 2007–2008 to 2009–2010. In 2012–2013 the project will again select several clusters of completed SRDC funded projects and determine their benefit: cost ratios.

BSS346 – Using innovative processes for research, development and packaging to support the adoption of better farming practices

(Funded May 2011 – May 2013)

This BSES led research project aims to use new, innovative and emerging technologies to research and develop new strategies to promote Best Management Practices (BMP) and new farming systems that will allow the Australian industry to remain competitive. Furthermore it will encourage and provide tools and training for growers to understand, test and adopt these better farming practices.

As part of its response to the industry’s reform of RD&E, BSES is using Development Officers to focus its extension activity on ‘Packaging’ and ‘Strategic’ components. These Development Officers provide a stronger link between the development of better farming practices by RD&E specialists and the adoption of these practices by growers. They are developing packages of information that allow growers to make informed decisions about alternative management strategies, and deliver training on these themes to industry extension specialists.

These packages link to previous successes, such as GrubPlan, Six Easy Steps and QCANE Select, and will address most of the industry's RD&E themes. The focus of packages is on management of nutrients, weeds, pests, irrigation and biosecurity and on the selection of appropriate varieties.

WS009 – RD&E Communication

(Funded July 2012 – June 2017)

SRDC will continue to deliver recommendations outlined in the Communications and Stakeholder Engagement Strategy. For example it was recommended SRDC upgrade existing SRDC communications tools with the emphasis of improving communication about the results of RD&E projects.

SRDC events including seminars and regional expos will be delivered in the current format, although the program will be extended in 2012–2013. SRDC seminars are presented in Brisbane on a monthly basis by researchers leading SRDC funded projects. Regional Expos are hosted in cane growing areas with presentations by leading researchers on the outcomes of SRDC funded projects relevant to a particular cane region and the industry.

In 2012–2013 SRDC will launch a new website. The new website will focus on five key areas including: corporate information; SRDC's RD&E program; how to apply for research funding; news and events; and a new RD&E reports search engine.

SRDC will continue to roll out its new branding and style guide across SRDC publications including statutory reports, fact sheets, brochures and other promotional material.

In 2012–2013, SRDC will continue to increase awareness of SRDC's role and responsibilities and RD&E project outcomes through existing communication methods which have been improved, and through new communication tools – including the launch in mid 2012 of SRDC's new magazine. This magazine will profile updates and summaries of RD&E projects and SRDC events.

GGN001 – Grower Group Network

(Funded July 2012 – June 2013)

The Grower Group Network seeks to assist sugarcane growers, their advisors and researchers while they are undertaking on-farm research and development through SRDC's Grower Group Innovation Project (GGIP) Program. The output of the Grower Group Network is the day-to-day management of GGIP program to ensure effective progress of projects and assisting the grower groups writing GGIP proposals and reporting the outcomes of their projects to SRDC. The Grower Group Services website www.growergroupservices.com.au contains milestone and final reports for all current research projects undertaken by grower groups. In 2012–2013 this project team will continue to work with SRDC and sugarcane growers to facilitate innovative research that supports the industry to "self develop" to become more profitable and environmentally sustainable.

Allocation of SRDC investments across National and Rural RD&E Priorities

Table 4 and Table 5 summarise investments allocated to each of the National and Rural RD&E Priorities respectively, across SRDC's four investment programs.

Table 4

RD&E 2012–2013 expenditure estimates by SRDC Investment Program across National RD&E Priority Goals (\$'000).

National Research Priorities	An Environmentally Sustainable Australia				Promoting and Maintaining Good Health		Frontier Technologies for Building and Transforming Australian Industries					Safeguarding Australia	Total
	A1	A2	A3	A7	B3	B4	C1	C2	C3	C4	C5	D3	
Growing the Crop	143	240	23	379	–	206	299	314	–	449	275	498	2828
Milling the Crop	–	192	–	254	–	86	224	234	57	215	113	–	1376
Sustaining the Environment	195	–	152	66	–	230	–	85	23	13	21	48	833
Skills and Capabilities	–	–	–	31	20	71	500	5	–	10	759	–	1397
Total	338	432	175	730	20	593	1023	638	80	687	1168	546	6434

Key to NRP Goals in which SRDC has RD&E investments

<p>An Environmentally Sustainable Australia</p> <p>A1: Plant genetics A2: Pest control A3: Soil – Plant interactions A4: Harvesting</p>	<p>Frontier Technologies for Building and Transforming Australian Industries</p> <p>B1: Mill capital use and operating efficiency B2: Enhancing the value of existing products B3: Transport efficiency B4: Raw sugar quality</p>
<p>Promoting and Maintaining Good Health</p> <p>C1: Positioning industry as a leader in environmental responsibility C2: Waste minimisation and utilisation. C3: Preparing for a global environment with different resource availability and values</p>	<p>Safeguarding Australia</p> <p>D1: Innovation skills: D2: Leadership and decision making skilling: D3: Business practices and value chain improvements: D4: Extension and adoption of research</p>

Table 5

Composition of Government Research Priorities attributed to each SRDC Investment Program by Rural RD&E Priorities (\$'000)

Rural Research, Development & Extension Priorities	Productivity and Adding Value	Supply Chain and Markets	Natural Resource Management	Climate Variability & Climate Change	Biosecurity	Supporting the Priorities:		Total
						Innovation skills	Technology	
Growing the Crop	767	–	272	379	468	445	496	2828
Milling the Crop	586	19	347	99	–	93	233	1376
Sustaining the Environment	295	–	359	66	80	19	14	833
Skills and Capabilities	305	5	300	31	–	550	205	1397
Total	1953	24	1277	575	548	1107	949	6434

Please note: Data included in this table has been rounded to the closest whole number.

APPENDIX A

SRDC PROJECTS 2012–2013

Growing the crop				
A1 – Plant genetics				
Project code	Project title	Start	End	Contact
BSS319	Maximising the rate of parental improvement in the Australian sugarcane breeding program	Jul 08	Mar 15	Dr Xianming Wei BSES Limited
BSS334	More crop per drop II : developing water-efficient and drought tolerant sugarcane cultivars for irrigated and dryland farming – Stage II	Jul 10	Dec 14	Dr Prakash Lakshmanan BSES Limited
BSS343	Maximising genetic gain from family and within family selection	Jul 11	May 16	Dr Mike Cox BSES Limited
BSS344	New germplasm to develop more productive varieties with enhanced resistance to nematodes, Pachymetra root rot and smut	Jul 11	May 15	Mr Barry Croft BSES Limited
CPI017	Developing sugarcane for production systems utilising total biomass	Jul 09	Dec 13	Dr Phillip Jackson CSIRO
CPI018	Climate ready sugarcane: Traits for adaptation to high CO ₂ levels	Jul 09	Aug 13	Mr Chris Stokes CSIRO
CPI019	Towards a complete genome sequence of sugarcane; generation of data and development of bioinformatic resources	Jul 10	Aug 13	Dr Karen Aitken CSIRO
CPI020	Sugarcane compositional analysis to enable food safety assessment of modified varieties	Jul 10	May 13	Dr Anne Rae CSIRO
CPI022	Seed dormancy and establishment: a critical gap in the knowledge to support safe deployment of GM sugarcane.	Jul 11	Sep 14	Dr Graham Bonnett CSIRO
ICSB02	Australian support of the International Consortium for Sugarcane Biotechnology	Jan 11	May 13	Dr Peter Twine SRDC

New Projects – Commencing 1 July 2012

BSS325 (3)	SmutBuster III: accelerated breeding of smut-resistant varieties	Jul 12	Jul 16	Dr Mike Cox BSES Limited
CPI024	Faster flowering – new opportunities for genetic improvement	Jul 12	Jul 15	Dr Anne Rae CSIRO
BSS351	Improving the accuracy of selection in sugarcane breeding trials through accounting for site variability	Jul 12	Jul 17	Dr Xianming Wei BSES Limited
CPI025	Development and testing of a SNP marker platform in sugarcane	Jul 12	Jul 15	Dr Karen Aitken CSIRO
CPI026	Investigation of smut resistance mechanisms in sugarcane	Jul 12	Jul 15	Dr Karen Aitken CSIRO

Growing the crop

A2 – Pest control

Project code	Project title	Start	End	Contact
BSS331	Preparing the Australian sugar industry for threats from exotic pests and diseases	Jul 09	Dec 12	Dr Robert Magarey BSES Limited
BSS342	Remote sensing to implement an effective pest management strategy for canegrubs	Jul 11	Mar 15	Dr Peter Samson BSES Limited
GGP054	Herbert cane growers strategic grub management implementing BSES decision making tools	May 10	Jan 13	Mr Geoff Morley Herbert Cane Grub Management Group
GGP056	A monitoring-based system to enhance canegrub control best management practice for Isis sugarcane growers	Feb 10	Jan 13	Mr Wayne Stanley Isis Productivity Limited Grower Grub Group
GGP064	Improved Pachymetra Management in NSW	May 12	Dec 14	Mr Doug Irby NSW Canegrowers Association – Tweed Branch
GGP066	Integrated feral pig management in the Wet Tropics cane region	May 12	Aug 14	Mr Kevin Sheahan and Mr Ian Kemp Lannercost/ Leach United Pig Management Group

A3 Soil and Plant interactions

Project code	Project title	Start	End	Contact
DPI020	Management solutions to optimise performance of new farming systems in southern canelands	Jul 08	Oct 12	Dr Mike Bell Queensland Alliance for Agriculture and Food Innovation
DPI022	Cropping solutions for the sugarcane farming systems of the Burdekin	Jul 11	Jul 13	Mr Mike Hanks QLD DAFF
DPI023	Better integration of peanuts into a precision controlled traffic sugarcane farming system – study tour	May 12	Oct 12	Mr Neil Halpin QLD DAFF
GGP047	Maximising soys in Central Queensland	Jan 09	Oct 12	Mr Simon Mattson Mackay Soybean Study Group
GGP053	Improvement of internal soil drainage and yield on heavy clay soils in the Herbert	Jan 10	Dec 14	Mr Vince Russo Lumps Farming Group
GGP059	Developing prescription compost to suit specific soils in Maryborough	Feb 10	Dec 13	Mr Glen Grohn Driving Agricultural Goals Group
GGP060	Developing a robust soybean industry in Central and Northern Queensland	Jun 11	Dec 13	Mr Greg Miller The United Soybean Growers Group

Growing the crop				
A3 Soil and Plant interactions <i>(continued)</i>				
Project code	Project title	Start	End	Contact
GGP065	Using distribution & changes in soil organic carbon as a basis for adjusting in field N application rates and valuing carbon changes	May 12	Mar 15	Mr Tony Bugeja Homebush Innovative Grower Group
GGP067	Assessing the impact of biochar in the Herbert cane industry	May 12	Aug 14	Mr Geoff Morley The Biochar Grower Group of Lannercost
STU070	Richard Brackin – Microbiology of sugarcane soils	Jan 10	Jul 13	Prof Susanne Schmidt University of Queensland
UQ044	SaveN Cane: Developing selection tools for N-efficient sugarcane	Jul 09	Dec 14	Prof Susanne Schmidt University of Queensland

New Project – Commencing 1 July 2012

NCA012	UV absorption as a tool for growers to benchmark humified organic carbon in soil	Jul 12	Jan 14	Dr Pam Pittaway National Centre for Engineering in Agriculture
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A4 – Harvesting				
Project code	Project Title	Start	End	Contact
BSS318	Measurement of in-field sucrose loss by mobile refractometry	Jul 08	Aug 12	Mr Cam Whiteing BSES Limited

New Project – Commencing 1 July 2012

NET001	Quantification of the potential to reduce harvesting losses by utilisation of field edge trash separation technology	Jul 12	Jul 13	Mr Chris Norris Norris Energy Crop Technologies
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Milling the crop

B1 – Mill capital use and operating efficiency

Project code	Project Title	Start	End	Contact
GGP063	Investigating renewable feedstock's such as (Hibiscus Canabinues – Kenaf and Crotalaria Juncea – Sunn Hemp) for co-generation at Mackay Sugar Limited	Jan 11	May 13	Mr Joe Muscat Mackay Fibre Producers
QUT014	Recovery of sucrose Project 2	Jul 10	Dec 12	Mr Kameron Dunn Queensland University of Technology – CTCB
QUT032	Developing a new methodology for competency based training courses for shift supervisors in sugar factories	Nov 08	May 13	Prof Ross Broadfoot Queensland University of Technology – CTCB
QUT038	Implement supervisory/advisory control of pan and fugal stations	Jul 10	Dec 13	Prof Ross Broadfoot Queensland University of Technology – CTCB
QUT040	Advanced computer simulation of sugar factories – SysCAD	Jul 10	May 13	Prof Ross Broadfoot Queensland University of Technology – CTCB
QUT046	Evaluation of mud filtrate clarification options to improve factory performance	Jul 11	May 13	Prof William Doherty Queensland University of Technology – CTCB
QUT048	Evaluate Brazilian mud filtration technology to increase the profitability and environmental performance of Australian factories	Jul 11	Aug 14	Mr Hakan Bakir Queensland University of Technology – CTCB
QUT050	Improving the performance and specification of evaporator stations	Jul 11	Aug 13	Prof Ross Broadfoot Queensland University of Technology – CTCB

New Projects – Commencing 1 July 2012

QUT054	Determine the optimum tube dimensions for Robert evaporators through experimental investigations and CFD modelling	Jul 12	Jul 15	Prof Ross Broadfoot Queensland University of Technology – CTCB
QUT055	Improved modelling of wet scrubbers	Jul 12	Jul 15	Dr Anthony Mann Queensland University of Technology – CTCB
BSS352	Developing measurement tools for nutrients and heavy metals in mill by-products	Jul 12	Jul 14	Ms Zofia Ostatek – Boczynski BSES Limited
QUT056	Flocculation and sedimentation of slow settling mud and mud cake conditioning	Jul 12	Jan 15	Prof Bill Doherty Queensland University of Technology – CTCB.

Milling the crop				
B2 Enhancing the value of existing products				
Project Code	Project title	Start	End	Contact
NSC020	Commercialisation of a low cost trash separation plant	Jul 10	May 14	Mr Cam Palmer NSW Sugar Milling Co-operative
QUT036	The production of biofuels and value added co-products from thermochemical processing of sugarcane bagasse	Jul 09	May 14	Dr Phil Hobson Queensland University of Technology – CTCB
QUT049	Biomass characterisation facility for extended stockpile model accuracy and capability	Jul 11	Mar 14	Dr Phil Hobson Queensland University of Technology – CTCB
QUT051	Revenue diversification from sugarcane fibre: novel technologies for the processing of bagasse for low-cost biofuels production	Jul 11	Aug 14	Dr Ian O'Hara Queensland University of Technology – CTCB
QUT053	Process for making bagasse paper pulp	Apr 12	Apr 16	Dr Tom Rainey Queensland University of Technology – CTCB
STU066	Darryn Rackemann – Production of levulinic acid and its derivatives from sugarcane biomass	Jul 09	Jul 13	Prof William Doherty Queensland University of Technology – CTCB
STU067	Kameron Dunn – Conversion of lignin to industrial fuels and chemicals	Jul 09	Jul 13	Dr Phil Hobson Queensland University of Technology – CTCB
STU068	Patrick Bewg – Modification of lignin biosynthesis in sugarcane for the production of cellulosic ethanol	Feb 10	Jul 13	Dr Heather Coleman Queensland University of Technology – CTCB
STU071	William Gilfillan – Biodegradable polymer nanocomposites derived from natural fibre and starch	Jan 11	Jul 14	Prof William Doherty Queensland University of Technology – CTCB
UQ048	Sugar cane feedstock into fuel additives and chemicals: conversion to furan derivatives by catalytic processes	Jul 11	May 14	Dr Jorge Beltramini University of Queensland

B3 – Transport efficiency				
Project Code	Project title	Start	End	Contact
QUT033	Improving the efficiency of traffic office operations through improved traffic officer training	Nov 08	Aug 14	Dr Geoff Kent Queensland University of Technology – CTCB
QUT047	Increasing harvest and transport efficiency through the use of locomotive GPS	Jul 11	Aug 14	Dr Geoff Kent Queensland University of Technology – CTCB

Sustaining the environment

C1 Positioning industry as a leader in environmental responsibility

Project Code	Project title	Start	End	Contact
CGH003	The Herbert catchment water quality monitoring project	Jul 11	Jun 14	Mr Jeff Cantamessa Terrain Natural Resource Management
CVA003	Managing Climate Variability Program	Jul 07	Sep 13	Ms Bianca Cairns SRDC
NCA011	Development of precision spray technologies for the Australian sugarcane industry	Jul 10	Aug 13	Mr Craig Baillie National Centre for Engineering in Agriculture
STU073	Skocaj – Climate forecasting to improve sugarcane nitrogen management in the wet tropics	Jan 11	Jul 14	Dr Yvette Everingham James Cook University

C2 Waste minimisation and utilisation

Project Code	Project title	Start	End	Contact
GGP061	Effective use of lower mill mud rates in the nutrition program	Jan 11	May 14	Mr John Fox Mt Catherine Cooperative
SCU003	Development of value-added products from sugar cane boiler ash	Jul 11	May 14	Dr Malcolm Clark Southern Cross University

C3 Preparing for a global environment with different resource availability and values

Project Code	Project title	Start	End	Contact
CSE022	A collaborative approach to precision agriculture RD&E for the Australian sugar industry	Jul 08	Sep 14	Dr Rob Bramley CSIRO
GGP051	Maximising centre pivot efficiencies	Apr 09	Aug 12	Mr John Fox Precise Pivot Management Grower Group
DPI021	Remote sensing-based precision agriculture tools for the sugar industry	Jul 09	Dec 12	Dr Andrew Robson QLD DAFF

Skills and Capabilities				
D1 – Innovation skills				
Project Code	Project title	Start	End	Contact
STU072	Anthony Brinin – Enhancing sugarcane for decreased water content and increased sugar content at harvest	Jan 11	Jul 14	Prof Sagadevan Mundree Queensland University of Technology – Centre for Tropical Crops and Biocommodities
AFF002	Science and Innovation Awards for Young People	Mar 03	Apr 13	Ms Carolyn Martin SRDC
RDA005	Rewarding an innovation culture in the Australian sugar industry	Jul 06	May 13	Ms Carolyn Martin SRDC

D2 – Leadership and decision making skilling				
Project Code	Project title	Start	End	Contact
SRD019	Building the presentation and media skills of SRDC Scholarship students	Jul 06	Feb 13	Dr Diana Saunders SRDC
CG022	Mentoring for sugar industry succession and growth	Jul 11	May 14	Mr Ron Mullins Canegrowers
JCU032	How will climate change impact climate variability in sugarcane growing regions?	Jul 09	Oct 12	Dr Yvette Everingham James Cook University
SRD035	SRDC Nuffield Scholarship	Jul 11	Jul 14	Ms Carolyn Martin SRDC
SRD032	Training Rural Australians In Leadership (TRAIL)	Sep 10	Jun 13	Ms Bianca Cairns SRDC
SRD042	TRAIL Blazers Leadership Course	Mar 12	Jun 14	Ms Bianca Cairns SRDC

D3 – Business practices and value chain improvements				
Project Code	Project title	Start	End	Contact
OHS003	Farming and Fishing Health and Safety Collaborative Partnership (Phase 3)	Mar 08	Sep 13	Ms Bianca Cairns SRDC
RIR002	Developing a LCI database for Australian agriculture	Feb 12	Feb 13	Ms Bianca Cairns SRDC

New Projects – Commencing 1 July 2012

NCA013	Implementing a framework for farmers to engage in the use of precision technologies	Jul 12	Jul 15	Mr Craig Baillie National Centre for Engineering in Agriculture
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Skills and Capabilities

D4 – Extension and adoption of research

Project Code	Project title	Start	End	Contact
BCA002	Performance evaluation of SRDC RD&E investments	Jul 07	Sep 13	Ms Annette Sugden SRDC
BSS346	Using innovative processes for research, development and packaging to support the adoption of better farming practices	May 11	May 13	Dr Peter Allsopp BSES Limited
GTG002	Implementation of the communication plan for the Sugarcane Gene Technology Group	Jul 07	Aug 12	Mr Warren Males Canegrowers
WS009	RD&E communication	Jul 03	Jun 13	Ms Carolyn Martin SRDC

New Projects – Commencing 1 July 2012

GGN001	Grower Group Network	Jul 12	Jun 13	Mr Joe Muscat Grower Group Services
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Attachment B

ORGANISATIONAL IDENTIFIERS IN PROJECT CODES

<i>Project Codes</i>	<i>Organisation</i>
AFF	Department of Agriculture, Fisheries and Forestry
BCA	Benefit Cost Analysis performed by a contracted specialist
BSS	BSES Limited
CG	Queensland Cane Growers Organisation Limited
CGH	Herbert River District Cane Growers Organisation Limited
CPI	CSIRO Plant Industry
CSE	CSIRO Sustainable Ecosystems
CVA	Managing Climate Variability Program
DPI	Queensland Department of Agriculture, Fisheries and Forestry
GGP	SRDC Grower Group Innovation Project
ICSB	International Consortium of Sugarcane Biotechnology
JCU	James Cook University
NCA	National Centre for Engineering in Agriculture
NET	Norris Energy Crop Technologies
NSC	New South Wales Sugar Milling Cooperative Limited
OHS	Collaborative Partnership for Farming and Fishing Health & Safety
QUT	Queensland University of Technology
RDA	SRDC Research and Development Awards
SCU	Southern Cross University
SRD	SRDC managed activities
STU	SRDC student scholarships
TSL	Tully Sugar Limited
UQ	University of Queensland
WS	SRDC Workshops

ABBREVIATIONS AND ACRONYMS

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences	ICSB	International Consortium of Sugarcane Biotechnology
ACFA	Australian Cane Farmers' Association	ISSCT	International Society of Sugar Cane Technologists
ACGC	Australian Cane Growers' Council	JV	Joint Venture
ASSCT	Australian Society of Sugarcane Technologists	LCA	Life Cycle Assessment
AOP	Annual Operational Plan	LCI	Life Cycle Inventory
APSIM	Agricultural Production Systems sIMulator	N₂	Nitrogen gas
ASA	Australian Sugar industry Alliance	¹⁵N	A rare stable isotope of Nitrogen
ASMC	Australian Sugar Milling Council Proprietary Limited	NCEA	National Centre for Engineering in Agriculture
ASSCT	Australian Society of Sugar Cane Technologists	NIR	Near-Infrared
AusAgLCI	Australian Agriculture Life Cycle Inventory	NRM	Natural Resource Management body
BAC	Bacterial artificial chromosomes	NRP	National R&D Priorities
BPMS	Business Process Management System	PhD	Doctor of Philosophy
BSES	BSES Limited	PIERD	Primary Industries and Energy Research and Development Act 1989
CAC Act	Commonwealth Authorities and Companies Act 1997	PIMC	Primary Industries Ministerial Council
CBP	Capacity Building Project	POAMA	Predictive Ocean Atmosphere Model for Australia
CCS	Commercial Cane Sugar	PSII	Photo System Inhibiting
CO₂	Carbon Dioxide	QAAFI	Queensland Alliance for Agriculture and Food Innovation
CSIRO	Commonwealth Scientific and Industrial Research Organisation	QDAFF	Queensland Department of Agriculture, Fisheries and Forestry
CTCB	Centre for Tropical Crops and Biocommodities at QUT	QTL	Quantitative Trait Loci
DAFF	Federal Department of Agriculture, Fisheries and Forestry	QUT	Queensland University of Technology
DEEDI	Department of Employment, Economic Development and Innovation (QLD)	R&D	Research and Development
EOI	Expression of Interest	RD&E	Research, Development and Extension
FEAT	Farm Economics Analysis Tool	RRDC	Rural Research and Development Corporations
GGIP	Grower Group Innovation Project	SNP	Single Nucleotide Polymorphism
GIS	Geographical Information System	SRDC	Sugar Research and Development Corporation
GIVE	Grower Innovation Virtual Expo	SSCS	Smart supervisory/advisory control system
GM	Genetically Modified	TRAIL	Training Rural Australians In Leadership
GGs	Grower Group Services	WATL	Water and The Land
GPS	Global Positioning System	UV	Ultraviolet
HCPSL	Herbert Cane Productivity Services Limited		



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