ANNUAL OPERATIONAL PLAN 2010–2011

Investing in Sugarcane Industry Innovation

Australian Government

Sugar Research and Development Corporation

**Sugar Research &
Development Corporation**

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SRDC Annual Operational Plan 2010–2011

ISSN 1036-6863
Published 2011
Designed by SALT.design
Printed by Printcraft

Front cover photo:
University of Queensland Researcher Dr Andrew Fletcher inspects fertilizer trial with sugarcane varieties grown in a UQ glasshouse facility in Brisbane. (Photo courtesy of Sacron Innovation)

Contents

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).

NSW Canegrower Angus Stainlay.
(Photo courtesy of Rural Press Limited, The Land Newspaper)

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

Section 19 of the PIERD Act requires SRDC to develop and prepare a written Research and Development Plan. SRDC's R&D Plan 2007–2012 was finalised by the SRDC Board in July 2007 after extensive stakeholder consultation and approved by the then Parliamentary Secretary for Agriculture, Fisheries and Forestry in August 2007.

Section 25 of the PIERD Act requires SRDC to develop and prepare a written Annual Operational Plan (AOP). 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 R&D Plan in force during the year. This document is the SRDC AOP for 2010–2011, and is aligned with the approach, structure, outcomes and deliverables of the R&D Plan 2007–2012.

The Annual Operational Plan also incorporates an outcome/output framework to facilitate performance reporting required by the *Commonwealth Authorities and Companies Act 1997*.

This AOP firstly outlines key elements of the R&D Plan 2007–2012, including SRDC's vision, investment approach, drivers and priorities, and in this context describes the Corporation's proposed activities in 2010–2011 to deliver against the outcomes of the R&D Plan.

SRDC's Vision
& 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 in the future and will have many of the following characteristics.

Across the *entire sugarcane industry system or value chain*, i.e. across the farming, harvesting, milling, transport and marketing sectors, solutions will be primarily developed and implemented on a mill area or regional basis. There will be increased adoption of the best practice philosophy in all sectors to increase industry productivity, resilience and sustainability. Sector participants will be more committed to working together to increase total revenue from the mill area or region and will be more closely attuned to market signals. People who work in the industry will be developed and the human capital utilised more effectively.

The *farming sector* will utilise emerging technologies more effectively to benefit the value chain as a whole. Water, nutrients, crop biomass, soil organic matter, varieties, and crop rotations will be managed more efficiently, leading to enhanced economic and environmental performance. Improved cane varieties (including genetically modified varieties) will be released faster and will be targeted to specific situations. Growers will have access to a more diverse range of advisory services and will continuously improve their farming and business management skills.

Operations in the *harvesting and transport sectors* will be better integrated and use capital more efficiently. Cane will be better presented to the harvester. There will be fewer and larger harvesting groups with more efficient loading and transport systems. Feedback and payment systems will enable rapid and rewarding improvements to performance for all stakeholders.

In the *milling and marketing sectors*, deregulation will enable closer and more direct business relationships between millers, their suppliers, and their various customers. Raw sugar will remain the dominant commodity, but will be supplemented by products such as energy, animal feeds, and the specialty outputs of biotechnology such as ethanol.

SRDC is committed to setting the right targets for R&D investments, to making sound investment decisions that address those targets using rigorous transparent processes, to managing investments so that they succeed, and to ensuring that R&D delivers outcomes for its stakeholders and builds capacity for change, learning and innovation across the industry.

SRDC plays a national role in planning R&D for the sugarcane industry. SRDC takes a strategic view of the needs and opportunities for R&D and seeks investment opportunities to foster innovation that will benefit both the industry and the community. SRDC responds to the priorities, needs, and views on R&D of its major industry stakeholders, the Australian Government, and the general community – and is accountable to them.

SRDC invests in R&D to find new and improved ways of doing things rather than investing in ongoing core services that are the responsibility of others, or basic research to generate new knowledge for its own sake. It also invests in a range of foresight activities that guide its setting of investment targets.

SRDC invests in R&D conducted by others and does not carry out research in its own right. SRDC enters into cooperative partnerships with sugarcane industry participants across its sectors, the R&D agencies, other rural R&D corporations, and the general community. It regards its partners as co-investors in the quest for a profitable, internationally competitive and sustainable Australian sugarcane industry. Through its investments, SRDC shares in the risks associated with R&D.

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

Key Industry Drivers

The Australian sugarcane industry is strongly influenced by the twin drivers of *globalisation and competition*. Other major drivers or forces which can be viewed as either threats or opportunities for the industry or a combination of both include *climate change*, societal pressure for industries to be more *environmentally and socially sustainable*, concerns about *biosecurity* and the *safety and health* implications of processes and products, the desire to enhance *human capital*, and the availability of new *enabling sciences and technologies*.

The Australian sugarcane industry sells a high proportion of its raw sugar production into the world market, so it is very familiar with *globalisation and competition* as drivers. International demand for sugar is expected to increase broadly in step with population growth. Although the Australian dollar is at time favourable to growers, terms of trade in the longer term are likely to continue to decline because of more rapid increases in input costs than prices received for bulk products like raw sugar.

Prices are expected to be linked with timing of supply and demand and with the costs of production of the most efficient exporting country. Brazil's industry is highly integrated across the industry value chain and well supported by government policies, and Brazil is expected to remain the benchmark against which all sugar exporting nations must compete. Another aspect of globalisation is the global mobility of people and goods, coupled with the increasing intensity of some natural processes, which will necessitate a heightened focus on proactive management of biosecurity risks.

Changes in global and regional climate are already impacting on agricultural industries, and over the next 50 years are expected to have important implications for sugar producing regions. Considerable interest and activity in analysing climate issues and options are underway nationally and internationally.

Sugarcane is among the crops with the highest potential productivity in terms of biomass per unit area, and is expected to play a significant role in the development of renewable biological energy sources. Changing expectations of societies around the world, particularly in more developed countries, are also putting increasing pressure on all industries to be sustainable and to take greater account of environmental and social effects (the triple bottom-line thrust).

Thus, *environmental and social accountability* is increasingly important and being imposed internationally, nationally and regionally. Sustainable management of the industry's natural resources is accepted as critical to its long-term viability, from both economic and ecological perspectives. The *safety* of production processes and the resultant products is also of increasing concern to consumers. The awareness of the balance between the *human health* benefits from food energy supply and adverse effects such as obesity and diabetes is increasing.

The need to maintain and enhance *human capital* is critical to future industry competitiveness. Skills shortages in rural industries are recognised as a serious threat to future economic, environmental and social performance.

SRDC recognises the *benefits of collaboration* and leveraging of funding and skills to achieve targeted outcomes. Investment and operational links with other Research and Development Corporations, Universities, Cooperative Research Centres and government at all levels will continue to be a priority, allowing cross-commodity and issue – related research to occur.

Industry and Government Priorities

The following diagram outlines the priorities established by the Australian Government through the PIERD Act and the National and Rural R&D priorities, and the broad strategic industry needs identified through consultation. SRDC analyses these priorities and identifies how R&D 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		*Sugar Industry*
National Research Priorities	Rural R&D Priorities	Strategic Needs
■ An environmentally sustainable Australia ■ Promoting and maintaining good health ■ Frontier technologies for building and transforming Australian industries ■ Safeguarding Australia	■ Productivity and adding value ■ Supply chain and markets ■ Natural resource management ■ Climate variability and climate change ■ Biosecurity ***Supporting the priorities:*** ■ Innovation skills ■ Technology	■ 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

Industry and R&D Environment

The Australian sugarcane industry produces raw and refined sugar from sugarcane. Income is also derived from by-products including ethanol and molasses, and from generation of electricity. The outlook for sugar is not just underpinned by sugar prices but also ethanol production and electricity cogeneration. High sugar prices are projected to lead to an increase in world sugar production over the medium term, which will stem principally from Brazilian cane sugar production for both sugar and ethanol.

Australia's gross value of cane produced in the last five years (2005–2010) varied between $870 million and $1,220 million, and is forecast to come in at the lower end of that range at 31.5 million tonnes in 2010–2011. Although Australia's total production is expected to drop marginally, the export value is expected to increase due to the ability to lock in forward prices.

SRDC obtains income from levies on the processing of sugarcane into raw sugar by the sugar industry, matching funds from the Australian Government, and from interest. The levy is set by the Minister on the advice of SRDC's representative bodies, and in 2010–2011 is expected to remain at $0.14 per tonne of sugarcane processed, divided equally between growers and millers.

According to ABARE, Australian cane growers are also expected to respond to high world prices by increasing cane area to 420,000 hectares by the end of the 2010–2011 projection. This is significant because it will be the first expansion since 2002–2003.

However, the increase in world sugar production is projected to lead to declining world sugar prices over the period to 2014–2015, even though in real terms it will remain above the low levels experienced in the early 2000s.

The strong demand for ethanol has led to important modifications to the development and structure of the Brazilian sugarcane industry, which has increased the supply of both sugar and ethanol. As a major exporter, any changes in Brazilian sugar and ethanol production affect the whole international market.

While sugar will remain the economic driver of the Australian sugarcane industry, there are substantial opportunities in Australia for electricity generation from cane fibre and production of ethanol as a renewable fuel from molasses. The Australian sugar industry has the potential to make a significant contribution to a greener future for Australia through these renewable fuels derived from sugarcane. (ABARE, Australian Commodities, vol. 16, no. 1, March 2010).

Corporate Governance & 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).

Objectives of SRDC

The objectives of SRDC are directly related to the objects of the PIERD Act. They are to:

- improve the competitive position and cost efficiency of the Australian sugar industry;
- achieve sustainable use and sustainable management of the natural resource base of the sugarcane industry;
- apply industry, scientific and community resources more effectively to R&D in the sugarcane industry; and
- manage SRDC resources efficiently and improve the accountability for expenditure on R&D for the sugarcane industry.

Responsible Minister

SRDC is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry.

At the time of writing, the responsible Minister was the Hon. Tony Burke, MP. The present Minister is Senator the Hon. Joe Ludwig and the Hon. Dr Mike Kelly AM MP is the Parliamentary Secretary for Agriculture, Fisheries and Forestry. The Minister:

- approves the five-year Research and Development 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.

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.

The Rural Research and Development Council is now the government's key advisory body on rural research and development. The principal goal of the council is to provide high level advice and coordination to better target and improve the effectiveness of the Federal government's investment in R&D.

Productivity Commission Review

In early 2010, the Productivity Commission started their inquiry into rural Research and Development Corporation (RDC) arrangements. The inquiry will consider the economic and policy rationale for Australian Government investment in rural research and development. It will also examine the interactions and potential overlaps across governments and programs to ensure Australia gets the best value for its research and development spending.

The full terms of reference for the Productivity Commission inquiry were published in early 2010. Amongst other things, this inquiry will examine 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.

- Throughout 2010 the Commission will hold public hearings and release a draft report for public comment, before delivering a final report to the Government in February 2011.
- Industry Representative Organisations
- The PIERD Act prescribes the following representative organisations 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 organisations. SRDC meets formally with the representative organisations at least three times each year to discuss SRDC activities, and statutory reporting, levy arrangements, R&D priorities and any other matters of mutual interest.

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 CAC Act.

An Audit Committee of three non-executive directors appointed by the Board provides advice to the Board to assist it in fulfilling its responsibilities relating to accounting, reporting and compliance practices of the Corporation. The Board has established the following Corporate Governance Framework for SRDC.

Leadership

SRDC operates under the direction of a 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 operation 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.

The key Board functions are:

- establishing goals, setting strategic direction, approving the annual budget and approving large items of expenditure
- developing and approving a five-year SRDC Research and Development Plan, an Annual Operational Plan, and a Portfolio Budget Statement and producing an Annual Report.
- 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 R&D 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 level of remuneration for the Executive Director
- evaluating its own performance and that of its committees and SRDC management against agreed indicators.

Planning and Reporting

The five-year R&D Plan defines SRDC's core business, indicates broad priorities for R&D and defines the corporate strategy to achieve its outputs and outcome.

The Annual Operational Plan (AOP) specifies the broad groupings of R&D 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 outcome, outputs, performance information and financial position each year. It is consistent with the five-year R&D Plan and the AOP and is tabled in Parliament.

The SRDC Annual Report gives particulars of R&D 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 R&D Plan and its corporate outputs and outcome. 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 three times each year with SRDC's three representative bodies to discuss SRDC's operations, investment needs and priorities.

Management

The SRDC Business Process Management System (BPMS) folds active quality assurance 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.

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 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 R&D Plan 2007–2012 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 R&D activities and management performance.

Board Membership 2010–2011

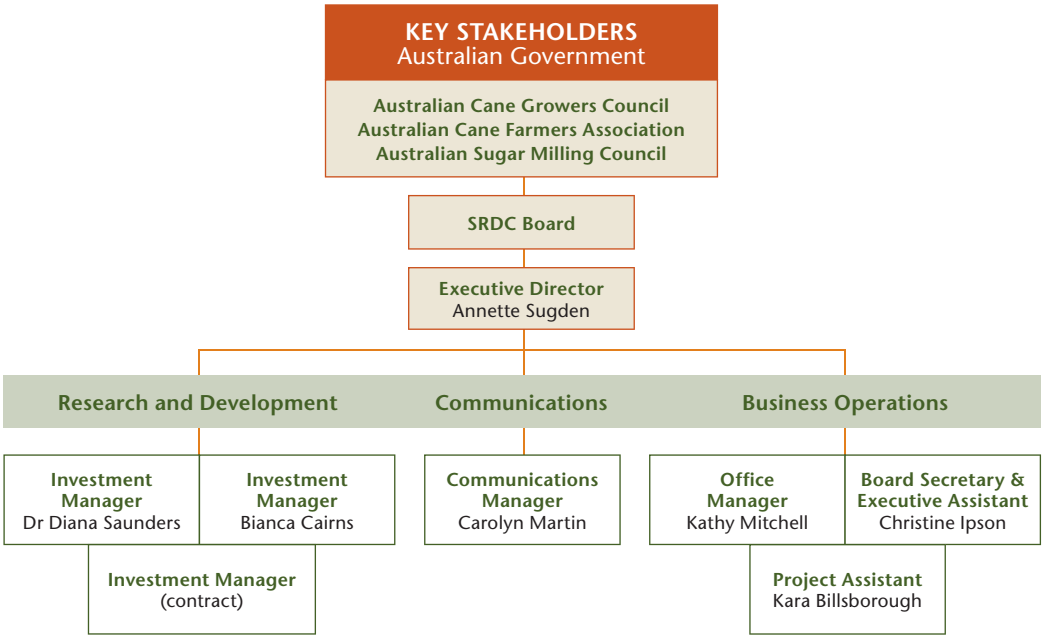
Directors expected to hold office in 2010–2011 and their terms of appointment are:

Chairperson	Mr Ian Knop AM	30 September 2010
Deputy Chairperson	Mr Steve Guazzo	30 April 2011
Executive Director	Ms Annette Sugden	28 May 2013
Nominated Directors	Mr Michelle Braude	30 April 2011
	Mr David Campbell	30 April 2011
	Ms Caroline Coppo	30 April 2011
	Mr Ian Sampson	30 April 2011
	Ms Angela Williams	30 April 2011
	Dr Anthony Pressland	30 April 2011

On 1 December 2009, the SRDC Board appointed Ms Annette Sugden as Acting Executive Director following the resignation of Dr Frikkie Botha.

Corporate Structure

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



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 R&D 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 R&D activities and management systems as part of the Annual Operational Plan.

SRDC invests in four types of projects:

- **Research Projects** (RP) are SRDC's core investments in R&D and comprise around 90% 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 end September and requested to present their proposal to a selection review panel in November.
- **Scholarship Projects** (SP) support postgraduate study. Applications are advertised on the SRDC website annually for projects to commence at the beginning of each calendar year.
- **Capacity Building Projects** (CBP) are small projects which support specific learning development opportunities for individuals or groups. SRDC calls for CBPs in June and January each year for activities to be conducted in the following calendar and financial years, respectively.
- **Grower Group Innovation Projects** (GGIP) are projects conducted by grower groups. SRDC calls for GGIP projects in June each year for projects to commence at the beginning of each the calendar year.

Scholarship proposals are assessed by the SRDC Scholarship Committee. Applications for research projects, CBPs and GGIPs are assessed by a selection review panel including external technical experts and industry assessors.

The portfolio of projects outlined in this Annual Operational Plan includes continuing projects commenced prior to 2010–2011, and new research projects approved by the Board in November 2009. Commencement of new projects is subject to finalisation of the proposals and execution of project agreements. Budget allocations for all new projects to commence during 2010–2011 are listed in Attachment A.

SRDC Outcomes, Outputs and Inputs in the R&D Plan 2007–2012

The SRDC R&D Plan 2007–2012 outlines three investment arenas on which the R&D portfolio is based. It nominates arena outcomes and outputs, and provides target ranges for the allocation of resources to the investment arenas. The following diagram illustrates the relationships between SRDC's Corporate Outcome, Arena Outcomes, Outputs 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 Arenas	Regional Futures	Emerging Technologies	People Development
Outcomes	*Implementation of innovative farming, harvesting, transport, milling and marketing systems tailored to the needs and opportunities of each region*	*Rapid translation of relevant emerging technologies that will enhance the industry's competitive edge in the global marketplace*	*Development of individuals and networks across the sugarcane industry that enhance the capacity for continuous improvement*
Outputs	■ Value chain integration ■ Farming and harvesting systems ■ Transport, milling and marketing systems	■ Genetics and breeding systems ■ Farming, harvesting, transport, milling, and marketing systems	■ Individual capacity ■ Social capacity
Inputs	**60–65%**	**20–25%**	**15–20%**

The total SRDC budget for 2010–2011 will be $11.576 million. The forecast revenue and expenditure for SRDC for 2010–2011 are shown in Table 1 and compare the estimated budget result for 2009–2010.

Table 1
SRDC Budgets 2009–2010 and 2010–2011

SRDC Budget	2009–2010	2010–2011
Estimated crop size (cane for crush)	31.50 million tonnes	31.50 million tonnes
Estimated gross value of production	$900 m	$1000 m
Levy rate = cents/tonne	**$0.14 cents**	**$0.14 cents**

Income	2009–2010 ($m)	2010–2011 ($m)
Industry contribution	$4.410	$4.410
Australian Government contribution	$4.503	$5.468
Interest and other	$0.420	$0.420
Total Income	**$9.333**	**$10.298**

Expenditure	2009–2010 ($m)	2010–2011 ($m)
Continuing projects	$6.135	$5.321
New PIERD Act projects	$1.200	$4.143
Total projects	$7.335	$9.464
Operation of SRDC	$2.009	$2.112
Total Expenditure	**$9.344**	**$11.576**

Note: Project expenditure only includes projects that were contracted as at 1 March 2010.
Estimated crop production and levy contributions are based on forecasts as at 1 March 2010.

Resourcing of Outcomes and Outputs in 2010–2011

Table 2 compares the proposed allocation of resources across investment arenas in 2010–2011 against the target allocation in the R&D Plan. Table 2 also shows numbers of continuing and new projects as at 1 March 2010.

Additional projects, including new Scholarships and Capacity Building Projects, will be considered subsequent to the submission of this Annual Operational Plan and final expenditure will be conditional on execution of project agreements. Projects approved at 1 March 2010 (except for Commercial-in-Confidence projects) are listed in Attachment A.

Table 2

Target and proposed allocation of resources across investment arenas, and indicative numbers of continuing and new projects for 2010–2011

	Investment Arena			
2010–2011	Regional Futures	Emerging Technologies	People Development	Total
Target allocation in R&D Plan	60–65%	20–25%	15–20%	100%
Allocation (%)	56.6%	31.5%	11.9%	100%
Project numbers				
Continuing	46	11	9	66
New Research	9	3	1	13
Scholarships	–	–	12	12
Total	**55**	**14**	**22**	**91**

Note: This table only includes projects that are contracted as at 1 March 2010.

Monitoring & EVALUATION

At the Investment Arena level

During the term of the R&D Plan 2007–2012, SRDC will monitor and evaluate its performance in achieving the three Investment Arena outcomes. Reports, case studies, and surveys will be conducted to document and illustrate these achievements. Key Performance Indicators and measures in each Investment Arena over the term of the R&D Plan are listed in Table 3.

Completed and continuing and some new R&D investments are expected to deliver benefits during 2010–2011 in the form of improved economic performance of sugarcane growing, harvesting, milling and marketing enterprises 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 2010–2011 are outlined in the following section which describes those investments in detail.

Evaluations of achievement at the Investment Arena level will be supported during 2010–2011 by monitoring and evaluation of each individual project, in terms of delivery against agreed outputs and outcomes. 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 and to achieve intended outcomes.

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 R&D 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 R&D portfolio by learning, experimenting, and influencing beneficial change?

The processes that SRDC uses in addressing these questions include an annual review of SRDC Performance by the Board; annual consultations on SRDC results and performance with the Representative Bodies and with industry representatives in each region/mill area; and evaluations of the effectiveness of various groups and types of projects by the Board.

Table 3

Key Performance Indicators and Measures for the three Investment Arenas over the term of the R&D Plan 2007–2012 for projects ending in 2010–2011

	REGIONAL FUTURES
Key Performance Indicator (1)	Enhanced structure and functions of regional sugarcane industry value chains
Measure	Demonstration of improved integration of the industry value chain within regions delivering increased profitability and more efficient use of capital based on environmentally responsible and safe business practices
Targets for projects ending 2010–2011	***Improved value change operations and value-adding opportunities*** **TSL002** Pelletising mill mud and ash *(Funded July 2007 – Aug 2010)* **QUT014** Recovery of sucrose part 2 *(Funded July 2006 – Feb 2011)*
Key Performance Indicator (2)	Enhanced resource utilisation in the farming and harvesting sectors
Measure	Implementation of improved farming and harvesting systems that increase revenue and reduce input costs, and concurrently are environmentally and socially sustainable
Targets for projects ending 2010–2011	***Enhanced industry preparedness – Climate change and improved varieties*** **CVA003** Managing Climate Variability Program Phase 2 *(Funded July 2007 – Sept 2010)* **QUT027** Opportunities for the Australian sugar industry in greenhouse gas abatement and carbon trading *(Funded Dec 2009 – Dec 2011)* ***Improved sugarcane breeding systems*** **GGP041** Frost tolerant varieties for NSW *(Funded Jan 2009 – May 2011)* **GGP048** Better targeting of new cultivars for North Queensland through additional trials in four areas *(Funded Jan 2009 – May 2011)* ***Managing biosecurity risks and enhancing integrated pest management*** **BSS303** Sugarcane biosecurity integrated plan *(Funded July 2007 – Aug 2010)* **NFS002** An integrated approach to nut grass control *(Funded July 2007 – Aug 2010)* ***Managing and improving soil resources and harvesting systems*** **BSS306** Establishing the second crop cycle into permanent beds *(Funded July 2007 – Dec 2010)* **UQ043** Harnessing soil biology to improve the productivity of the new sugarcane farming system. *(Funded July 2007 – Aug 2010)* **GGP044** Enhancing nutrient placement: Sub surface application of cane specific compost. *(Funded Jan 2009 – May 2011)* **GGP037** New Innovative double row chopper system *(Funded July 2007 – Sept 2010)* ***Managing water more sustainably*** **MAF002** Evaluating alternative irrigation for a greener future *(Funded July 2006 – Aug 2010)* **GGP058** Developing irrigation strategies in the Central Region for a range of water entitlements and soil types *(Funded Feb 2010 – Aug 2010)* **GGP051** Maximising centre pivot efficiencies *(Funded April 2009 – March 2011)*

	REGIONAL FUTURES
Key Performance Indicator (3)	Enhanced processes and product range in the transport, milling and marketing sectors
Measure	Implementation of more productive and cost-effective transport, milling and marketing systems in harmony with the environment and societal expectations
Targets for projects ending 2010–2011	***Enhancing cost-efficiency in transport and milling systems*** **LEV001** Restoring efficiency to harvested cane transport in New South Wales *(Funded July 2008 – Nov 2010)* **TSL001** Improved management of scale formation and scale removal in the Tully evaporator station *(Funded July 2007 – Aug 2010)*

	EMERGING TECHNOLOGIES
Key Performance Indicator (4)	Enhanced approaches for sugarcane genetic improvement
Measure	Technologies developed that accelerate the delivery of improved varieties for sugar production and value-added products
Targets for projects ending 2010–2011	***Improved breeding systems to deliver new varieties for diagnostic technologies for genetic screening*** **BSS307** Development and implementation of NIR based predictive tools to rate sugarcane varieties against smut and Fiji leaf gall *(Funded July 2007 – Nov 2010)* ***Improved understanding of sugar accumulation*** **CSE023** Pathways to exploiting enhanced photosynthetic efficiency for higher sucrose and biomass yield *(Funded July 2008 – Aug 2011)* ***Genetic modification of the sugarcane plant*** **UQ040** Extending Sugar Booster technology into multiple sugarcane cultivars for optimal deployment by Australian industry *(Funded July 2005 – Aug 2010)* ***Food safety and human health*** **CPI020** Nutritional analysis of cane for GM varieties *(New project funded July 2010)*
Key Performance Indicator (5)	Enhanced technological innovation across the sugarcane industry
Measure	Technologies developed that improve business performance across different sectors of the sugarcane industry
Targets for projects ending 2010–2011	***Improved processing technologies*** **QUT030** Vacuum condenser design modification *(Funded Nov 2008 – Dec 2010)*

	PEOPLE DEVELOPMENT
Key Performance Indicator (6)	Enhanced effectiveness of individuals contributing to the sugarcane industry
Measure	Demonstration of improved capability and capacity of sugarcane industry participants to learn, change, collaborate, lead and innovate to advance the sugarcane industry
Targets for projects ending 2010–2011	***Enhancing the individual capacity of sugarcane industry people*** Twelve continuing postgraduate scholars are studying in a range of disciplines including: plant breeding and biotechnology, rodent pest management, soil health, environmental codes of practice, exotic pest threats, bagasse fractionation and alternative uses, and information systems. Six of these are expected to conclude in 2010–2011. **STU052** **Kylie Anderson** – Invasion potential of Eumetopina Flavipes, vector of Ramu Stunt disease of sugarcane. *(Funded June 2005 – Sept 2010)* **STU055** **Karen Benn** – The motivators and barriers to the adoption of more sustainable farming practices. *(Funded Sept 2005 – July 2010)* **STU062** **Henry Thomas** – Effective methods for communicating the lessons learned from decision support systems to broader audiences. *(Funded Jan 2007 – Oct 2010)* **STU063** **Ian O'Hara** – Pre-treatment of sugarcane bagasse for enzymatic hydrolysis and fermentation. *(Funded March 2008 – July 2011)* **STU064** **Daniel Zamykal** – Intelligent data analysis methods from effective integration of precision agriculture within the Australian sugar industry. *(Funded March 2008 – July 2011)* **STU065** **Milovan Bokan** – Abiotic stress tolerant sugarcane: Drought-proofing sugarcane with cell-death protection genes. *(Funded Feb 2008 – July 2011)*
Key Performance Indicator (7)	Enhanced effectiveness of partnerships and networks contributing to the sugarcane industry
Measure	Demonstration of improved capability and capacity of regional groups, networks, industry sectors and researchers, to collaborate and innovate to beneficially change the operation of the industry
Targets for projects ending 2010–2011	***Improved capacity to collaborate and innovate within and beyond the industry*** **AFF022** Science and Innovation Awards for Young People *(Funded March 2003 – April 2011)* **QUT032** Developing a new methodology for competency based training courses for shift supervisors in sugar factories *(Funded Nov 2008 – May 2011)* **JCU030** Pre-treatment of sugarcane *(Funded July 2009 – May 2011)*

Addressing Targeted Outcomes & STAKEHOLDER PRIORITIES IN 2010–2011

This section outlines SRDC's planned investment activities in 2010–2011 and beyond. The three Investment Arenas provide the basic framework for an integrated description of how the activities address the arena outcomes and outputs, and the Australian Government's national and rural R&D priorities.

Australian Government R&D Priorities

The four National Research Priorities are:

- **An environmentally sustainable Australia**
- **Promoting and maintaining good health**
- **Frontier technologies for building and transforming Australian industries**
- **Safeguarding Australia**

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 R&D 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 R&D priorities are reported in Tables 4 and 5 at the end of this section.

Regional Futures Arena

Arena Outcome: *Implementation of innovative farming, harvesting, transport, milling and marketing systems tailored to the needs and opportunities of each region.*

The Regional Futures Arena focuses on the implementation and/or integration of existing technologies or close-to-market emerging technologies to enhance the economic, environmental and social sustainability of regional sugarcane industries. Some R&D in this Arena will be applicable to all or several regions, while in other cases R&D approaches may need to differ to fit the outcome that each region or mill area is seeking.

Value Chain Integration

Key deliverables in the R&D Plan 2007–2012 across the value chain are: improved value chain operations and payment systems; better utilisation of capital; enhanced preparedness for emerging risks and opportunities; improved environmental stewardship, and improved health and safety of industry people and families.

TSL001 – Improved management of scale formation and scale removal in the Tully evaporator station
(Funded July 2007 – Aug 2010)

The Tully sugar industry operates in the wet tropics and harvesting and crushing operations are subject to the variability in weather conditions. High maintenance standards are in place to ensure high levels of factory availability are achieved when conditions allow crushing operations to occur, however, the Tully evaporator station experiences high rates of scaling, and valuable throughput is lost as a result

of reduced crushing rate as scaling increases, and the factory stops to chemically clean the evaporators.

A reduction in factory lost time for evaporator cleaning offers opportunities for increased cane crushing and sugar production, with the same installed factory capacity. It will provide an improved utilisation of installed assets and also assist in reducing operating costs. This project will reduce the rate of scale formation and improve the rate and impacts of scale removal from the evaporator vessels at Tully mill through a better understanding of the conditions that promote scaling, and a better understanding of the effectiveness of cleaning regimes and effluent disposal. While Tully mill has some unique scale issues, aspects of this work will be relevant to other mills.

Improved value-chain operations and utilisation of capital

NSC019 – Improving the harvesting and transport of biomass for sugar and power production in NSW
(Funded July 2009 – Aug 2012)

This continuing project will support the implementation of a sustainable harvest and transport system to maximise the amount of biomass collected from whole-crop harvest for the co-generation plants at Condong and Broadwater mills. The objective of this project is to improve the efficiency and cost-effectiveness of the whole-crop harvesting process, even during non-crushing season.

CPI020 – Sugarcane compositional analysis to enable food safety assessment of modified varieties
(New project funded July 2010 – May 2013)

This new three year project will develop nutritional analysis data for sugarcane stalk and/or leaves taken from current commercial varieties grown over three seasons across different geographic regions. The dataset will act as a baseline against which the composition of Genetically Modified (GM) sugarcane can be compared for deregulation purposes.

The data collected will establish the 'normal' ranges within which non-GM cane components (e.g. fat, protein, carbohydrates etc) occur. At present, only fragmented information is available on the nutritional composition of the sugarcane stalk. The project team has an existing relationship with the Australian regulatory body FSANZ, and are aware of what is required by Australian regulatory standards. In addition, the data generated will assist the OECD task force on the safety of novel foods and feeds to create a consensus document on the composition of sugarcane.

UQ045 – Streamlined life cycle assessment *(LCA)* tool for assessing the environment benefits of progressive cane growing
(New project funded July 2010 – Feb 2012)

This new one year project will refine a sugarcane Life-Cycle Assessment (LCA) model into a streamlined LCA tool for industry use. This tool will define the environmental pros and cons of different sugarcane management strategies (i.e. the growing sector). This is a joint University of Queensland (UQ) and BSES Limited project. The university developed the current LCA model and has experience in environmental modelling, whilst BSES has extensive knowledge in relation to cane farming systems.

The LCA tool will provide information on the environmental impacts of farming practices and will complement the economic information currently available for farming practices via the Queensland Department of Employment, Economic Development and Innovation's (DEEDI) Farm Economic Analysis Tool (FEAT).

WS009 – Research and Development Communication
(Funded July 2003 – June 2013)

Following positive feedback from participants SRDC's new format for research events will continue to be delivered in 2010–2011. A series of SRDC seminars will be presented in Brisbane by researchers leading SRDC funded projects. Also Regional Expo Forums will be hosted for growers and millers to hear about the outcomes from SRDC funded projects relating to the industry.

Enhanced industry preparedness – climate change and improved varieties

CVA004 – Managing Climate Variability Program – Phase 3
(Funded July 2010 – Sept 2014)

Managing the impacts of climate variability and climate change are important factors in enhancing the robustness of regional value chains. The global need to reduce carbon emissions provides opportunities and potentially increased costs for the sugarcane industry that need to be assessed.

SRDC will continue to collaborate with Research and Development Corporations (RDCs) to implement the National Climate Change Research Strategy for Primary Industries (CCRSPI). During the third phase, the venture will identify collaborative research opportunities that assist producers to understand and build capacity to meet, climate change mitigation and adaptation needs. Also, 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 (MCVJV).

Improved health and safety

OHS003 – Farming and fishing health and safety collaborative partnership Phase 3
(Funded March 2008 – May 2012)

SRDC will continue to participate in the cross Research and Development Corporation's project titled Collaborative Partnership for Primary Industries Health and Safety. Previous investments in this initiative have supported several projects relevant to sugarcane growers, including the Healthy Farm Families Program, all-terrain vehicle safety and injury prevention, children's safety on farms, and incentives for adoption of safe farm work systems. Several of these programs are continuing to have beneficial impacts on sugarcane farming families.

Farming and Harvesting Systems

Key deliverables in the R&D Plan 2007–2012 to realise improved farming and harvesting systems are: improved biosecurity risk management; improved management of soil and water resources; improved farm business management; better harvesting equipment and practices, and recognition of the benefits from ecosystem services.

Managing biosecurity risks and enhancing integrated pest management

The sugar industry is vulnerable to attack from invading pests and diseases, considering its location in the tropics adjacent to many of Australia's near neighbours. SRDC has supported several activities to identify potential risks and establish contingency plans to deal effectively with possible incursions. SRDC has also invested substantial funding in recent years in diagnostic and taxonomic investigations to assist with insect and disease quarantine, and on development of plans to assist in preparation for and management of any invasion.

BSS303 – Sugarcane biosecurity integrated plan
(Funded July 2007 – Aug 2010)

This continuing project will finalise the Integrated Sugarcane Biosecurity Plan. The project will update all current incursion management plans with new information, changed procedures, and lessons learned from the smut incursion in 2006. It will also continue to develop several new plans for exotic pests and diseases, including Downy Mildew, Ramu Stunt, sugarcane Longhorn Borer, Eumetopina Planthopper, Sugarcane Thrips and those Moth Borers not covered by existing plans.

The project will improve knowledge on exotic pests and diseases and their latest management strategies, and on cane biosecurity among biosecurity organisations, industry advisers and cane farmers, to deliver a more secure and prosperous industry with a reduced risk of damage by exotic incursions.

BSS325 – Smut Buster: Accelerated breeding of smut-resistant sugarcane varieties
(Funded July 2008 – June 2011)

Since July 2008, SRDC has invested in a major project to accelerate the development and release of new smut-resistant sugarcane varieties. This project was in partnership with the Commonwealth Government's Rural and Community Projects initiative and part of the Sugar Industry Reform Package. The project targets a range of approaches to develop rapid screening technologies for smut resistance and recover high yielding varieties. This program aims to double the rate of release of elite varieties within three years.

GGP054 – Herbert canegrowers strategic grub management using BSES Limited decision making tools
(Funded May 2010 – Jan 2013)

This continuing project will enhance grower adoption of systems and tools designed by BSES Limited to manage grey back canegrub outbreaks. This project will also develop means to integrate control of the grey back canegrub into the improved farming systems developed through the Sugar Yield Decline Joint Venture.

NFS002 – An integrated approach to nut grass control
(Funded July 2007 – Aug 2010)

Work in NSW is continuing to develop an integrated management and decision support strategy for growers to manage nutgrass. The project aims to deliver productivity and economic gains for growers to reduce nutgrass growth. Examples of methods include reducing the number of spray applications and improved cropping systems by introducing controlled traffic farming and soybean break cropping. The project will produce guidelines, a decision support package, and structured methods for effective approaches to nutgrass control.

NCA010 – The development of precision spray technologies for the Australian sugar industry
(New project funded July 2010 – June 2013)

This project will extend research of precision spot spraying systems and technology. It will evaluate commercially available precision spray equipment at sites in the Bundaberg, Mackay and Burdekin regions, and monitor offsite herbicide movement once strategies have been developed.

The aim of this project is to develop precision spray technologies that are more target oriented and have the potential to revolutionise weed management by more effective and efficient control of weeds. The development of more precise spray and weed management will lead to reduced herbicide usage, relief from traditional chemicals, and reinforcement of minimum tillage farming systems, while maximising production.

BSS331 – Preparing the Australian sugar industry for threats from exotic pests and diseases
(Funded July 2009 – Oct 2012)

To help protect the industry from exotic pests and diseases, a project led by BSES Limited will develop and validate specific molecular diagnostic tests and screening tests for known diseases prominent in Papua New Guinea. It will also determine pest and disease resistance ratings for the most important Australian varieties and refine pest and disease incursion management plans.

Managing and improving soil resources and harvesting systems

The industry is continuing to implement improved farming systems identified in SRDC's major farming systems investment in the Sugar Yield Decline Joint Venture (SYDJV). Further studies are underway in several projects that are building on the outputs of the SYDJV. Key ongoing research issues include choice of varieties, nitrogen dynamics, nutrient stratification, interface issues between cane and fallow crops, water infiltration and efficiency of use, indicators of soil biological health including free living nematodes, and machinery development.

BSS306 – Establishing the second crop cycle into permanent beds
(Funded July 2007 – Dec 2010)

A project in the central district is working with existing groups of innovative growers to develop practical solutions to establishing the second sugarcane cropping cycle and break crops onto permanent beds. Maintaining the beds and crop residues will sustain the soil structure and beneficial biology in the beds. Reduced tillage delivers substantial costs savings, and working with existing grower groups will enhance their creativity and cohesiveness.

DPI020 – Management solutions to optimise performance of new farming systems in southern cane lands
(Funded July 2008 – Oct 2012)

An ongoing project funded jointly with the Grains R&D Corporation focuses on the interactions between sugarcane and legume crops in southern cane lands. The project will deliver strategies to:

- manage trash at the end of the sugarcane cycle to optimise break crop establishment;
- improve water use efficiency and maintain balanced and suppressive soil biology; enhance management of cadmium;
- improve understanding of water use efficiency and the soil health impacts of reduced/zone tillage and wider rotation crop choice.

Improved integration of farming systems will provide resilient and profitable farm businesses with expectations that whole farm profitability could increase between 20 and 30 per cent.

DPI022 – Integration of sugarcane, grains, grain legumes and cotton in sustainable irrigated cropping systems in the Burdekin
(New project funded July 2010 – May 2014)

This project will complete an integrated study of Burdekin farming systems involving sugarcane, grains, grain legumes and cotton. Three-way multi-agency funding has been sought from SRDC, Grains RDC and Cotton RDC. The project seeks to provide sugarcane growers with information to optimise nitrogen and water management and maximise cane production in rotation with legumes or cotton. Currently there is a lack of information, particularly for the soils of the Burdekin River Irrigation Area (BRIA) on integration of sugarcane farming systems developed from the Sugar Yield Decline Joint Venture using legume and cotton rotations.

UQ043 – Harnessing soil biology to improve the productivity of the new sugarcane farming system
(Funded July 2007 – Aug 2010)

This continuing project is combining the expertise of members of the Sugar Yield Decline Joint Venture team with soil biologists from the University of Queensland. The project will advance knowledge of soil health using powerful molecular techniques and quantitative tools to monitor the functional diversity of soil organisms and identify soil nitrogen and carbon dynamics. The results will deliver enhanced sustainability and productivity of farming systems through improved soil fertility, improved use of nitrogen from sugarcane and legume residues, reduced nitrogen applications and reduced risk of nitrogen losses.

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

This continuing 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 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.

The next step will be to complete evaluation and refinement of commercial yield monitors and establish yield mapping protocols. It will also scope technologies for determining commercial cane sugar (CCS).

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

This project will 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 was also provide a cost benefit analysis for implementation.

BPS001 – Identifying management zones within cane paddocks: an essential foundation for precision sugarcane agriculture
(Funded July 2007 – Aug 2011)

This project will continue to develop and promote techniques for targeted application of best management practices within sugarcane paddocks. The zones are being identified by integrated mapping of satellite imagery, soil electromagnetic induction recordings, other soil properties and sugarcane yields.

The project will continue statistically testing the nature and strength of relationships between soil properties and their electromagnetic responses. Targeting of crop inputs may result in reduced costs, enhanced productivity, better environmental performance through reduced offsite movement of nutrients and chemicals, improved land management practices, and sustained profitability.

Managing water more sustainably

SRDC has an extensive portfolio of investments targeting improved water management and utilisation efficiency, in keeping with the major national initiative to promote water conservation.

BSS329 – Understanding water quality in sugarcane farming systems
(Funded Feb 2010 – Aug 2012)

Access to quality water for farming is an area of high priority in the SRDC research program. In collaboration with BSES Limited a group of researchers and industry representatives will commission a water quality project to gain a better understanding of water quality levels needed for sugarcane farming systems.

MAF002 – Evaluating alternative irrigation for a greener future
(Funded July 2006 – Aug 2010)

This grower led project will continue to investigate benefits of low-pressure overhead irrigation and drip irrigation through trickle tape systems. Through a comparative analysis this project will recommend the best irrigation methods to reduce the volume of water applied, and allow green cane harvesting to be adopted without shortening row lengths. The final stage of this project will provide an economic assessment of a trickle drip irrigation system, established on a neighbouring property in the Burdekin region.

Implementing better harvesting systems

Harvesting is a major linking point in the sugarcane value chain. Improved harvest efficiency has potential for economic and environmental benefits for growers, harvesters and millers, through capital and labour efficiencies, and reduced losses of cane and juice during the harvesting process.

BSS296 – Evaluation of genotypes for controlled-traffic farming system
(Funded July 2006 – Dec 2011)

This continuing project, in conjunction with the improved farming systems initiatives, will address a demand from growers for information on the varieties that perform best under controlled traffic farming systems. Current varieties were selected under conventional 1.5m row spacing and new varieties may be needed for wider rows. The project will determine whether changes are needed to variety selection procedures. The project will provide an understanding of the genotype (cultivar/clone) by row format interaction, and the traits that could be used to predict performance on wider row formats.

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

Adoption of harvesting best practice (HBP) has been constrained by the difficulty of demonstrating sugar losses from sub-optimal harvesting. This project 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. The next step will focus on developing a system that could be used state-wide to test a large proportion of all harvesters on a regular basis in a whole range of conditions. Returns of up to $50 per hectare are estimated from the widespread adoption of HBP.

Enhancing cost-efficiency in transport and milling systems

Key deliverables in the R&D Plan 2007–2012 to realise improved transport, milling and marketing systems are: reduced operational and maintenance costs, new value-adding opportunities, and new marketing opportunities. Cane transport remains an area of high expenditure for sugar factories with substantial capital tied up in locomotives and cane bins.

QUT024 – Reducing transport costs through the automation of schedule generation
(Funded Nov 2008 – Nov 2011)

SRDC is supporting a project aimed at reducing transport costs through the automation of schedule generation for both harvesting and transport. This project promises to bring strong benefits to the industry through reductions in locomotive shifts and the number of cane bins required, more widespread use of practical, automatically generated schedules to reduce delivery delays, reduced cane age on delivery which will improve sugar quality, and improved ability to model the harvest transport system and whole value chain leading to lower overall costs.

LEV001 – Restoring efficiency to harvested cane transport in New South Wales
(Funded July 2008 – Nov 2010)

This research seeks to achieve a cost effective method of transporting whole cane from the loading pads to the mill in bins provided by a milling cooperative. The project seeks to raise the bulk density of the whole cane in the bins to achieve an optimum cost-effective weight for transport, using techniques that do not involve changing the current methods of cutting, loading and transport.

QUT 040 – Advanced computer simulation of sugar factories SysCAD
(New project funded July 2010 – May 2012)

This project will develop a highly adaptable 'whole of sugar factory' process model by testing a software package that provides facilities for 'whole of plant' assessments of sugar factories with the option to use either generic models or specific complex models for individual unit operations.

New value-adding opportunities

TSL002 – Pelletising mill mud and ash
(Funded July 2007 – Aug 2010)

Australian sugar mills are very keen to optimise the use of by-products and maximise environmental safety. In 2010–2011, SRDC will support a project that will develop methodologies to convert mill mud and ash (by-products from the cane crushing/sugar production process) enhanced with other nutrients including nitrogen, phosphorous and potassium, into a value added pelletised product that can be sold as a complete fertiliser. A successful outcome will reduce the potentially adverse environmental impacts of mud and ash storage and repeated high application rates on farms close to the mill.

NSC020 – Commercialisation of low cost trash separation plant
(New Project Funded July 2010 – April 2012)

This two year project will design, construct and optimise a low cost, factory based trash separation plant at Condong Sugar Mill. A separation plant is of interest to NSWSMC as they wish for growers to harvest whole-crop cane (i.e. includes stalk, trash and tops) to increase the volume of bagasse available for their cogeneration facilities. However research is indicating that processing cane with high levels of trash through the milling train is having detrimental effects on sugar recovery.

Therefore if a method of separating the cane from the trash at the cane receiver station of a mill would allow the majority of trash to be rerouted straight to the cogeneration facility. Dealing with increasing levels of trash at the mill will be of growing importance to other mill groups in the near future, in particular, Burdekin mills which will soon face green cane harvesting as burning of cane is phased out under state regulations.

QUT 039 – Reducing the economic and environmental risks of large scale bagasse storage through depithing
(New project funded July 2010 – Aug 2011)

This project will investigate the effect of pith removal on the storage of bagasse with a particular focus on dust, leachate and spontaneous combustion. Other issues that impact on storage will also be assessed, such as the bulk density and compressibility. If successful this project aims to generate measurable economic and environmental benefits for the industry.

Emerging Technologies

Arena Outcome: *Rapid translation of relevant emerging technologies that will enhance the industry's competitive edge in the global marketplace.*

The Emerging Technologies Arena recognises that the industry is reliant on strategic research to sustain it into the future. R&D conducted in this arena will mainly involve research on frontier technologies or implementation of more-distant-from-market emerging technologies in the fields of breeding systems, farming, harvesting, milling and marketing systems, biotechnology and diversification.

While directed in the longer term at delivering improved economic, environmental and/or social outcomes, individual R&D projects conducted in this arena may not deliver these benefits in the short term.

Genetics and Breeding Systems

The R&D Plan 2007–2012 recognises the need for R&D to underpin the ongoing development of sugarcane germ-plasma for multiple uses. Key deliverables in the R&D Plan are: improved breeding systems and evaluation approaches; diagnostic technologies for screening for enhanced disease and stress resistance; enhanced breeding approaches based on improved understanding of the processes of sugar accumulation; and genetic modification of the sugarcane plant for increased industry profitability.

The provision of improved varieties has been a long-term component of the industry's approach to productivity, and underpinning research and development has been a key area of investment since SRDC's inception.

Improved breeding systems to accelerate genetic gain and delivery of new varieties

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. The 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 rapidly and efficiently.

BSS334 – More crop per drop: Developing water-efficient and drought tolerant sugarcane cultivars for irrigated and dry land farming
(New project funded July 2010 – Dec 2014)

A long-term goal of developing water use-efficient and drought tolerant sugarcane cultivars has been progressed through the research program. A project is assessing the variation in currently available germ-plasma, and identifying elite clones and/or a rapid screening method to select water use-efficient and drought tolerant cultivars. This represents an additional approach to reduce the impact of recurring drought and the rising cost of water on industry profitability and competitiveness to those outlined in the Regional Futures Arena.

BSS333 – International GxE for sugarcane physiology Australia
(New project funded July 2010 – May 2014)

This new project will link Australian researchers with the International Consortium on Sugarcane Modelling (ICSM) initiative. The ICSM will undertake studies in several counties to improve understanding of genotype by environment (GxE) interaction across world sugar industries. 'Gene to phenotype' models are being developed to identify both the environment in which selections for improved crops are made and the genes, markers and traits required to exploit a given environment. It should enable better targeting of selection environments and an understanding of how varieties perform in areas beyond where they were developed. The project includes a PhD studentship to train a young scientist in crop modelling and physiology, which is vital as several key researchers are approaching retirement.

CPI019 – Towards a complete genome sequence of sugarcane: generation of data and development of bio-informatics resources.
(New project funded July 2010 – June 2013)

This 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 develop a platform that can be used by the sugarcane community to capture maximum benefit from the genome information and enhance our ability to identify genes that underpin important traits and assist in development of new varieties.

Diagnostic technologies for genetic screening

BSS307 – Development and implementation of NIR based predictive tools to rate sugarcane varieties against smut and Fiji leaf gall
(Funded July 2007 – Nov 2010)

This continuing project will develop and implement new predictive tools for screening against sugarcane smut and Fiji leaf gall. These tools will improve the delivery of resistant varieties in shorter timeframes, and reduce the cost of varietal selection. If successful the project will deliver significant efficiency gains and cost reductions over traditional screening methods. Also this work will link with the Regional Communities Program project described in the Regional Futures Arena to accelerate the development of smut-resistant varieties.

Improved understanding of sugar accumulation

CSE023 – Pathways to exploiting enhanced photosynthetic efficiency for higher sucrose and biomass yield
(Funded July 2008 – Aug 2011)

The role of sucrose in feedback inhibition of photosynthesis of sugarcane plants is not yet fully understood. A better understanding of the basic physiology of sugarcane and existing limitations to higher sucrose content and yield being addressed through current research funded by the SRDC should lead to innovative approaches to crop improvement. Increasing the photosynthetic efficiency of sugarcane will also enhance its natural physiological advantages as a feedstock for the biofuel market.

Genetic modification of the sugarcane plant

UQ040 – Extending Sugar Booster technology into multiple sugarcane cultivars for optimal deployment by Australian industry
(Funded July 2005 – Aug 2010)

This continuing project will build on R&D conducted by CSR Sugar and the University of Queensland to develop their 'Sugar Booster' technology, which has shown promise of producing the value added-product isomaltulose as well as higher yields of sucrose and other fermentable sugars. In additional this project will explore pathways for agronomic evaluation and regulatory assessment of GM sugarcane.

Food safety and human health

CPI020 – Nutritional analysis of cane for GM varieties
(New project funded July 2010)

This three year project will develop a nutritional analysis of sugarcane stalk and/or leaves taken from current commercial varieties grown over three seasons across different geographic regions. This dataset will act as a baseline against which the composition of GM sugarcane can be compared for deregulation purposes.

The data collected will establish the 'normal' ranges within which non-GM cane components (e.g. fat, protein, carbohydrates etc) occur. At present only fragmented information is available on the nutritional composition of the sugarcane stalk.

The project team has an existing relationship with the Australian regulatory body FSANZ, so the data collected is likely to be what is required by Australian regulatory standards. In addition the data generated will assist the OECD task force for the Safety of Novel Foods and Feeds to create a consensus document on the composition of sugarcane.

Nitrogen use efficiency and climate change

UQ044 – SaveN Cane: Developing selection tools for N-efficient sugarcane
(Funded July 2009 – Dec 2013)

This project aims to advance knowledge of traits that make sugarcane more nitrogen (N) use efficient. Such knowledge will assist in developing tools for breeding nitrogen use-efficient clones, thus lowering nitrogen fertiliser demand.

CPI017 – Developing sugarcane for production systems utilising total biomass
(Funded July 2009 – Dec 2013)

This project will facilitate the development of cultivars for the Australian sugarcane industry suited to production systems utilising total sugarcane biomass to prepare for, and maximise, the industry benefits expected to arise from emerging commercial opportunities.

CPI018 – Climate ready sugarcane: Traits for adaption to high CO2 levels
(Funded July 2009 – Dec 2013)

This project will investigate plant physiological adaptation to climate as a result of inevitably elevated CO2 conditions. The next phase will assess adaptive strategies for the sugarcane plant in terms of improved water use efficiency and increased water stress.

Improved processing technologies

Key deliverables in the R&D Plan 2007–2012 are: improved monitoring technologies and data flow between grower, harvester and miller that improve cane quality and overall efficiency of the value chain, improved processing technologies for making sugar and other products, and technologies to exploit new opportunities in the energy economy.

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

This continuing project will develop economically viable technologies to produce biofuels, platform chemicals and other value added products using thermo-chemical processing of bagasse. The project will also enhance links with research and development institutions and end user clients to ensure appropriate hydrothermal liquefaction and fractionation technologies are developed.

People Development

Arena Outcome: *Development of individuals and networks across the sugarcane industry that enhance the capacity for continuous improvement.*

The People Development Arena recognises the need for a continued focus on improving the skills and capabilities of all members of the sugarcane industry (younger and older, male and female alike), and improving the functioning of partnerships between industry, researchers, and the general community. Otherwise the opportunities provided by more technical research and development will not be realised.

Key deliverables in the R&D Plan 2007–2012 are: improved capability of individuals across the industry for positive, innovative and effective leadership; and improved capacity of individuals to change, learn, and innovate.

Improved capacity to change, learn and innovate

Scholarships

The aim of SRDC's scholarship program is to ensure the future of the sugar industry by fostering scientific skills and knowledge. SRDC will continue its postgraduate scholarship program in 2010–2011.

Twelve continuing postgraduate scholars are studying in a range of disciplines including plant breeding and biotechnology, rodent pest management, soil health, environmental codes of practice, exotic pest threats, bagasse fractionation and alternative uses, and information systems. Three of these started in early 2010 and six of these are expected to conclude in 2010–2011. Funded scholarships include:

STU068 – Patrick Bewg – will research *Modification of lignin Bio-synthesis in sugarcane for the production of cellulosic ethanol* through the Queensland University of Technology.
(Funded Feb 2010 – July 2013)

STU069 – Mark Wang – will determine *Greenhouse gas emissions from sugarcane agriculture and mitigation options* through the Australian National University.
(Funded March 2010 – Sept 2013)

STU070 – Richard Brackin – will investigate the *Microbiology of sugarcane soils* through the University of Queensland which could lead to reduced requirements for fertiliser use.
(Funded Jan 2010 – July 2013)

STU049 – Peter Wulf – Self regulatory codes of practice and their effectiveness in achieving best environmental management practices within NQ primary industries.
(Funded July 2003 – May 2013)

STU052 – Kylie Anderson – Invasion potential of Eumetopina Flavipes, vector of Ramu Stunt Disease of Sugarcane.
(Funded June 2005 – Sept 2010)

STU055 – Karen Benn – The motivators and barriers to the adoption of more sustainable farming practices.
(Funded Sept 2005 – July 2010)

STU062 – Henry Thomas – Effective methods for communicating the lessons learned from decision support systems to broader audiences.
(Funded Jan 2007 – Oct 2010)

STU063 – Ian O'Hara – Pre-treatment of sugarcane bagasse for enzymatic hydrolysis and fermentation.
(Funded March 2008 – July 2011)

STU064 – Daniel Zamykal – Intelligent data analysis methods from effective integration of Precision Agriculture within the Australian Sugar Industry.
(Funded March 2008 – July 2011)

STU065 – Milovan Bokan – Abiotic stress tolerant sugarcane: Drought-proofing sugarcane with cell-death protection genes.
(Funded Feb 2008 – July 2011)

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

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

Queensland University of Technology

In 2010–2011 SRDC will continue to fund ten research projects through the Queensland University of Technology and the Sugar Research Institute as well funding three new projects aligned with sugarcane research priorities.

Some example of funded projects include:

QUT032 – Developing a new methodology for competency based training courses for shift supervisors in sugar factories
(Funded Nov 2008 – May 2011)

This project will investigate novel workplace training programs for sugar transport and factory operations based on new integrated learning methodologies. This work involves collaboration between experts at QUT in interactive web-based education systems and in milling and transport engineering. This project also aims to develop the capacity of new supervisors to make effective decisions, with improved career prospects for supervisors.

QUT 033 – Improving the efficiency of traffic office operations through improved traffic officer training
(Funded Nov 2008 – Aug 2011)

This project aims at building the capacity of traffic officers to better manage transport operations. It will also contribute to ways to handle the turnover of staff in the mills and to improve the management of transport and factory operations.

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

This continuing project will develop economically viable technologies to produce biofuels, platform chemicals and other value added products using thermo-chemical processing of bagasse. The project will also enhance links with R&D institutions and end user clients to ensure appropriate hydrothermal liquefaction and fractionation technologies are developed.

QUT038 – Implement supervisory/advisory control and pan and fugal stations
(New project funded July 2010 – Dec 2012)

Australian factories operate with very few operating and supervisory staff but in order to remain competitive it is likely that this number will need to be reduced even further. However, the complexity of the task in operating the factory in an optimal manner has increased, owing to competing production requirements. This project will implement a smart advisory/supervisory control system (SSCS) for pan and fugal station operations and to demonstrate and evaluate its effectiveness and acceptability by factory operators, supervisors and management.

JCU030 – Pre-treatment of sugarcane
(Funded July 2009 – May 2011)

This project will be supported by three engineering honours students at James Cook University to investigate novel sugarcane pre-treatment options at mills.

For many years SRDC has worked in partnership with James Cook University to support Masters and PhD scholarships. As part of SRDC's people development program it was identified exposing Honour students to real sugarcane industry issues could lead to future postgraduate studies or career interest in the industry.

Improving social capacity

Key deliverables in the R&D Plan 2007–2012 are: improved capacity to collaborate and innovate within the industry; improved industry structures and processes that enhance its ability to compete internationally; improved capacity to learn and innovate from people outside the industry; and improved capacity of regional industry participants to partner with researchers in identifying, addressing and delivering R&D outcomes.

Improved capacity to collaborate and innovate within and beyond the industry

AFF022 – Science and Innovation Awards
(Funded March 2003 – April 2011)

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 as a joint RDC program coordinated by DAFF and the Bureau of Rural Sciences. (AFF002).

RDA005 – Rewarding an innovation culture in the Australian sugar industry
(Funded July 2006 – May 2013)

SRDC promotes and recognises innovation by researchers in the sugarcane industry by awarding the Innovation in R&D Awards each year at the Australian Society of Sugarcane Technologists (ASSCT) conference. The categories offered are:

- **SRDC Team Innovation Award**, for an innovative solution to a complex problem which is transferable and outperforms current practice;
- **SRDC Individual R&D Award**, for a sustained contribution by an individual to research and development over the past five years; and the
- **SRDC Service Award**, for leadership by an individual in influencing innovative R&D through management, policy development or promotional activities over the past five years.

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.

Grower Group Innovation Projects

SRDC's Grower Group Innovation Projects (GGIPs) play an important role in encouraging growers to interact with other growers and advisers to evaluate R&D outputs in their local area. The main industry gains are likely to be through more rapid adoption of improved practices and farming systems.

Up to 19 Grower Group Innovation Projects will be underway in 2010–2011 to apply aspects of new farming system principles to specific situations. The range of topics being addressed includes variety selection, planting systems, soil health monitoring, integrated insect and weed pest management, nutrient management, bed-forming and rotation cropping.

Building the capacity of growers to adopt research and development practices is strengthened by enabling grower groups to develop and conduct their own research and development projects on-farm. The key aim is to allow growers to become more profitable and environmentally sustainable.

GN001 – Grower Group Network

The Grower Group Network is currently managed through a project led by three part-time project officers, with substantial separation from direct SRDC involvement in the day-to-day management of GGIP projects. SRDC still calls for and assess new GGIP proposals and contracts new projects, but management, conduct and project reporting will occur under the auspices of the Grower Group Network.

Capacity Building Projects

SRDC allocates around 15% of budget for Capacity Building Project (CBP) initiatives in 2010–2011. SRDC is targeting capacity building in industry people through travel or through exposure to resource people visiting their regions, in addition to travel by researchers to workshops and conferences. SRDC provides partial funding for these activities, with partnership funding required from those travelling, or from other organisations. Capacity Building Project (CBP) applications for activities during 2010–2011 were received in April 2010, and will be finalised by July 2010.

Allocation of SRDC Investments across National and Rural R&D Priorities

Table 4 and Table 5 summarise investments allocated to each of the National and Rural R&D Priorities respectively, within SRDC's three investment arenas.

Table 4

R&D 2010–2011 expenditure estimates by SRDC Investment Arena across National R&D Priority Goals ($'000)

National Research Priorities	An Environmentally Sustainable Australia				Promoting and Maintaining Good Health		Frontier Technologies for Building and Transforming Australian Industries			Safe-guarding Australia	Total
	A1	A2	A3	A7	B3	B4	C2	C4	C5	D3	
Regional Futures	578	258	514	617	34	2311	281	305	638	1014	**6550**
Emerging Technologies	242	213	17	1232	0	302	1020	408	213	0	**3647**
People Development	13	0	36	101	0	198	45	88	900	0	**1381**
Total	**833**	**471**	**567**	**1950**	**34**	**2811**	**1346**	**801**	**1749**	**1014**	**11577**

**Includes estimates for projects not contracted as at 1 March 2010 and SRDC operating costs pro-rata*

Key to NRP Goals in which SRDC has R&D investments

An Environmentally Sustainable Australia

A1: Water – a critical resource

A2: Transforming existing industries

A3: Overcoming soil loss, salinity and acidity

A7: Responding to climate change and variability

Promoting and Maintaining Good Health

B3: Preventive healthcare

B4: Strengthening Australia's social and economic fabric

Frontier Technologies for Building and Transforming Australian Industries

C2: Frontier technologies

C4: Smart information use

C5: Promoting an innovation culture and economy

Safeguarding Australia

D3: Protecting Australia from invasive diseases and pests

Table 5

Composition of Government Research Priorities attributed to each SRDC Investment Arena by Rural R&D Priorities ($'000)

Rural Research & Development Priorities	Productivity and Adding Value	Supply Chain and Markets	Natural Resource Management	Climate Variability & Climate Change	Biosecurity	*Supporting the Priorities:* Innovation Skills	*Supporting the Priorities:* Technology	Total
Regional Futures	2309	374	1345	643	1063	542	1014	**7290**
Emerging Technologies	745	0	259	1232	34	426	0	**2696**
People Development	82	29	22	101	0	1059	0	**1293**
Total	**3136**	**403**	**1626**	**1976**	**1097**	**2027**	**1014**	**11279**

**Includes estimates for projects not all contracted as at 1 March 2010 and estimated SRDC operating costs pro-rata i.e. $11279 + $298 = $11577.*

Attachment A
SRDC PROJECTS & SCHOLARSHIPS 2010–2011

Arena – Regional Futures

Strategy – Value Chain Integration

Continuing Projects

Project	Title	Duration	Contact	Fund
CSR038	Increasing in-mill NIR effectiveness and Increasing in-mill NIR effectiveness and communicating data to all sectors for improved decision making in the sugarcane value chain	Jul 06 – Feb 11	Mr John Markley	$25,979
CVA003	Managing Climate Variability Program Phase 2	Jul 07 – Sep 10	Dr Diana Saunders	$0
CVA004	Managing Climate Variability Program Phase 3	Jul 10 – Sep 14	Dr Diana Saunders	$50,000
JCU032	How will climate change impact climate variability in sugarcane growing regions?	Jul 09 – Oct 12	Dr Yvette Everingham	$144,411
NSC019	Improving the harvesting and transport of biomass for sugar and power production in NSW	Jul 09 – Aug 12	Mr Rick Beattie	$168,490
OHS003	Farming and Fishing Health and Safety Collaborative Partnership (Phase 3)	Mar 08 – May 12	Mrs Bianca Cairns	$20,000
QUT027	Opportunities for the Australian sugar industry in greenhouse gas abatement and carbon trading	Dec 09 – Dec 11	Dr Phil Hobson	$109,000
WS009	Research and Development Communication	Jul 03 – Jun 13	Ms Carolyn Martin	$75,000

New Projects

CPI020	Sugarcane compositional analysis to enable food safety assessment of modified varieties	Jul 10 – May 13	Dr Anne Rae	$164,143
UQ045	Streamlined life cycle assessment (LCA) tool for assessing the environmental benefits of progressive cane growing	Jul 10 – Feb 12	Dr Marguerite Renouf	$70,000

Strategy – Farming and Harvesting Systems

Continuing Projects

Project	Title	Duration	Contact	Fund
BPS001	Identifying management zones within cane paddocks: an essential foundation for precision sugarcane agriculture	Jul 07 – Aug 11	Dr Ross Coventry	$210,513
BSS296	Evaluation of genotypes for a controlled-traffic farming system	Jul 06 – Dec 11	Dr Barry Salter	$91,506
BSS302	Epidemiology studies into sugarcane smut	Jan 07 – Dec 10	Dr Robert Magarey	$100,000
BSS303	Sugarcane biosecurity integrated plan	Jul 07 – Aug 10	Dr Mohamed Sallam	$19,107
BSS306	Establishing the second crop cycle into permanent beds	Jul 07 – Dec 10	Mr Bradley Hussey	$67,267
BSS318	Measurement of in-field sucrose loss by mobile refractometry	Jul 08 – May 12	Mr Cam Whiteing	$134,887
BSS325	SmutBuster: Accelerated breeding of smut-resistant sugarcane varieties	Jul 08 – Jun 11	Dr Frikkie Botha	$685,235
BSS329	Understanding water quality in sugarcane farming systems	Feb 10 – Aug 12	Ms Toni Anderson	$368,680
BSS331	Preparing the Australian sugar industry for threats	Jul 09 – Oct 12	Dr Robert Magarey	$196,638
CSE022	A collaborative approach to Precision Agriculture from exotic pests and diseases RD&E for the Australian sugar industry	Jul 08 – Sep 14	Dr Rob Bramley	$322,995
DPI020	Management solutions to optimise performance of new farming systems in southern canelands	Jul 08 – Oct 12	Dr Mike Bell	$110,000
DPI021	Remote sensing-based Precision Agriculture tools for the sugar industry	Jul 09 – Aug 12	Dr Andrew Robson	$131,855
GGP037	New innovative double row chopper system	Jul 07 – Sep 10	Mr Chris Cannavan	$11,000
GGP041	Better frost tolerant varieties for NSW	Jan 09 – Dec 10	Mr Alan Munro	$10,000
GGP042	Winter soybean for biodiesel and nitrogen fixation	Jan 09 – Mar 12	Mr David Singh	$19,960
GGP044	Enhancing nutrient placement: Sub surface application of cane specific compost	Jan 09 – May 11	Ms Barbara Walker	$17,500
GGP045	Developing extended fallow options for the Plane Creek district	Jan 09 – Aug 11	Mr Robert Sluggett	$12,000
GGP046	Investigate skip row configuration in sugarcane	Aug 09 – Apr 12	Mr Lee Blackburn	$15,400

Strategy – Farming and Harvesting Systems *(continued)*				
Project	Title	Duration	Contact	Fund
GGP047	Maximising soys in Central Queensland	Jan 09 – Apr 12	Mr Simon Mattson	$21,150
GGP048	Better targeting of new cultivars for north Queensland through additional trials in four areas	Mar 09 – Dec 11	Mr Chris McClelland	$1,000
GGP049	Investigating reduced nitrogen application rates for profitability and sustainability	Apr 09 – May 12	Mr Chris McClelland	$18,000
GGP050	Improving soybean and nitrogen management in subtropical NSW cane systems	Apr 09 – Dec 11	Mr Alan Munro	$15,150
GGP051	Maximising centre pivot efficiencies	Apr 09 – Mar 11	Mr John Fox	$3,300
GGP052	The next step for Precision Agriculture	May 09 – Jan 11	Mr Tony Bugeja	$5,500
GGP053	Improvement of internal soil drainage and yield on heavy clay soils in the Herbert	Jan 10 – Dec 12	Mr Vince Russo	$31,000
GGP054	Herbert cane growers strategic grub management implementing BSES decision-making tools	May 10 – Jan 13	Mr Geoff Morley	$19,000
GGP055	Helping sugarcane farmers integrate electronic recording systems into their farming business	Jan 10 – Jan 12	Mr Michael Reinaudo	$14,450
GGP056	A monitoring-based system to enhance canegrub control best management practice for Isis sugarcane growers	Feb 10 – Jan 13	Mr Wayne Stanley	$37,000
GGP057	SECMAPPER (Soil Electrical Conductivity Mapper): mapping soil electrical conductivity patterns below trash blankets and stubble	Jan 10 – Dec 11	Mr Alan Pace	$14,000
GGP058	Developing irrigation strategies in the Central Region for a range of water entitlements and soil types	Feb 10 – Aug 10	Ms Joy Guy	$38,000
GGP059	Developing prescription compost to suit specific soils in Maryborough	Feb 10 – Feb 13	Mr Glen Grohn	$12,474
MAF002	Evaluating alternative irrigation for a greener future	Jul 06 – Aug 11	Mr Chris Hesp	$85,000
NFS002	An integrated approach to nut grass control	Jul 07 – Aug 10	Dr Bob Aitken	$5,400
UQ043	Harnessing soil biology to improve the productivity of the new sugarcane farming system	Jul 07 – Aug 10	Dr Susanne Schmidt	$48,000

Strategy – Farming and Harvesting Systems *(continued)*				
Project	Title	Duration	Contact	Fund
New Projects				
DPI022	Integration of sugarcane, grains, grain legumes and cotton in sustainable irrigated cropping systems in the Burdekin	Jul 10 – May 14	Dr Mike Bell	$125,000
NCA011	The development of precision spray technologies for the Australian sugar industry	Jul 10 – Jun 13	Mr Craig Baillie	$183,250

Strategy – Transport, Milling and Marketing Systems				
Continuing Projects				
Project	Title	Duration	Contact	Fund
LEV001	Restoring efficiency to harvested cane transport in New South Wales	Jul 08 – Nov 10	Mr Michael O'Connor	$34,500
QUT024	Reducing transport costs through the automation of schedule generation	Nov 08 – Nov 11	Dr Geoff Kent	$46,949
QUT029	Evaluation of a prototype dewatering mill	Nov 08 – May 14	Dr Geoff Kent	$20,000
TSL001	Improved management of scale formation and scale removal in the Tully evaporator station	Jul 07 – Aug 10	Mr John King	$15,000
TSL002	Pelletising mill mud and ash	Jul 07 – Aug 10	Mr John King	$5,300
New Projects				
MSA006	Investigation into alternative clarification technologies	Jul 10 – Jul 12	Dr Bryan Lavarack	$100,000
MUL003	Removal of endogenous polysaccharides in raw sugar	Jul 10 – May 11	Mr Glenn Pope	$90,500
NSC020	Commercialisation of a low cost trash separation plant	Jul 10 – Apr 12	Mr Cam Palmer	$250,000
QUT039	Reducing the economic and environmental risks of large scale bagasse storage through depithing	Jul 10 – Aug 11	Mr Ian O'Hara	$45,000
QUT040	Advanced computer simulation of sugar factories – SysCAD	Jul 10 – May 12	Dr Ross Broadfoot	$110,000

Total Regional Futures = $4,745,489

Arena – Emerging Technologies

Strategy – Genetics and Breeding Systems

Continuing Projects

Project	Title	Duration	Contact	Fund
BSS305	More crop per drop: developing water-efficient and drought tolerant sugarcane cultivars for irrigated and dryland farming	Jul 07 – Apr 11	Dr Prakash Lakshmanan	$100,000
BSS307	Development and implementation of NIR based predictive tools to rate sugarcane varieties against smut and Fiji leaf gall	Jul 07 – Nov 10	Dr Michael O'Shea	$50,000
BSS319	Maximising the rate of parental improvement in the Australian sugarcane breeding program	Jul 08 – Mar 15	Dr Xianming Wei	$136,880
CPI017	Developing sugarcane for production systems utilizing total biomass	Jul 09 – Dec 13	Dr Phillip Jackson	$280,000
CPI018	Climate ready sugarcane: Traits for adaptation to high CO2 levels	Jul 09 – Aug 13	Dr Geoff Inman-Bamber	$131,217
CSE023	Pathways to exploiting enhanced photosynthetic efficiency for higher sucrose and biomass yield	Jul 08 – Aug 11	Dr Geoff Inman-Bamber	$132,728
UQ040	Extending Sugar Booster technology into multiple sugarcane cultivars for optimal deployment by Australian industry	Jul 05 – Aug 10	Dr Robert Birch	$80,000
UQ044	SaveN Cane: Developing selection tools for N-efficient sugarcane	Jul 09 – Dec 13	Dr Susanne Schmidt	$315,438

New Projects

BSS333	International GxE for sugarcane physiology – Australia	Jul 10 – May 14	Dr Barry Salter	$48,662
BSS334	More crop per drop: developing water-efficient and drought tolerant sugarcane cultivars for irrigated and dryland farming	Jul 10 – Dec 14	Dr Prakash Lakshmanan	$258,120
CPI019	Towards a complete genome sequence of sugarcane; generation of data and development of bioinformatic resources	Jul 10 – Jun 13	Dr Karen Aitken	$250,000

Strategy – Farming, Harvesting, Transport, Milling and Marketing Systems

Continuing Projects

Project	Title	Duration	Contact	Fund
QUT014	Recovery of sucrose Part 2	Jul 06 – Feb 11	Mr Kameron Dunn	$65,326
QUT030	Vacuum condenser design modification	Nov 08 – Dec 10	Mr Kameron Dunn	$57,341
QUT031	Dunder concentrating	Feb 10 – Nov 10	Mr Kameron Dunn	$25,644
QUT036	The production of biofuels and value added co-products from thermo chemical processing of sugarcane bagasse	Jul 09 – May 14	Dr Phil Hobson	$271,936

Total Emerging Technologies = $2,203,292

Program – People Development

Strategy – Individual Capacity

Continuing Projects

Project	Title	Duration	Contact	Fund
AFF002	Science and Innovation Awards for Young People	Mar 03 – Apr 11	Ms Carolyn Martin	$16,000
QUT003	An integrated pest management strategy for climbing rat in the far-north Queensland sugarcane production system	Jul 05 – Mar 12	Dr Susan Fuller	
QUT032	Developing a new methodology for competency based training courses for shift supervisors in sugar factories	Nov 08 – May 11	Dr Ross Broadfoot	$71,194
QUT033	Improving the efficiency of traffic office operations through improved traffic officer training	Nov 08 – Aug 11	Dr Geoff Kent	$43,412
RDA005	Rewarding an innovation culture in the Australian sugar industry	Jul 06 – May 13	Ms Carolyn Martin	$35,000
SRD019	Building the presentation and media skills of SRDC Scholarship students	Jul 06 – Feb 13	Dr Diana Saunders	$18,000
STU049	Peter Wulf – Self-regulatory codes of practice & their effectiveness in achieving best environmental management practices within NQ primary industries	Jul 03 – Dec 10	Dr Ann Peterson	$3,000
STU052	Kylie Anderson – Invasion potential of Eumetopina flavipes, vector of Ramu Stunt Disease of Sugarcane	Jun 05 – Sep 10	Dr Bradley Congdon	$0
STU055	Karen Benn – The motivators and barriers to the adoption of more sustainable farming practices	Sep 05 – Jul 10	Dr Janice Elder	$0
STU062	Henry Thomas – Effective methods for communicating the lessons learned from decision support systems to broader audiences	Jan 07 – Oct 10	Dr Joseph Mula	$0
STU063	Ian O'Hara – Pre-treatment of sugarcane bagasse for enzymatic hydrolysis and fermentation	Mar 08 – Jul 11	Dr Les Edye	$21,333
STU064	Daniel Zamykal – Intelligent data analysis methods from effective integration of Precision Agriculture within the Australian Sugar Industry	Mar 08 – Jul 11	Dr Yvette Everingham	$21,333
STU065	Milovan Bokan – Abiotic stress tolerant sugarcane: Drought-proofing sugarcane with cell-death protection genes	Feb 08 – Jul 11	Dr Harjeet Khanna	$18,667
STU066	Darryn Rackemann – Production of laevulin acid and its derivatives from sugarcane biomass	Jul 09 – Jul 13	Dr William Doherty	$32,000
STU067	Cameron Dunn – Conversion of lignin to industrial fuels and chemicals	Jul 09 – Jul 13	Dr Phil Hobson	$32,000
STU066	Darryn Rackemann – Production of laevulin acid and its derivatives from sugarcane biomass	Jul 09 – Jul 13	Dr William Doherty	$32,000

Strategy – Individual Capacity *(continued)*				
Project	Title	Duration	Contact	Fund
STU068	Patrick Bewg – Modification of lignin biosynthesis in sugarcane for the production of cellulosic ethanol	Feb 10 – Jul 13	Dr Heather Coleman	$32,000
STU069	Mark Wang – Greenhouse gas emissions from sugarcane agriculture and mitigation options	Mar 10 – Sep 13	Dr Ben Macdonald	$32,000
STU070	Richard Brackin – Microbiology of sugarcane soils	Jan 10 – Jul 13	Dr Susanne Schmidt	$32,000
New Projects				
QUT038	Implement supervisory/advisory control of pan and fugal stations	Jul 10 – Dec 12	Dr Ross Broadfoot	$130,000

Strategy – Social Capacity				
Continuing Projects				
Project	Title	Duration	Contact	Fund
BCA002	Performance evaluation of SRDC R&D investments	Jul 07 – Sep 13	Ms Annette Sugden	$60,000
GGN001	Grower Group Network	Jul 08 – May 12	Mr Chris Aylward	$169,061
JCU030	Pre-treatment of sugarcane	Jul 09 – May 11	Dr Mohan Jacob	$32,960

Total People Development = $799,960

Grand Total – SRDC programs in 2010–2011 = $7,748,741

Note: Another new project is called "Reducing nitrous oxide emissions from sugarcane lands" funded in partnership with DAFF. It aims to start in April/May 2009 and conclude in June 2012 and is led by Dr Wang from NRW.

Attachment B
ORGANISATIONAL IDENTIFIERS IN PROJECT CODES

Project Codes	*Organisation*
AANR	Australian Agriculture and Natural Resources online
AFF	Department of Agriculture, Fisheries and Forestry
BBF	Burdekin Bowen Integrated Floodplain Management Advisory Committee
BCA	Benefit Cost Analysis
BPS	Burdekin Productivity Services
BRIA	Burdekin River Irrigation Area
BSS	BSES Limited
CG	Queensland Canegrowers
CGH	Canegrowers Herbert River
CGT	Canegrowers Tully
CIS	Canegrowers Isis
CMY	Canegrowers Mackay
CPI	CSIRO Plant Industry
CRC	CRC for Sugar Industry Innovation through Biotechnology
CSE	CSIRO Sustainable Ecosystems
CSR	CSR Sugar Ltd
CCS	Commercial Cane Sugar
CVA	Managing Climate Variability Program
DPI	Queensland Department of Primary Industries and Fisheries
FPP	Full Project Proposal
GGN	Grower Group Network
GGP	Grower Group Innovation Project
GRF	Granshaw Farming
IBS	Innisfail-Babinda Cane Productivity Services Limited
JCU	James Cook University
LDI	Leading Industries
LEV	Lower Empire Vale Harvesting Co-op
LWA	Land and Water Australia
MAF	Mulgrave Area Farm Integrated Action
MAP	Mackay Area Productivity Services
MUL	Mulgrave Central Mill
NCA	National Centre for Engineering in Agriculture
NFS	NSW Farming Systems Group
NPS	National Program for Sustainable Irrigation
NSC	New South Wales Sugar Milling Cooperative Ltd.
OHS	Rural R&D Corporations Farm Health & Safety Program
QUT	Queensland University of Technology
RDA	SRDC sponsored Awards
SRD	SRDC managed activities
STU	SRDC student scholarships
TSL	Tully Sugar Ltd
UNW	University of New South Wales
UQ	University of Queensland
WAA	Western Australia Department of Agriculture
WS	SRDC Workshops

Attachment C
ABBREVIATIONS & ACRONYMS

ACFA	Australian Cane Farmers' Association
ACGC	Australian Cane Growers' Council
ASSCT	Australian Society of Sugarcane Technologists
AOP	Annual Operational Plan
ASMC	Australian Sugar Milling Council Proprietary Limited
ASSCT	Australian Society of Sugar Cane Technologists
BPMS	Business Process Management System
BRIA	Burdekin River Irrigation Area
BSES	BSES Limited
CAC Act	Commonwealth Authorities and Companies Act 1997
CBP	Capacity Building Project
CCS	Commercial Cane Sugar
CPPB	Cane Protection and Productivity Board
CRC	Cooperative Research Centre
CRCSIIB	Cooperative Research Centre for Sugar Industry Innovation and Biotechnology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Australian Government Department of Agriculture, Fisheries and Forestry
DAFWA	Department of Agriculture and Food, Western Australia
DEEDI	Department of Employment, Economic Development and Innovation (QLD)
FEAT	Farm Economics Assessment Tool
FMS	Farm Management Systems
GGIP	Grower Group Innovation Project
GIS	Geographical Information System
GM	Genetically Modified
GPS	Global Positioning Service
GVP	Gross Value of Production (of sugarcane)
HGIP	Harvester Group Innovation Project
IGG	Industry Guidance Group
IP	Intellectual Property
IPM	Integrated Pest Management
ISSCT	International Society of Sugar Cane Technologists
JCU	James Cook University
MCVP	Managing Climate Variability (Program)
NIR	Near Infrared
NSWSMC	New South Wales Sugar Milling Cooperative
OH&S	Occupational Health and Safety
ORIA	Ord River Irrigation Area
PBS	Portfolio Budget Statement
PIERD	Primary Industries and Energy Research and Development Act 1989
QDPI&F	Queensland Department of Primary Industries and Fisheries
QDNRM	Queensland Department of Natural Resources and Mines
QSL	Queensland Sugar Limited
QUT	Queensland University of Technology
R&D	Research and Development
RDC	Research and Development Corporations
RIRDC	Rural Industries Research and Development Corporation
SRDC	Sugar Research and Development Corporation
SRI	Sugar Research Institute (at Queensland University of Technology)
SYDJV	Sugar Yield Decline Joint Venture
UQ	University of Queensland
WIS	Women in Sugar

Program Leader,
Dr Prakash Lakshmanan
leads the BSES & CSIRO Joint
Venture for Molecular Breeding.
(Photo courtesy of BSES Limited)

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Australian Government

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