



ANNUAL REPORT HIGHLIGHTS 2013-14



LOW CARBON LIVING
CRC



An Australian Government Initiative



2013/14 PARTNERS



2013/14 PROJECT PARTNERS





HASSELL:
Burnley Living Roof, University of
Melbourne, Burnley Camp, Australia
Photography by Peter Bennetts

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The Cooperative Research Centre for Low Carbon Living (CRCLCL) is a national research and innovation hub whose core purpose is to work with industry and governments to lower the carbon emissions of the built environment, while driving competitive advantage for Australian industry.

To do this we will deliver:

- opportunities for lower-embodied carbon manufacturing
- a more efficient and productive built environment sector as a whole
- engaged communities participating in low carbon living
- an evidence base for good planning and policy
- large-scale national capability development
- tools, technologies and techniques that will ensure the sector remains globally competitive

Our aim is to ultimately facilitate a reduction of 10Mt of CO₂ emissions per annum by 2020 and deliver a Net Present Value of \$680 million in benefits to the Australian economy by 2027, while achieving significant capacity building for high quality research, education and training for the built environment sector.

YEAR 2 HIGHLIGHTS

1 July 2013 – 30 June 2014

51

APPROVED
PROJECTS

31

ACTIVE
PROJECTS

10

COMPLETED
PROJECTS

44

CRCLCL
PARTNERS

2

PROJECTS IN
COMMERCIALISATION
PHASES

3080

ATTENDEES
AT CRCLCL
PRESENTATION

54

STUDENT PLACES
IDENTIFIED

26

HIGHER DEGREE
STUDENTS ENROLLED

40

END-USER PUBLICATIONS
& REPORTS

5

ACTIVE LIVING
LABORATORIES

\$13.13

MILLION

TOTAL CONTRIBUTIONS BY
PARTNERS & GOVERNMENT

CHAIR'S REPORT

Following a successful first year in which we laid solid foundations in governance and operational processes, the CRCLCL enjoyed a period of consolidation in our second year. We are once again very pleased with how we have advanced towards making the vital goal of low-carbon living in Australia a reality.

The Board of Directors met four times in 2013-2014, with one of our major focuses being the development of operational monitoring and reporting systems and research management processes to ensure our activities remain aligned with our overall research objectives, and those of our industry and end-user partners. An outcome of this has been the development of the CRCLCL's Research Framework tool, which defines and documents these processes.

The CRCLCL headquarters team was expanded in 2013, with new staff resources dedicated to communications and project management being appointed. The role of Research Project Manager was introduced to drive project delivery and monitor the timing and performance of the CRC's Research Programs and projects against schedule. The Communications Manager fulfils the important role of communicating CRCLCL activities both internally and externally via a growing range of platforms, including newsletters, social media and our website.

“ With a total of 51 diverse projects and 54 associated higher degree student places now approved by the Board, spanning our 44 active partners, we have many research highlights to share from the past year. ”

Another significant change in the year was to the CRCLCL's Participants' Agreement, which has been updated with the approval of all participants and the Commonwealth, to empower the Board with greater flexibility and responsiveness in introducing new participants and accommodating changes requested by existing participants. This has resulted in several participant changes during the year, and the Board approving the admission of three new Other participants to commence in our third year.

On the research front, we have made important and exciting progress this year, ably led by our CEO and Program Leadership Group. With a total of 51 diverse projects and 54 associated higher degree student places now approved by the Board, spanning our 44 active partners, we have many research highlights to share from the past year. These will be summarised later in this report and outlined further under our Impact Pathways.

I would like to extend my thanks to all who have been involved with the CRCLCL over the past year and look forward to our continued association. It is a privilege to lead this talented group of researchers, end-users and policy makers on such an important journey towards meeting Australia's climate change responsibilities. The CRCLCL is emerging as an important agent of change and I am confident our impact will be felt for many years to come.



A handwritten signature in black ink that reads "Robert Hill". The signature is written in a cursive, flowing style.

The Hon Robert Hill AC
Chair, Board of Directors

CEO'S REPORT

Our second year of operation has proved to be a rewarding one for the CRCLCL and we are well on the way to achieving true impact in each of the areas we are targeting. In the financial year we had 31 projects underway in which 10 were completed across our three Research Programs and have made excellent progress towards meeting our defined milestones.

With a focus on consolidating our research management processes in the past year, we have defined eight *Impact Pathways* to strengthen the linkages between our activity areas and the impacts we intend to achieve through our outputs. These Impact Pathways comprise logical clusters of projects, and are aligned to either one or all of our three Research Programs.

Our eight Impact Pathways and the key research achievements within each will be described later in this report; however, it gives me great pleasure to raise attention to several of our key successes from the past year:

- The performance analysis tool for rooftop solar systems has been launched commercially by Solar Analytics, a spin-off company from Suntech R&D, with distribution via a number of vendors.
- Investigation and commercial development of photovoltaic/thermal (PVT) systems that enable rooftop photovoltaic panels to not only generate electricity but also heat and shade buildings (with Bluescope Steel) progressed to field trials.
- A project to engage the Blue Mountains tourism community with strategies to reduce carbon footprint achieved the first steps towards widespread end-user utilisation with development of a mobile application.
- The important *Visions and Pathways 2040* project delivered two consultative industry workshops and a roadmap to government to encourage policy dialogue.
- Several additional living laboratories were initiated across Adelaide, Melbourne and the Blue Mountains.

We are also pleased with progress towards meeting our commitments towards capacity building, education and training. We now have a total of 54 higher degree by research student places identified and approved towards our target of 88 – with 26 students enrolled, we will concentrate on filling the remaining places in the 2014–15 period. The past year also saw the delivery of our Education Scoping Study, along with several other education and training initiatives.

“ The drive towards low carbon living affects everyone in the global community, and we are proud to be in the position to contribute to world knowledge in this area. ”

Providing opportunities for information exchange is also high on our agenda, and we participated in a number of seminars, conferences and workshops during the year. In October 2013 we held our inaugural Annual Participant Forum, which brought all CRCLCL partners together to workshop new research, innovations and directions in low carbon living. Our SME and Peak Body network also continued to be active in 2013–2014.

On the whole it has been a year in which the CRCLCL really hit its stride. As our research projects have started to deliver on their objectives. We are continuing to forge new collaborations, investigations and alliances – both domestic and international. The drive towards low carbon living affects everyone in the global community, and we are proud to be in the position to contribute to world knowledge in this area.



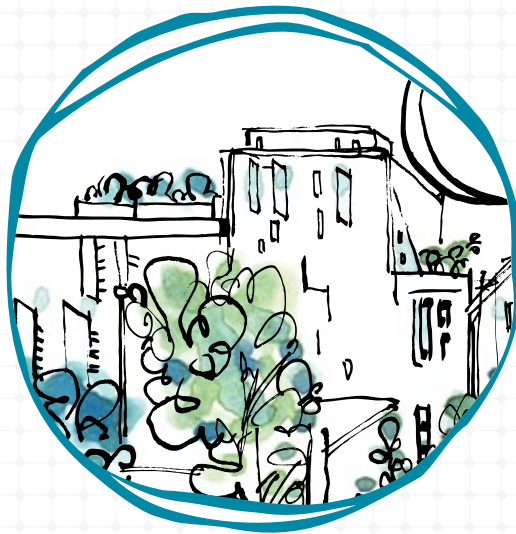
Scientia Professor Deo Prasad AO
Chief Executive Officer

Brookfield Place,
by CRCLCL partners
HASSELL and
Brookfield Multiplex.



IMPACT PATHWAYS

PROGRAM 1 INTEGRATED BUILDING SYSTEMS



PATHWAY 1

HARNESSING THE AUSTRALIAN SUN

Towards active solar roofing and building products and other heat management systems becoming the default solution in the built environment

PROGRAM 2 LOW CARBON PRECINCTS



PROGRAM 3 ENGAGED COMMUNITIES



PATHWAY 5

EVIDENCE BASE FOR LOW CARBON LIVING POLICY

Supporting governmental carbon reduction initiatives and policies with evidence of high triple bottom line return for Australia

PATHWAY 2

LOWERING THE EMBODIED CARBON IN BUILDINGS

Towards mainstream adoption and specification of new construction materials manufactured with low associated carbon emissions

PATHWAY 3

MAINSTREAMING LOW CARBON BUILDINGS

Providing quantifiable evidence of performance in low carbon buildings to instil industry and consumer confidence and drive mainstream adoption

PATHWAY 4

DESIGNING INTEGRATED LOW CARBON PRECINCTS

Towards the routine planning of low carbon neighbourhoods, considering transport, infrastructure, land use and waste management

PATHWAY 6

ENHANCING COMMUNITY ENGAGEMENT

Driving a wave of change towards low carbon living practices among the community, assisted by local government incentives

PATHWAY 7

LIVING LABORATORIES AS LOW CARBON LIFESTYLE NARRATIVES

Creating buzz around low carbon living by establishing living laboratories that help define and demonstrate what a sustainable lifestyle is

PATHWAY 8

ENHANCE EDUCATION AND CAPACITY BUILDING

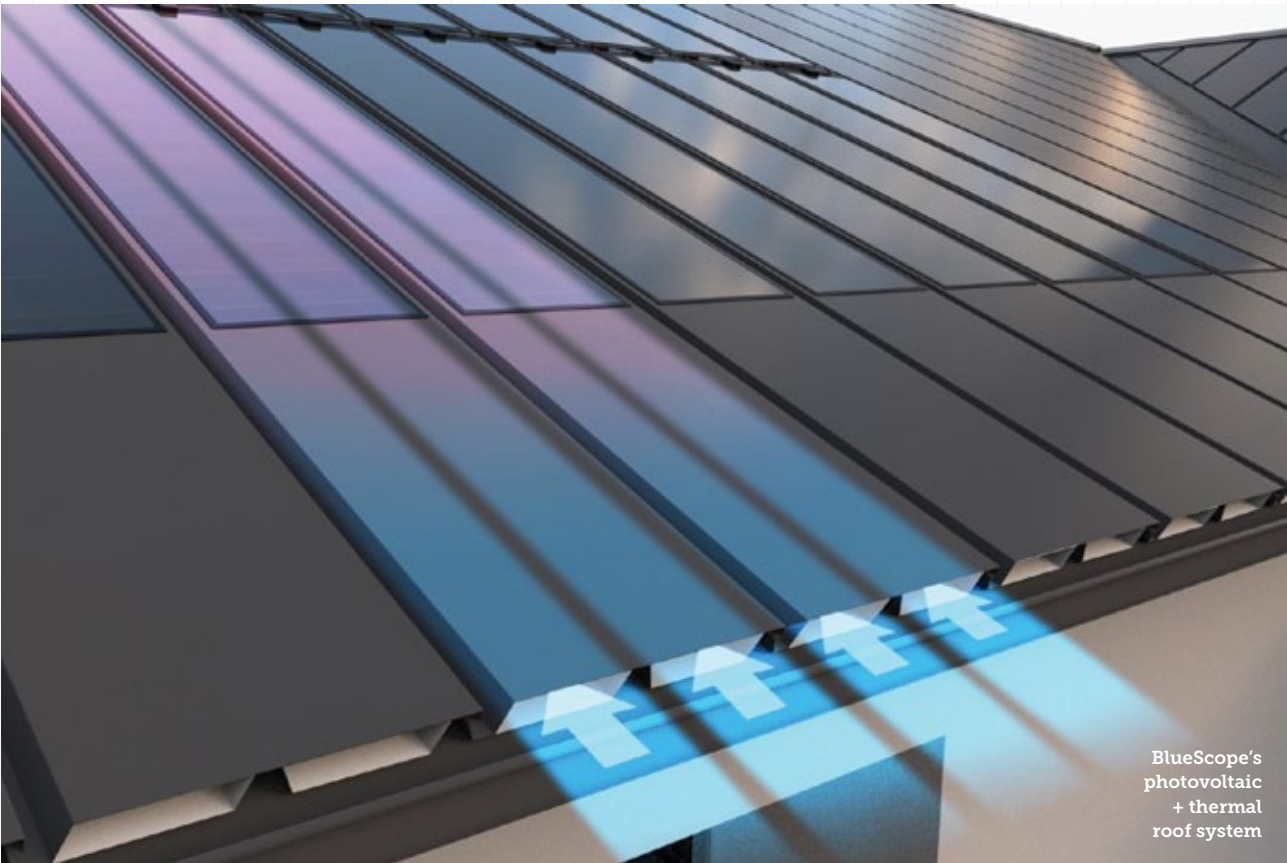
Leaving a legacy to help drive the widespread adoption of sustainable living practices in the future by inspiring and educating the next generation

PATHWAY 1

HARNESSING THE AUSTRALIAN SUN



Josh's House
Photo:
Josh Byrne
& Associates



BlueScope's
photovoltaic
+ thermal
roof system

Sunlight is the most abundant and clean energy source available. It is also one of the most under-utilised. By developing integrated technologies for harnessing (and managing) this plentiful natural resource more efficiently, we aspire to make active solar roofing and building products the default solution for all buildings.

We are developing aesthetically pleasing products and integrated systems that deliver improved multi-functional performance across solar power generation (electricity) and thermal management of buildings (heating, insulation, ventilation, shading). Innovative green designs with two or three-in-one benefits are expected to improve economic returns and drive widespread adoption.

PARTNERS

- AECOM
- BlueScope
- CSR
- Suntech R&D
- NSW OEH
- CSIRO
- UniSA
- UNSW

FIELD TRIALS OF UNIQUE HEAT-AND-SHADE SOLAR PANELS

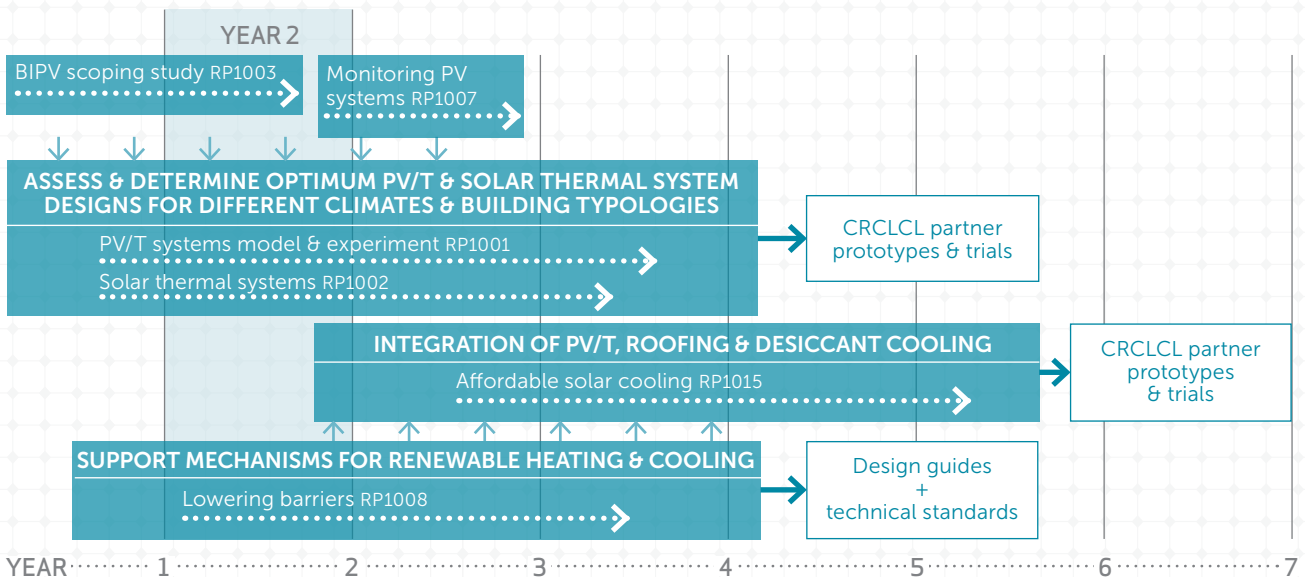
After the successful development of a prototype in our first year, CRCLCL partners BlueScope Steel and the Universities of NSW and South Australia are about to commence residential field trials of a photovoltaic/thermal (PVT) roofing system that not only generates electricity, but also heats and shades buildings (RP1001). This three-in-one integrated solution has huge commercial potential for both residential and commercial buildings.

COMMERCIAL LAUNCH OF ROOFTOP PERFORMANCE ANALYSIS TOOL

A performance analysis tool that uses algorithms and weather data to provide a prediction, monitoring and fault detection system for rooftop solar panel systems has been launched commercially by Solar Analytics, a spin-off company from CRCLCL partner, Suntech R&D Australia. Designed for both commercial and residential applications, the Solar Analytics tool allows users to identify and correct energy production levels from their photovoltaic system to ensure their system is generating as much power as it should (RP1007).

OTHER RESEARCH PROJECTS OF INTEREST

- An investigation of the potential for utilising low cost thermal energy from PVT collectors
- Addressing the barriers confronting industry uptake of renewable heating and cooling technologies and developing industry support mechanisms



PATHWAY 2

LOWERING THE EMBEDDED CARBON IN BUILDINGS

At the foundation of the low carbon built environment is an emerging breed of construction materials manufactured using techniques that minimise energy consumption and associated carbon emissions. By independently researching these ‘low embedded carbon’ materials and barriers to their uptake, we aspire to drive their adoption until they are a mainstream solution regularly specified by the construction industry.

We are studying the design, durability and field performance of low embedded carbon construction materials such as geopolymer concrete, recycled timber and hybrid systems to prove their commercial viability. By showcasing their application and developing new performance standards, we aim to drive market growth and uptake.

PARTNERS

- AECOM
- Ash Development Association of Australia
- Australasian Slag Association
- Standards Australia
- Sydney Water
- Swinburne
- UNSW

OVERCOMING THE BARRIERS TO GEOPOLYMER CONCRETE

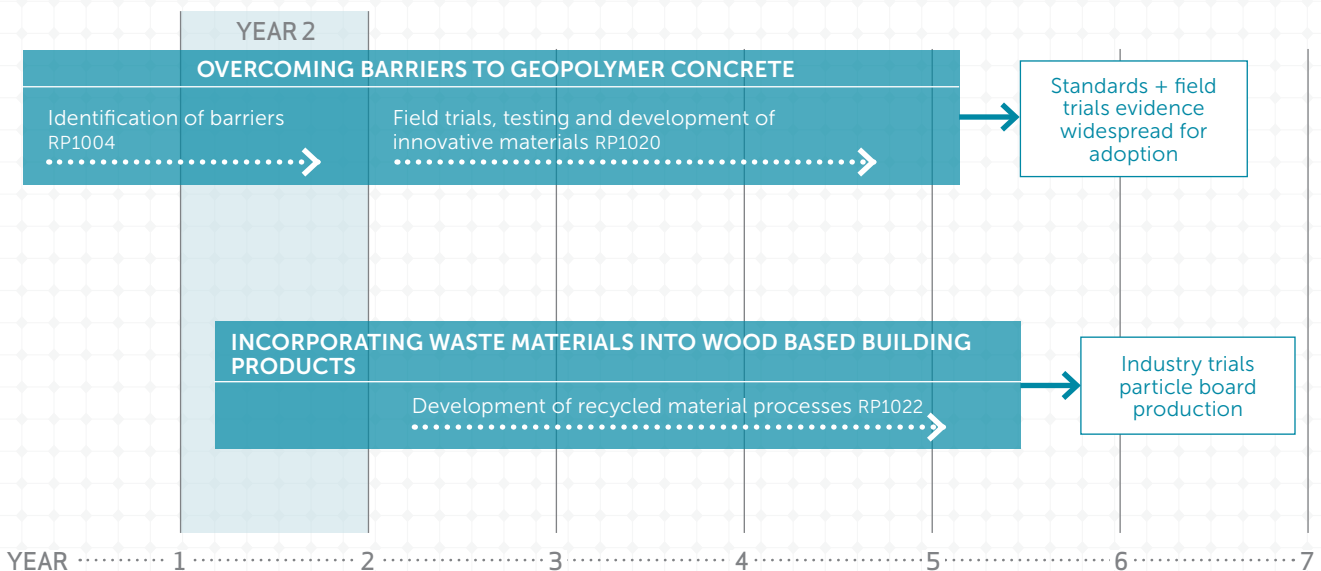
Several partners completed a study to identify the barriers and pathways for widespread adoption of geopolymer concrete, which is made from materials such as fly ash instead of Portland Cement. The findings of the study revealed the Australian Standards, which do not recognise concretes without Portland cement, to be one of the major barriers. Another barrier was the lack of long-term performance data, which has led to field trials and materials testing of these materials.

OTHER RESEARCH PROJECTS OF INTEREST

The investigation of alternate low carbon, low cost sustainable products for the particle board industry.



Photo: AECOM



PATHWAY 3

MAINSTREAMING LOW CARBON BUILDINGS

The provision of quantified evidence as to what measures genuinely deliver low carbon outcomes – and how significant those outcomes are – will play a critical role in driving widespread adoption of low carbon buildings across the board. To provide that evidence and confidence, we are critically examining the designs and modelling the performance of several new and existing low energy Australian buildings.

Taking an integrated approach to design, development and operation, we aim to develop proxy indicators for energy efficiency that will motivate low carbon building, purchasing and leasing behaviour.

This work also involves showcasing the technical and economic performance of low carbon technology, materials and designs to consumers and the construction industry, and aims to inform the development of Australian building codes and standards.

PARTNERS

- AECOM
- Ametalin
- Ash Development Association of Australia
- Australasian Slag Association
- Brookfield Multiplex
- CSR
- HASSELL
- Nova Deko
- Renewal SA
- NSW OEH
- NSW Department of Planning and Infrastructure
- Victorian Building Authority
- CSIRO
- Curtin
- University of Melbourne
- UniSA
- UNSW

SHOWCASING RESIDENTIAL LOW CARBON BUILDINGS

CRCLCL research teams have presented the first reports from monitoring and modelling the following residential developments:

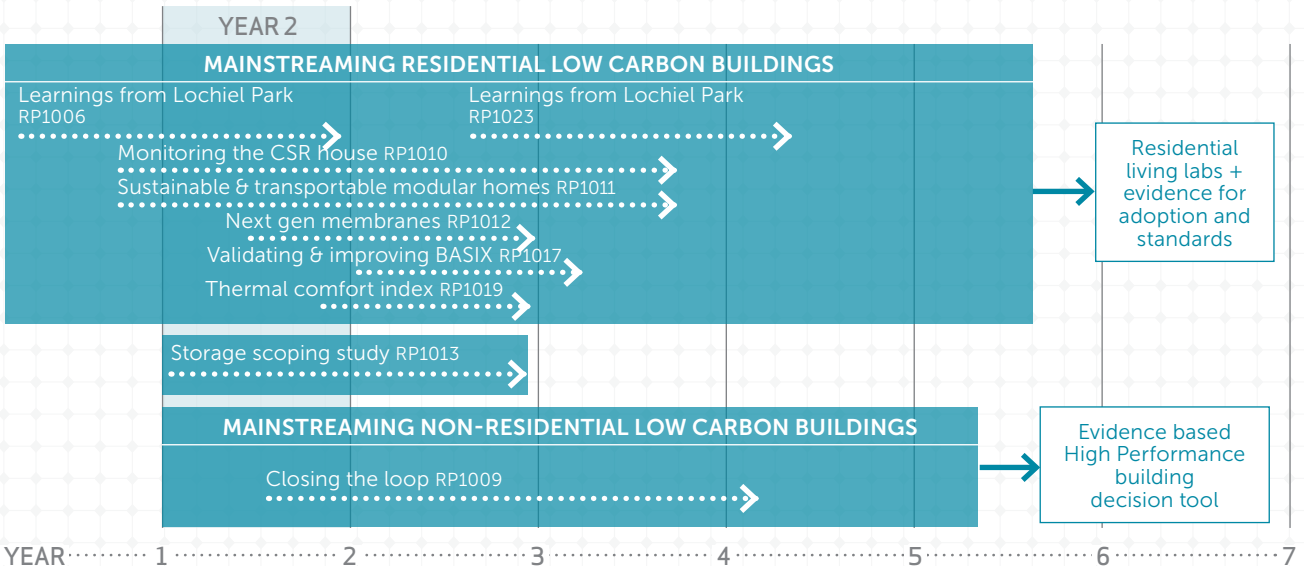
- Lochiel Park Green Village (zero carbon development that is part of the CRC’s Adelaide Living Laboratories)
- CSR House (six star energy efficiency rated house in Western Sydney)
- Sustainable and transportable prefabricated modular homes

CLOSING THE LOOP: HEALTH AND PRODUCTIVITY OUTCOMES IN LOW CARBON COMMERCIAL BUILDINGS

The ‘closing the loop’ project is developing a systematic evidence base correlating health and productivity benefits derived from low carbon work environments, with the view to building a decision-making support tool to evaluate the benefits of low carbon commercial buildings.

OTHER RESEARCH PROJECTS OF INTEREST

- Next-generation membranes to prevent moisture ingress
- Development of an advanced ‘thermal comfort index’ tool to inform decision-making
- A scoping study for the value and future directions for incorporating both electrical and thermal storage



PATHWAY 4

DESIGNING INTEGRATED LOW CARBON PRECINCTS



LOW CARBON PRECINCTS

For true low carbon living, we need to extend the focus beyond individual buildings to the neighbourhood as a whole – considering aspects such as transport, infrastructure, land use and waste management. Through the creation of precinct design and assessment methods and tools, the CRCLCL aspires to drive new policies and practices for property development, where energy and carbon performance targets are routinely embedded at the planning and design stage.

We are developing a series of novel and effective Precinct Information Models (PIMs) – comparative 3D virtual models of carbon performance within precincts that will provide the functionality and scientifically validated evidence required for government and industry acceptance of low carbon developments. Resilient, low carbon precincts that also promote health and productivity benefits will be fundamental to the sustainability of our 21st century cities.

PRECINCT INFORMATION MODELLING PLATFORM

Work is well underway on a Precinct Information Modelling platform to facilitate linkage of design assessment models and input data across a broad spectrum of precinct objects and activities (related especially to buildings and transport). This project will deliver an open data model that defines how information is structured for precinct-scale digital modelling across the breadth of the CRCLCL initiatives (RP2011).

INTEGRATED DEMAND FORECASTING

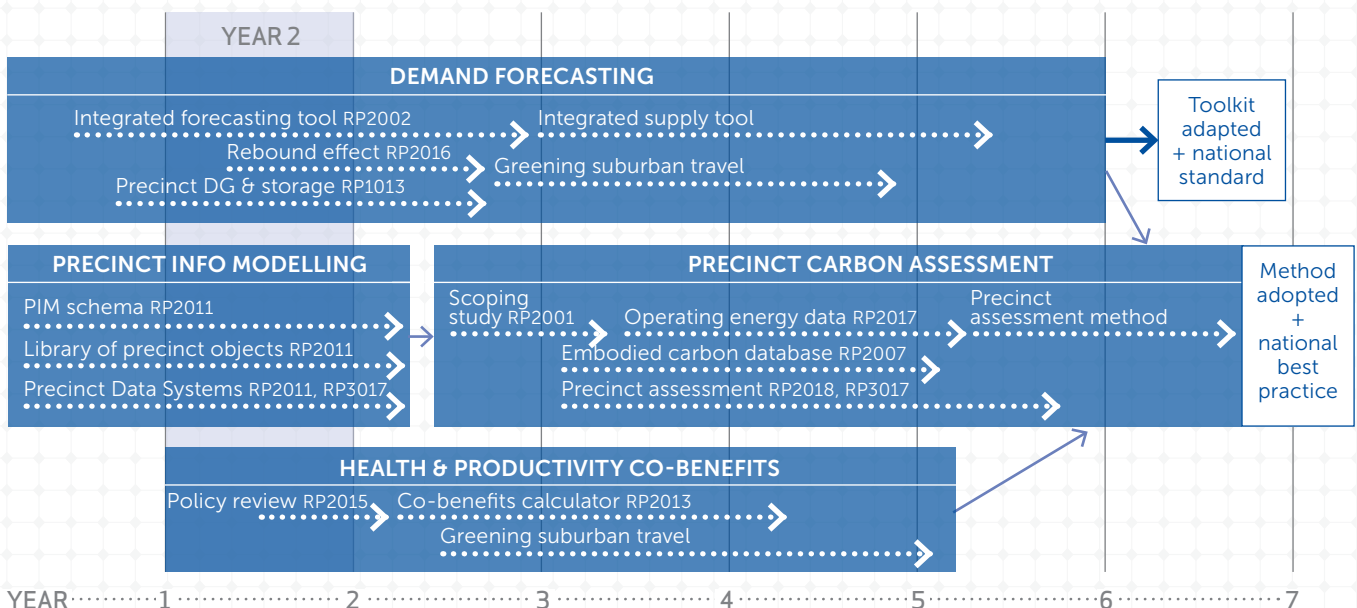
Commenced in our first year, development of a tool to help planners predict energy, transport, waste and water demand (ETWW) on a precinct level is reaching the prototype stage for testing in the CRC's living laboratories in Adelaide, Sydney and Melbourne (RP2002).

OTHER RESEARCH PROJECTS OF INTEREST

- Characterisation of urban micro climates
- Review of national and international initiatives and programs for low carbon precincts
- Policy review of health and productivity co-benefits

PARTNERS

AECOM
 Aurecon
 BlueScope
 Brookfield Multiplex
 Building SMART
 HASSELL
 HIA
 Hunter Water
 Sydney Water
 Infrastructure Sustainability Council of Australia
 Nursery and Garden Industry Australia
 Suez Environment Degremont
 City of Adelaide
 City of Fremantle
 City of Melbourne
 City of Sydney
 Commonwealth Department of Industry
 Commonwealth Department of Infrastructure and Regional Development
 Government of Western Australia, Department of Housing
 NSW Urban Growth Renewal SA
 SA Government
 SA Water
 Victorian Building Authority
 CSIRO
 Curtin
 Swinburne
 University of Melbourne
 UniSA
 UNSW



PATHWAY 5

EVIDENCE BASED SCENARIOS FOR GOVERNMENT

To support legislative carbon reduction initiatives and policies, the CRCLCL is working with all levels of government to explore the social, environmental and financial benefits of low carbon policy actions. Ensuring a high triple bottom line return for Australia will be a key factor for the government to implement policy change.

Detailed models of future energy use in the built environment will help test how take-up of alternative energy services might be affected by factors such as different policy scenarios and varying economic incentives. A particular concern will be to investigate how policy scenarios can be changed to make low carbon living more affordable, especially for low-income households.

PARTNERS

- Commonwealth Department of Industry
- NSW Office of Environment and Heritage
- SA Department of Environment Water and Natural Resources
- CSIRO
- Swinburne University of Melbourne
- UNSW

VISIONS AND PATHWAYS 2040

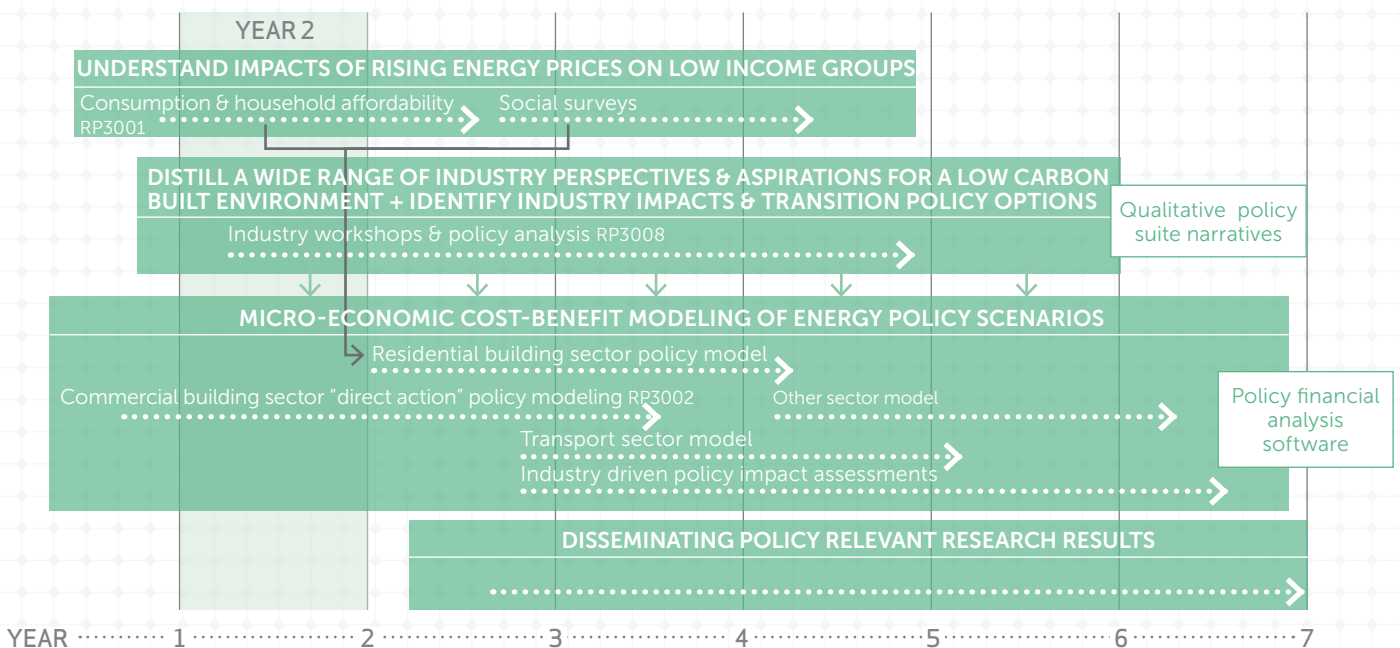
One of the year's most significant projects, Visions and Pathways 2040 involves a qualitative distillation of a wide range of industry perspectives and aspirations for a low carbon built environment. Two successful industry workshops were held – one each in Melbourne and Sydney. These facilitated discussion of the desirable features of a future built environment.

COST-BENEFIT MODELLING OF ENERGY POLICY SCENARIOS

Focusing on the commercial building subsector, a model has been constructed incorporating key stock building data from a diverse range of sources, such as the NSW Government NABERS database, the Australian Bureau of Statistics, Geosciences Australia, Australian Property Industry and others.

OTHER RESEARCH PROJECTS OF INTEREST

Quantitative analysis of the impacts of rising energy prices on low income groups



PATHWAY 6

ENHANCING COMMUNITY ENGAGEMENT

We aspire to generate a wave of change towards low carbon living practices among the community, supported by local government planning approvals and incentives. To stimulate both dialogue and demand, CRCLCL research teams are developing collaborative engagement and consultation processes among the community, developers and local government.

We are working with local councils and community groups across Australia to examine attitudes to and preferences around alternative technology and lifestyle options. The establishment of new perspectives on the deeper psychological and cultural barriers to low carbon living in Australia will help form new low carbon living adoption strategies to drive broader community transformation.

PARTNERS

- NSW Office of Environment and Heritage
- Blue Mountains World Heritage Institute
- Blue Mountains, Lithgow and Oberon Tourism
- CSIRO
- Curtin
- UniSA
- UNSW

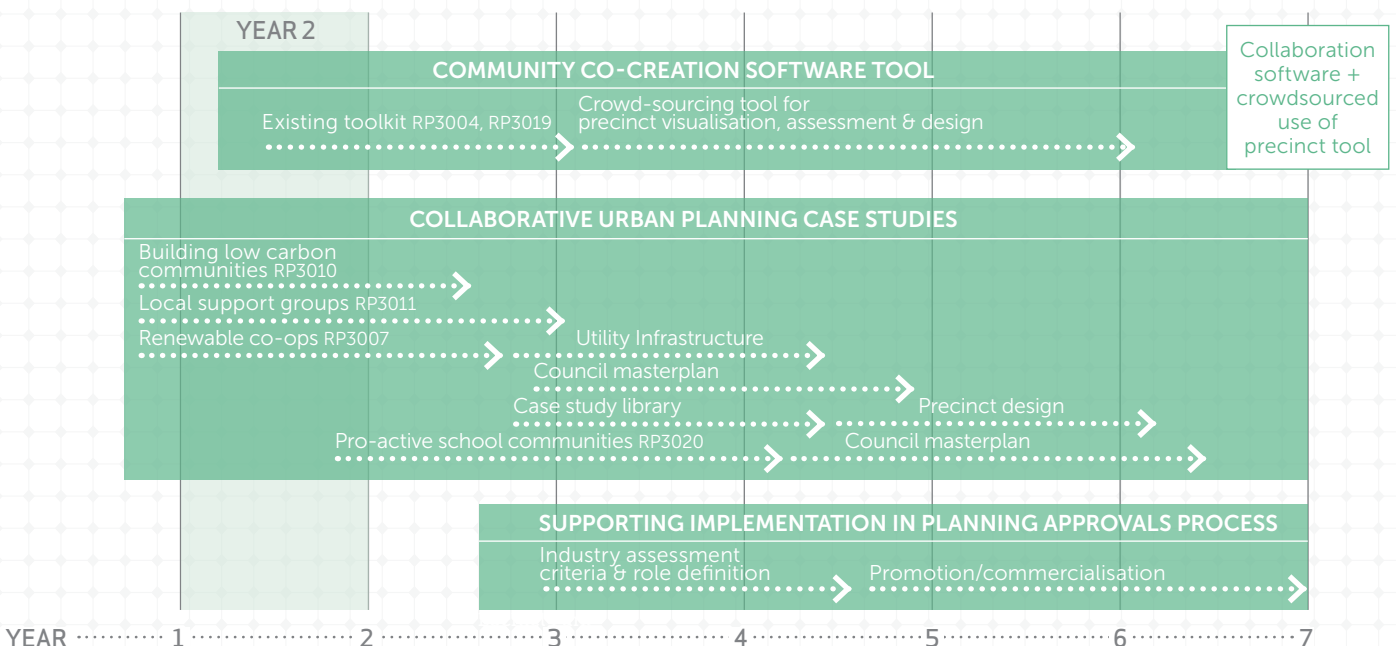
BLUE MOUNTAINS LOW CARBON TOURISM

One of the year's most successful projects involved establishment of a living laboratory to engage the Blue Mountains tourism community and businesses with the aim of reducing their carbon footprint. To explore the role of digital media in community engagement, a website has been launched to provide information about the project, along with low carbon options for accommodation, meals, walks etc, with a mobile application pending later in 2014.

A community-based public education program has also been established in conjunction with the Blue Mountains World Heritage Institute and Blue Mountains, Lithgow & Oberon Tourism. This led to an information and education forum in March to enhance community engagement and information on advantages of low carbon living.

OTHER RESEARCH PROJECTS OF INTEREST

- Community carbon reduction and wellbeing enhancement via the establishment of community-based 'Livewell Clusters'
- Opportunities and challenges for community-scale renewable energy projects



PATHWAY 7

LIVING LABORATORIES AS LOW CARBON LIFESTYLE NARRATIVES

Creating buzz around low carbon living will help generate demand and drive adoption. We're establishing a number of living laboratories around Australia to help demonstrate the benefits of sustainable living and generate positive narratives for low carbon lifestyles.

These living laboratories are 'learn by doing' environments involving local councils, developers, residents and businesses that integrate, test and evaluate low carbon living solutions in-situ. Asking the question "what does a sustainable lifestyle look like?", we are testing options and ideas for a range of localities featuring alternative climatic conditions, infrastructure provision, dwelling types, household types and socio-demographic profiles.

PARTNERS

- Australian Window Association
- BlueScope
- CSR
- HIA
- Josh Byrne and Associates
- Master Builders Association
- Next Practice
- NSW OEH & DEPI
- Renewal SA
- SA DEWNR
- CSIRO
- Curtin
- Swinburne
- TAFE Sydney
- University of Melbourne
- UniSA
- UNSW

ESTABLISHMENT OF LIVING LABORATORIES

Following the establishment of two living laboratories in Fremantle in our first year, we've initiated several additional living laboratories in year 2. Three of these together form the Adelaide living laboratory hub, which encompasses a diverse range of communities and will permit integrated research across all the CRCLCL's programs. A community-based living laboratory Livewell Clusters, is also underway in Melbourne's City of Yarra to explore personal and community-based carbon reduction initiatives.

JOSH'S HOUSE

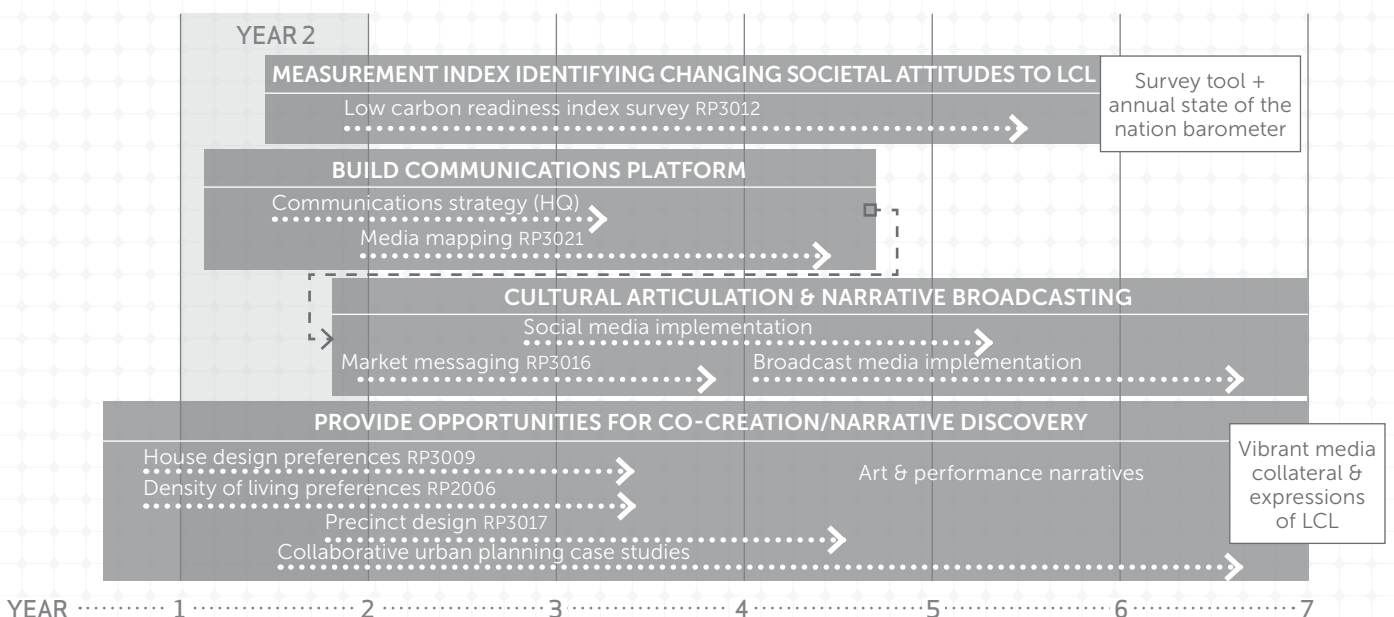
One of the CRCLCL's living laboratories is the 10-star energy efficiency rating showcase residence occupied by Josh Byrne of ABC's Gardening Australia and research fellow at Curtin. Our project partner Josh Byrne and Associates featured widely in media after taking out three low carbon-related awards at the 2014 Master Builders WA Housing Excellence Awards in February 2014.



Josh's House
Photography by Joel Barbitta,
D-Max Photography

KEY RESEARCH ACTIVITIES ASSOCIATED WITH THE LIVING LABORATORIES

- High-performance housing: monitoring, evaluating and communicating the journey
- Density of living preferences in low cost and low carbon housing
- Harmonising strategy for capturing and reporting data from living laboratories



PATHWAY 8

IMPROVED EDUCATION AND CAPACITY BUILDING

Low carbon living is important now, but it is vital for the future. It's essential the CRCLCL leaves a legacy that will help drive the widespread adoption of sustainable living practices over the coming years. This is dependent on inspiring the next generation of researchers, built environment specialists and communities through education and training.

We have a strong commitment to creating and delivering a suite of education, training and professional development programs targeted at a range of community, trade and professional groups. In addition to the 80+ PhD and Masters students that will be directly involved with the CRC, we aspire to embed a low carbon research agenda in Australian universities by establishing five nodes of excellence.

PARTNERS

- Building SMART
- Master Builders Association
- Sydney Coastal Councils Group
- Victoria Building Association
- CSIRO
- TAFE NSW Sydney Institute
- Curtin
- University of Melbourne
- Swinburne
- UniSA
- UNSW

SCOPING STUDIES

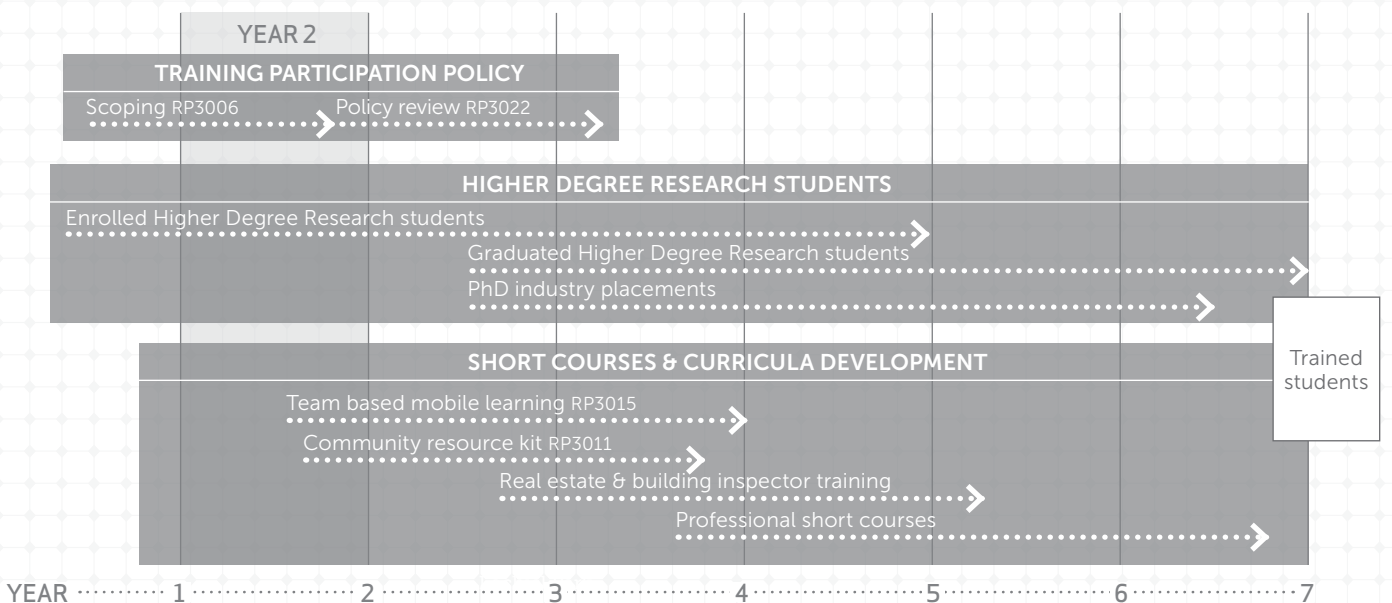
The CRCLCL's co-creation for low carbon education scoping study identified key target areas for education and capacity building across different industries, encompassing different methods of dissemination and industry/community engagement. A survey and gap analysis of participation in low carbon education and training was also completed and led to initiation of a project exploring policy impediments and incentives for effective education and training.

OTHER RESEARCH PROJECTS OF INTEREST

Short course and curricular development in team-based mobile learning

EDUCATION AND CAPACITY BUILDING

A total of 54 higher degree by research student places identified and approved working towards the CRCLCL's target of 88. During this time there were 26 students (23 PhD and 3 Masters) enrolled across Swinburne, Curtin, University of South Australia, University of Melbourne, UNSW and CSIRO. To further develop the education and capacity building effectiveness, the CRCLCL is currently finalising a new strategy involving five nodes of excellence to be implemented in year 3.





AECOM Brisbane,
by CRCLCL partners
AECOM.

SME & PEAK BODY NETWORK

Our SME and Peak Body Network reaches beyond the CRCLCL's official participants and research partners to represent the interests and needs of small and medium enterprises (SMEs) within the broader low carbon industry.

This is achieved by bringing together relevant built environment peak bodies and industry associations with our member SMEs to promote information sharing and more active engagement. Organisations connected to the Network can help drive the CRCLCL's research agenda and participate directly in projects. They also provide a conduit for disseminating research outcomes into the broader community and a channel for bringing products to market.

The Network met several times via teleconference in 2013-2014, including in person at the annual CRC Participants Annual Forum in October 2013. Representatives of the Network were also actively involved in several training and professional development initiatives to support low carbon living and solutions for the built environment.

SMES

Aurecon Australia HASSELL
BCI Media Group Woodhead

PEAK BODIES

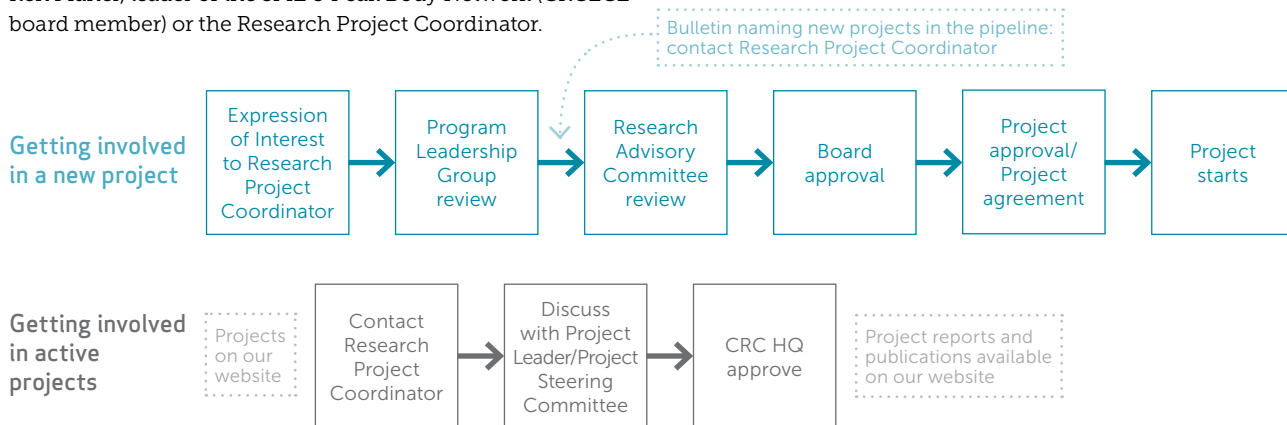
Australian Institute of Architects
Australian Sustainable Built Environment Council/Green Building Council
Consult Australia
Housing Industry Association
Standards Australia

INDUSTRY ASSOCIATIONS

Ash Development Association of Australia
Australasian Slag Association
Australian Window Association
Building SMART Australasia
Master Builders Australia

GETTING INVOLVED WITH PROJECTS

A quarterly bulletin to make all members of the Network aware of projects in the pipeline has been launched. Once a proposal is put forward, it is cycled through the Research Advisory Committee for assessment and recommendation, the Board for approval, and the CRCLCL Headquarters team for resource allocation and finalisation of the agreement. Members of the SME & Peak Body Network are able to get involved in projects of interest by contacting either Professor Ken Maher, leader of the SME & Peak Body Network (CRCLCL board member) or the Research Project Coordinator.



UTILISING RESEARCH OUTCOMES

Members of the Network are able to tap into the outcomes of the CRCLCL's many projects. The project reports are listed on our website, and can be sourced by contacting the CRCLCL HQ. The Network can also be connected with the project leaders for a deeper level of understanding.

COMMUNICATION

The CRCLCL ramped up communications activities significantly in the past year. Our objectives in communicating our achievements both internally and externally have been fourfold:

- supporting and promoting further collaboration
- transferring knowledge to end-users
- building a sense of community among CRCLCL participants and other interested parties
- raising general awareness of the issues surrounding low carbon living

Significant traction has been gained through initiatives such as an overhaul and redesign of our website and blog, launch of extensive electronic direct marketing campaigns, and extensive use of conventional and social media. We have also been active in preparing peer-reviewed papers for journals and conferences, as well as regularly reporting to CRCLCL participants on important updates, achievements, activities and outcomes.

Connect with us on Twitter @CRC_LCL



COLLABORATION

Collaboration is central to the operation and success of the CRCLCL. The challenges we are tackling fall across a broad range of disciplines, and so must our research activities. Strategic collaboration therefore occurs at every stage of our projects via a number of different channels.

COLLABORATION BETWEEN RESEARCHERS

One of the key strengths of this CRC is its broad base of expertise. The research teams involved are leaders in their fields and have been sourced from five universities, the CSIRO and the TAFE system. The CRC is also able to engage leading researchers from other institutions through Third Party Project Agreements and Memorandums of Understanding (MoUs). During the past year 29 active projects involved more than one research organisation.

COLLABORATION BETWEEN RESEARCHERS & END-USERS

An end-user driven approach is essential to the CRCLCL's success. We have made interaction between researchers and end-users a key requirement at all stages of project development to ensure the research is mapped to end-user needs and there are pathways for utilisation. The largest collaborative research project (RP2005 Urban Microclimates) currently underway at present involves 11 organisations spanning three states.

COLLABORATION BETWEEN END-USERS

The sector-wide challenges associated with the built environment mean end-users need to be actively engaged and able to communicate effectively with each other. The CRCLCL engages with a number of end-user forums – including our own SME and Peak Body network – to promote information sharing and ideas exchange. 'Closing the loop' (RP1009) is an industry led project that has received media attention through its co-branded press release with AECOM, Brookfield Multiplex and HASSELL.

COLLABORATION WITH EXTERNAL GROUPS, LOCAL & INTERNATIONAL

The CRCLCL has established a number of relationships with external groups, both local and international, with a focus on sharing knowledge and encouraging wider engagement. During the 2013-2014 year we held workshops and seminars with each of our various international participants: Concordia University in Montreal, Canada; KTH Royal University of Technology in Stockholm, Sweden; Tongji University in Shanghai, China; and global organisation United Nations Environment Programme (UNEP).

ANNUAL PARTICIPANTS FORUM



Among a large number of lectures, seminars and workshops the CRCLCL took part in over the past year, one of the most significant was our inaugural Annual Participant Forum, held in October 2013. The aim of this event, held at Australian Technology Park in Sydney, was to bring all our partners together to workshop new research, innovations and directions in low carbon research.



Over two days, we showcased our vision for the future, introduced our research programs and projects, and demonstrated the CRC's commitment to collaboration through a series of workshops led by industry affiliates. The Annual Participant Forum will be run on an annual basis to assist us in measuring the success of our collaborations.





HASELL:
Brookfield Place
Perth, Australia
Photography by
Peter Bennetts

OUR PEOPLE

BOARD



The Hon Robert Hill AC
Independent Chairman of CRC; Chair of Nominations Committee; member of Research Advisory Committee.



Sandy Hollway AO
Independent Deputy Chairman; Chair of CRC's Audit & Risk Committee.



Professor Ken Maher
Additional Director, leads SME and Peak Body Network



Professor George Collins
Research Sector Director; member of the Audit & Risk Committee.



Dr Kevin Cullen
Research Sector Director; member of Nominations Committee.



Professor Dennis Else
Industry Sector Director; Chair of Research Advisory Committee.



Lester Partridge
Industry Sector Director; member of Nominations Committee.



Timothy Horton
Government Sector Director; assisting CRC to develop its communications strategy.



Dr Kate Wilson
Government Sector Director; member of the Nominations Committee & Research Advisory Committee.

SME & PEAK BODY NETWORK

RESEARCH ADVISORY COMMITTEE

AUDIT & RISK COMMITTEE

NOMINATIONS COMMITTEE



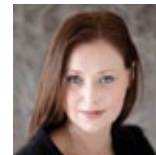
Scientia Professor Deo Prasad AO
CEO



Paul Hopkins
Business Manager and Company Secretary



Tom Cole
Research Project Coordinator*



Athena Prib
Communications Manager



Maria Schwensen
Office Manager

PROGRAM LEADERSHIP

INTEGRATED BUILDING SYSTEMS



Associate Professor Alistair Sproul
Program Leader



Professor Wasim Saman
Research Leader

LOW CARBON PRECINCTS



Professor John Boland*
Program Leader

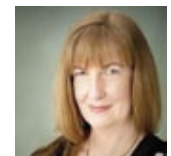


Professor Peter Newton
Research Leader

ENGAGED COMMUNITIES



Dr Stephen White
Program Leader



Associate Professor Catherine Bridge*
Research Leader

* Commenced in year 3

FINANCIAL OVERVIEW

The CRC for Low Carbon Living continued to maintain a healthy financial position in the 2013-14 reporting period, carrying forward unspent funds to use in its research in year three. The financial statements for the CRC for Low Carbon Living Ltd have been independently audited by

HLB Mann Judd (NSW) Pty Ltd and submitted to ASIC and the Commonwealth CRC Program. The Auditor's report contained no adverse, qualified or other matters of emphasis. Copies of the Annual Financial Report for the period ended 30 June 2014, are available on request.

RESOURCES RECEIVED

TOTAL CASH AND IN-KIND CONTRIBUTIONS BY PARTNERS & GOVERNMENT

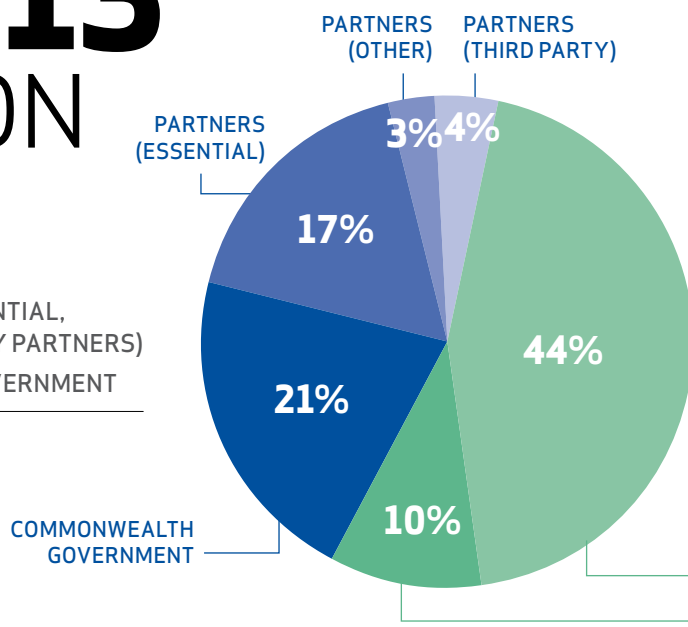
\$13.13
MILLION

CASH

FROM TWO SOURCES:

1. CRC PARTNERS (ESSENTIAL, OTHER & THIRD-PARTY PARTNERS)
2. COMMONWEALTH GOVERNMENT

TOTAL: \$6.01 MILLION



IN-KIND

includes time provided by partner employees (equivalent to 23.4 full-time researchers) and other non-staff resources such as facilities, equipment and materials

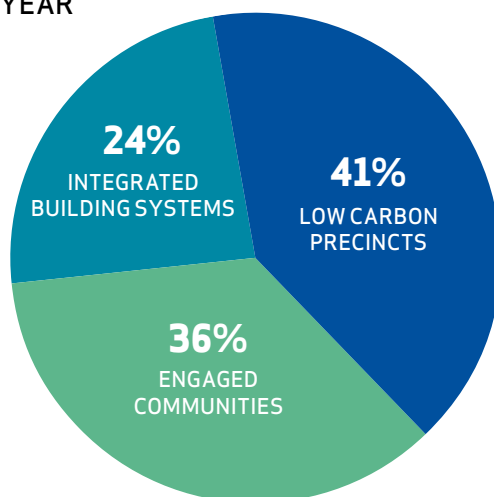
TOTAL: \$7.12 MILLION

Partners - Essential
Partners - Other

RESOURCES APPLIED

RESOURCES APPLIED ACROSS THE THREE RESEARCH PROGRAM AREAS IN THE SECOND YEAR

\$11.67
MILLION



This includes proportions of expenditure on administration and education, but no capital purchases were made.

YEAR 2 ACTIVE PROJECTS

1 July 2013 – 30 June 2014

PROJECT	PARTNERS
RP1001 Air handling solutions, integration approaches and building design considerations for Photovoltaic Thermal (PV-T) roofing.	BlueScope; UNSW; UniSA
RP1002 Concentrated solar thermal systems and absorption HVAC systems	UNSW; CSIRO
RP1004 Performance based Criteria for Concretes: Creating Pathways for Low Carbon Concrete Manufacture with Existing Standards	UNSW; Swinburne; ADAA; ASA
RP1006 Viable integrated systems for zero carbon housing	UniSA; CSIRO; UNSW; UoM; Renewal SA
RP1007 Intelligent automated monitoring of commercial photovoltaic systems	UNSW; Suntech R&D; AECOM
RP1008 Industry support mechanisms for renewable heating and cooling	CSIRO; UNSW; NSW OEH; CSR; BlueScope
RP1009 Closing the Loop on Evidence-based Low Carbon Design of non-residential buildings	UNSW; UoM; Curtin; UniSA; Brookfield Multiplex; HASSELL; AECOM
RP1010 Monitoring and modelling the CSR Low Energy House	CSR; UniSA; UNSW
RP1011 Sustainable and Affordable Living through Modular, Net Zero Energy, Transportable, and Self-Reliant Homes and Communities	Nova Deko; UNSW
RP1012 Next generation low-emissivity pliable membranes for moisture management in building construction (Stage 1 of 3)	UNSW; Ametalin
RP1013 Enabling better utilisation of distributed generation with distributed storage	UNSW; UniSA
RP1019 Advanced Comfort Index for residential homes	UNSW; CSR
RP2002 Integrated ETWW demand forecasting and scenario planning for precincts	UniSA; CSIRO; UNSW; Sydney Water; SA Water; Renewal SA; SA DEWNR; AECOM
RP2003 A review of national and international low carbon precincts to identify pathways for mainstreaming sustainable urbanism in Australia	Curtin
RP2005 Urban Micro Climates: Comparative study of major contributions to the Urban Heat Island effect in three Australian cities (Sydney, Melbourne, Adelaide)	UniSA; UNSW; UoM; NGIA; City of Adelaide; City of Sydney; CSIRO; SA DEWNR; Bluescope; HASSELL; Urban Renewal
RP2006 Action research to examine and demonstrate how to mainstream low-cost and low carbon housing in Western Australia. FredZED	Curtin; City of Freemantle; WA Housing Authority; The Next Practice
RP2007 Integrated Carbon Metrics (ICM) – a multi-scale life cycle approach to assessing, mapping and tracking carbon outcomes for the built environment	UNSW; UoM; UniSA; AECOM; Aurecon; Sydney Water; BlueScope
RP2008 Beneficial reuse of solids from wastewater treatment operations	UNSW; UniSA; Sydney Water; SA Water; Prospect Water; Hunter Water; Suez Environment; Degremont
RP2009 Planning a research agenda for low carbon transport	UniSA; SA DEWNR Urban Renewal
RP2015 Carbon reductions and co-benefits: literature and practice review of Australian policies relating urban planning and public health	UniSA; SA DEWNR; UNSW
RP3001 Resource consumption and Household affordability; the changing nature of utility costs and the distributional implications	Swinburne
RP3002 A framework for low carbon living community policy and program development	CSIRO; NSW OEH; Commonwealth Department of Industry
RP3007 Opportunities and challenges for the development and implementation of community-scale renewable energy projects	UNSW; UniSA
RP3008 Visions & Pathways 2040	HASSELL; UoM; UNSW; CSIRO; Swinburne
RP3009 High Performance Housing: LL monitoring, evaluating and Communicating (Josh's House)	Curtin; UniSA; Josh Byrne & Associates
RP3010 Building low carbon communities	UNSW; Curtin; UoM; TAFE Sydney; NSW OEH; BMLot, Gridstone; BMCC; BMWHI
RP3011 Community carbon reduction and wellbeing enhancement	Curtin
RP3012 Transformation to low carbon living: Social psychology of low carbon behavioural practice	UoM; CSIRO; Swinburne
RP3015 Increasing knowledge and motivating collaborative action on Low Carbon Living through team-based and game-based mobile learning	Swinburne; UoM; VBA; MBA; SCCG; BuildingSMART
RP3017 Adelaide Living Laboratory Hub – Lochiel Park, Bowden and Tonsley	Renewal SA; UniSA; SA DEWNR
RP3020 Carbon tools and frameworks for institutional precincts: Stage 1 – Low carbon schools scoping study	Curtin; City of Freemantle

COLLABORATING PARTNERS INDEX

	IMPACT PATHWAY							
	1	2	3	4	5	6	7	8
AECOM Australia Pty Ltd (AECOM)	█	█	█	█				
Ash Development Association of Australia (ADAA)		█	█					
Aurecon Australia Pty Ltd (Aurecon)				█				
Australasian Slag Association (ASA)		█	█					
Australian Window Association Inc (AWA)							█	
BCI Media Group Pty Ltd (BCI Media Group)							█	
BlueScope Steel Limited (BlueScope)	█			█			█	
Brookfield Multiplex Constructions Pty Limited (BM)			█	█				
BuildingSMART Australasia Incorporated (BuildingSMART)				█				█
City of Fremantle				█				
City of Greater Geraldton				█				
Commonwealth Department of Infrastructure and Regional Development (DIRD)				█				
Commonwealth Department of Industry				█	█			
Concordia University, Canada, representing Smart Net-zero Energy Buildings Research Network (NSERC)				█				█
Consult Australia				█				
CSIRO	█		█	█	█	█	█	█
CSR Limited (CSR)	█		█				█	
Curtin University of Technology (Curtin)			█	█		█	█	█
HASSELL			█	█	█			
Housing Industry Association Limited (HIA)				█			█	
Master Builders Australia Limited (MBA)							█	█
Nova Deko Pty Ltd (Nova Deko)			█					
NSW Department of Planning and Infrastructure (DEPI)			█					
NSW Office of Environment and Heritage (OEH)	█		█		█		█	
NSW Urban Growth				█				
Renewal SA			█				█	
SA Department of Environment Water and Natural Resources (DEWNR)				█	█		█	
South Australia Water Corporation (SA Water)				█				
Standards Australia Limited		█						
Suntech R&D Australia Pty Ltd (Suntech R&D)	█							
Swinburne University of Technology (Swinburne)		█		█	█		█	█
Sydney Coastal Councils Group Inc. (SCCG)								█
Sydney Water Corporation (Sydney Water)		█		█				
TAFE NSW Sydney Institute (TAFE Sydney)							█	█
City of Sydney				█				
The Australian Institute of Architects (AIA)				█				
Tongji University, China				█				█
University of Melbourne (UoM)			█	█	█		█	█
University of New South Wales (UNSW)	█	█	█	█	█	█	█	█
University of South Australia (UniSA)	█		█	█		█	█	█
Victorian Building Authority (VBA)			█	█				█
KTH, Royal Institute of Technology, Sweden				█				█
United Nations Environment Program (UNEP)				█				█
Project Partners								
Ametalin			█					
Australian Sustainable Built Environment Council (ASBEC)				█				
Blue Mountains, Lithgow & Oberon Tourism						█		
Blue Mountains World Heritage Institute						█		
City of Adelaide				█				
Government of Western Australia, Department of Housing				█				
Hunter Water				█				
Infrastructure Sustainability Council of Australia (ISCA)				█				
Josh Byrne & Associates/Josh's House							█	
Nursery & Garden Industry Australia (NGIA)				█				
Suez Environment Degrémont				█				
The Next Practice							█	



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An Australian Government Initiative

