

Annexure 2

Schedule 2 – Activities

1. Overview (clause 1.1)

The key challenge of the CRC for Low Carbon Living is to address climate change by bringing together leading innovators from the public and private sectors to develop the scientific, technological, industrial, educational and social resources required for Australian communities to develop a low carbon built environment.

The CRC includes three programs of research:

- **Research Program 1 - Integrated Building Systems:** will develop (i) low-carbon-lifecycle building construction components/ materials and (ii) building-integrated multipurpose solar products, to support the next generation construction practice.
- **Research Program 2 - Low Carbon Precincts:** will develop tools that enable the design of, and stimulate the market for, low carbon infrastructure at “precinct” scale.
- **Research Program 3 - Engaged Communities:** will focus on understanding and influencing public behaviour and purchasing decisions relating to low carbon products, using “living laboratories” to ensure that results are robust, tangible and appealing.

The expected outputs and benefits of the CRC are:

- A reduction in built environment carbon emissions by 10MTCO₂-e/yr by 2020;
- A projected economic benefit of over \$684 million;
- A benefit cost ratio of 2.9:1;
- Adoption of new government policies and industry building models that contribute to achievement of the government’s 2050 greenhouse gas emissions reduction target in the built environment; and
- 88 higher degree research students with skills in the low carbon built environment.

2. Strategic Research Priorities (clause 1.1)

	Strategic Research Priority Challenge	Associated Strategic Research Priority
Research Program 1	Lifting productivity and economic growth	Maximise Australia’s competitive advantage in critical sectors
Research Program 2	Living in a changing environment	Manage risk and capture opportunities for sustainable natural and human systems
Research Program 3	Living in a changing environment	Enable societal transformation to enhance sustainability and wellbeing

3. Milestones (clauses 1.1 and 4.1(d))

3.1 Research Program No. 1 - Integrated Building Systems - Output Milestones

This program will develop (i) low-carbon-lifecycle building construction components/ materials, and (ii) building-integrated multipurpose solar products. These outputs target next generation construction practice, where step-change emissions cuts are required. New design tools, rating frameworks and Australian Standards will underpin and stimulate the market for low carbon products and services. Design tools and a solar product will be commercialised in partnership with SMEs.

Output No.	Description	
R1.1	<p>Integrated photovoltaic (PV) and solar thermal technologies for buildings:</p> <p>Develop integrated building energy systems utilising Concentrating Solar Thermal Panels and PV that can produce multiple benefits (such as electricity, heating, cooling, ventilation, shading, daylighting and insulation).</p> <p>Integrate these systems with high performance building and novel Heating, Ventilation and Air Conditioning (HVAC) designs.</p> <p>Field trials and performance verification in high impact showcase commercial and residential buildings (Living Laboratories).</p>	
Output Milestones		Due date
R1.1.1	First generation designs for prototype systems completed.	30 June 2013
R1.1.2	Milestone report on design, construction, testing and performance of building integrated solar thermal and PV systems completed.	
R1.1.3	Design, construction and field trials of pre-commercial products in conjunction with industry partners completed.	30 June 2014
R1.1.4	Milestone report on performance of field trials of pre-commercial products.	
R1.1.5	First generation prototype products for commercialisation completed.	30 June 2016
R1.1.6	Second generation designs with multiple benefits developed.	30 June 2017
R1.1.7	Milestone report of trials of two solar systems integrated into building HVAC systems.	
R1.1.8	Design, construction and field trials of two second generation products in conjunction with industry partners.	30 June 2018
R1.1.9	Final milestone report on product performance in large scale implementation completed.	30 June 2019
R1.1.10	Final milestone report on identification of ongoing benefits and future research and commercialisation directions completed.	

Output No.	Description	
R1.2	<p>Low carbon materials:</p> <p>Develop low embodied carbon construction materials via manufacturing process improvements; low carbon, high performance composite building products and solutions; and structural designs that use materials efficiently to deliver lower carbon outputs.</p> <p>Emphasis on materials, products and designs that maximise durability, reusability and recyclability.</p> <p>Input annual lifecycle carbon intensity up-date bulletins into the Building Product Innovation Council Life Cycle Inventory database.</p>	
Output Milestones		Due date
R1.2.1	Barriers to innovative low carbon materials, products and designs identified.	30 June 2013
R1.2.2	Milestone report on design, construction, testings and performance of products for Australian industry and climatic conditions completed.	
R1.2.3	Design, construction and field trials of two pre-commercial materials, products and designs held in conjunction with industry partners.	30 June 2014
R1.2.4	First cycle prototype materials, products and designs developed and tested in collaboration with industry partners.	30 June 2015
R1.2.5	Trials of systems in a Living Laboratory.	
R1.2.6	First cycle of low carbon materials, products and designs based on partner priorities to determine whole of life benefits delivered in a building.	30 June 2016
R1.2.7	Trials of low carbon materials, low carbon composite products and low carbon designs in a Living Laboratory.	30 June 2017
R1.2.8	Report on performance of field trials of the pre-commercial products and site implementation completed.	30 June 2018
R1.2.9	Ongoing benefits and future research and commercialization directions identified.	
R1.2.10	Review of total outputs completed and low carbon materials, products and designs for large scale residential and commercial buildings with supporting IT design tools implemented.	30 June 2019

Output No.	Description	
R1.3	<p>Integrated Design, Showcase, Ratings and Standards:</p> <p>Develop a range of sustainable design features (new builds and retrofits) for low carbon commercial and residential buildings including incorporation of building integrated solar systems (Output 1.1) and low carbon materials (Output 1.2).</p> <p>Showcase high performance low carbon, commercial and residential buildings (Living Laboratory).</p> <p>Develop an evidence-based High Performance Building Decision-Support (HPBDS) tool (was previously a High Performance Building Investment Analysis - HPBIA tool) that will allow practitioners to analyse the health, productivity and economic performance of various low carbon options.</p> <p>Research outputs will inform ongoing development of Ratings and Standards.</p>	
Output Milestones		Due date
R1.3.1	Report on modelling studies of low carbon designs for Australian climatic zones, for new construction and retrofitting.	30 June 2013
R1.3.2	Longitudinal study of High Performance Buildings researching correlation with productivity completed.	
R1.3.3	Initial low carbon design buildings (Living Laboratories) constructed.	30 June 2014
R1.3.4	Framework of High Performance Building Investment Analysis tool (HPBIA) established and delivered to CRC partners.	
R1.3.5	Report on monitoring and verification of performance of new and retrofitted low carbon buildings.	30 June 2016
R1.3.6	Validation of the HPBDS tool.	
R1.3.7	Rating framework/tools for low carbon buildings (new and retrofit) completed.	
R1.3.8	Monitoring of showcase designs - detailed evaluation of technical performance (Living Laboratories) completed.	30 June 2017
R1.3.9	Report on validation and refinement of the HPBDS tool.	
R1.3.10	Progress report on low carbon design systems, construction, operation, maintenance, demolition and recycling.	
R1.3.11	Report on standards that widen the coverage of Minimum Energy Performance Standards – or Minimum Energy Performance Standard (MEPS) (e.g. novel HVAC systems and integrated solar systems).	
R1.3.12	Report on monitoring and verification of large scale residential and commercial projects (Living Laboratories).	30 June 2018
R1.3.13	Final technical report on low carbon designs for new and retrofitted residential and commercial buildings completed.	30 June 2019

Output No.	Description	
R1.4	<p>Education:</p> <p>31 higher degree research students trained – 25 PhD and 6 Masters of Engineering (ME) students.</p> <p>Three professional development programmes delivered through the Low Carbon Living CRC “Network”.</p> <p>Supporting training material (that can also be used with the education and training activity in Research Program 3) developed.</p>	
Output Milestones		Due date
R1.4.1	9 HDR students enrolled (7 PhD and 2 ME).	30 June 2013
R1.4.2	8 HDR students enrolled (6 PhD and 2 ME).	30 June 2014
R1.4.3	2 HDR students completed (2 ME).	
R1.4.4	7 HDR students enrolled. (6 PhD and 1 ME).	30 June 2015
R1.4.5	Preliminary drafts of training material and pilot professional development workshops completed in collaboration with activities within Research Program 3 .	30 June 2016
R1.4.7	7 HDR students enrolled (6 PhD and 1 ME).	
R1.4.8	9 HDR students completed (7 PhD and 2 ME).	
R1.4.9	Final versions of training material completed.	30 June 2017
R1.4.10	First delivery of training material and professional development programmes.	
R1.4.11	7 HDR students completed (6 PhD and 1 ME).	
R1.4.12	Delivery of training material and professional development programmes.	30 June 2018
R1.4.13	7 HDR students completed (6 PhD and 1ME).	
R1.4.14	Delivery of training material and professional development programmes.	30 June 2019
R1.4.15	6 HDR students completed (6 PhD).	

3.1.1 Research Program 1 - Integrated Building Systems - Utilisation Milestones

Utilisation No.	Description	
U1.1	<p>Commercialisation of building integrated solar technologies:</p> <p>Commercialise technologies developed by the CRC with industry partners.</p> <p>Adoption of these product solutions by design professionals, households and developers in new and retrofitted commercial and residential buildings.</p> <p>Usages associated with Output 1.1.</p>	
Utilisation Milestones		Due date
U1.1.1	Evaluation of prototype products and field testing of pre-commercial prototypes commenced by industry partners.	30 June 2014
U1.1.2	Pilot production of first generation building integrated solar thermal and PV products.	30 June 2015
U1.1.3	Field testing of first generation building integrated solar thermal and PV products.	30 June 2016
U1.1.4	Evaluation of prototype second generation products and field testing of pre-commercial prototypes commenced by industry partners.	30 June 2017
U1.1.5	Industry partners finalise design of commercial production lines for full scale production.	30 June 2018
U1.1.6	Full scale commercial production commenced.	30 June 2019

Utilisation No.	Description	
U1.2	<p>Commercialisation of low carbon materials:</p> <p>Commercialise low carbon materials with CRC industry partners.</p> <p>Uptake by government and the building industry will integrate lower carbon and more sustainable materials into new builds and retrofits of all building types.</p> <p>Usages associated with Output 1.2.</p>	
Utilisation Milestones		Due date
U1.2.1	Evaluation of prototype products by industry partners commenced.	30 June 2014
U1.2.2	Field testing of pre-commercial prototypes by industry partners completed.	30 June 2016
U1.2.3	Pilot production of low carbon composite building products.	
U1.2.4	Field testing of first generation low carbon products.	30 June 2017
U1.2.5	Industry partners finalise design of commercial production lines for full scale production.	30 June 2018
U1.2.6	Full-scale commercial production commenced.	30 June 2019

Utilisation No.	Description	
U1.3	<p>Integrated Design Innovation.</p> <p>Design professionals and developers will utilise the research generated by the CRC in order to integrate cost effective low carbon design solutions into new build and retrofits of commercial, industrial and residential buildings.</p> <p>They will also utilise the evidence-based High Performance Building Decision-Support (HPBDS) tool to aid in their investment decision making when assessing Low Carbon Buildings.</p> <p>Usages associated with Output 1.3.</p>	
Utilisation Milestones		Due date
U1.3.1	Commercial partners (Brookfield Multiplex) assessment of designs & cost benefit analysis completed.	30 June 2014
U1.3.2	Incorporation of cost effective designs, materials and potential products into commercial and residential designs completed.	30 June 2016
U1.3.3	Showcasing of low carbon designs for commercial constructions (Living Laboratory).	30 June 2017
U1.3.4	High Performance Building Decision-Support (HPBDS) tool trialled by industry partners.	
U1.3.5	Evidence-based analysis of high performance buildings and validation of energy performance and cost benefits completed.	30 June 2018
U1.3.6	Final assessment of the commercial applicability of the HPBDS tool in conjunction with CRC research partners.	
U1.3.7	Pilot line products (Usage 1.1) incorporated into advanced, high-performance buildings	30 June 2019

3.2 Research Program No. 2 - Low Carbon Precincts - Output Milestones

This program will develop tools that enable the design of, and stimulate the market for, low carbon infrastructure at the “precinct” scale. This will facilitate property developers and local government partners providing low carbon infrastructure at the development planning point of delivery. An emphasis on research education and training in building information modelling (BIM), and extension to a new precinct scale (PIM) platform, will dramatically improve SME design productivity. Health and productivity co-benefits analysis will demonstrate the increased value and stimulate demand for low carbon precincts.

Output No.	Description	
R2.1	Digital information platform for informed precinct design: Establish a world-first spatial database platform in an open standard format (compatible with international standards) able to integrate with proprietary databases in both the Geographic Information Systems (GIS) and BIM domains.	
Output Milestones		Due date
R2.1.1	Analysis of the information needs of CRC stakeholders leading to an agreed information model schema that extends work already completed in a previous ARC Linkage project (LP0776642) completed.	30 June 2013
R2.1.2	Initial implementation and testing of a database conforming to the proposed schema, with sample data sets provided by CRC partners completed.	30 June 2014
R2.1.3	Information exchange protocols that support the performance metrics identified from projects within the CRC developed.	30 June 2015
R2.1.5	The schema is implemented and tested using at least two prototype databases, with exchange protocols that interface to the tools under development in other activity areas at that time.	30 June 2016
R2.1.6	The schema is implemented and tested using prototype databases, with exchange protocols that interface to the tools under development in other activity areas at that time.	30 June 2017
R2.1.7	The schema is further implemented and tested using at least two additional prototype databases, with exchange protocols that interface to the tools under development in other activity areas at that time.	30 June 2018
R2.1.8	The PIM schema is a mature, applicable entity supporting information exchange across the range of tools and applications developed by the CRC and used by its industry partner.	30 June 2019

Output No.	Description	
R2.2	Integrated assessment of eco-efficiency during precinct design: Develop and test assessment models for precinct design, embodied in automated software applications based on the PIM technology from Output 2.01 .	
Output Milestones		Due date
R2.2.1	International survey of current neighbourhood assessment studies (e.g. Community Green Rating Tool, PRECINX, LEED US, etc.) and stakeholder reviews of performance requirements, metrics, benchmarks completed.	30 June 2014
R2.2.2	Functional specification finalised and Precinct Information Data Model plus connection to distributed databases that contain input data for assessments implemented.	30 June 2014
R2.2.3	Software prototype of automated precinct assessment tools, including visualisations that clarify assessments for different user categories, developed.	30 June 2015
R2.2.4	Book documenting Best Practice Approaches to the Design of Zero Carbon Low Consumption Communities published.	30 June 2019

Output No.	Description	
R2.3	Precinct-level demand forecasting for distributed infrastructure networks: Develop a comprehensive, integrated tool set that enables measurement and assessment of precinct performance based on PIM technology described in Output 2.1 and forecasts demand at precinct level in terms of low carbon living.	
Output Milestones		Due date
R2.3.1	Detailed functional specification of the demand forecasting tools produced, including definition of performance metrics, on the basis of an international review and subsequent stakeholder feedback.	30 June 2013
R2.3.2	Creation, assembly and testing of an integrated set of prototype tools for demand forecasting covering energy, water and transport (private and public), building on knowledge of existing tools and available data.	30 June 2015
R2.3.3	Integrating shell for incorporation of component tools as fully integrated tool set based on PIM data designed and implemented.	
R2.3.4	Case studies selected and designed for model testing, addressing greenfield, greyfield and brownfield settings, plus differing household demands linked to dwelling/household types, distributed generation and electric vehicle scenarios.	30 June 2016
R2.3.5	Case study testing completed, with consequential refinement of the integrated set of demand forecasting tools.	30 June 2018
R2.3.6	Book /manual describing the use and application of the integrated tool set published.	30 June 2019

Output No.	Description	
R2.4	Health and productivity co-benefits: Develop a suite of co-benefit calculators suitable for different stakeholders (government regulators, developers, precinct planners & designers and community end users) based on rigorous research to identify measurable metrics.	
Output Milestones		Due date
R2.4.1	Audit of current Australian policies (national, state, metropolitan and regional urban planning and health policies) to examine whether they adopt a co-benefits framework and the potential to do so completed.	30 June 2014
R2.4.2	Base line survey of current levels of active transport usage, including understanding of the environmental & human health benefits in the studied communities (Living Labs) plus constraints on the uptake of those practices completed.	30 June 2014
R2.4.3	Economic incentives / advantages for government & community end users of adopting a co-benefits framework to justify and promote active transport identified.	30 June 2016
R2.4.4	Prototype co-benefits calculator developed.	
R2.4.5	Trial adoption of incentives embodied in the co-benefits framework to test and evaluate their impact on the uptake of active transport in living laboratories commenced.	30 June 2017
R2.4.6	Review and evaluations of impacts, leading to the final development of the co-benefits tool that will provide an integrated evidence base for policy development, together with community incentive schemes commenced.	30 June 2018
R2.4.7	Suite of co-benefit calculators completed.	30 June 2018

Output No.	Description	
R2.5	Education: 27 higher degree research students trained. 6 sets of training material for professional development programmes delivered, providing support for the education and training activity in Research Program 3 .	
Output Milestones		Due date
R2.5.1	10 HDR students enrolled (7 PhD and 3 Masters).	30 June 2013
R2.5.2	Further 5 HDR students enrolled (4 PhD and 1 Masters).	30 June 2014
R2.5.3	3 Masters by research students completed.	
R2.5.4	Further 6 HDR students enrolled (4 PhD and 2 Masters).	30 June 2015
R2.5.5	Preliminary drafts of 1 set of training material delivered and pilot professional development workshops developed in collaboration with activities within Research Program 3 .	

R2.5.6	Final 6 HDR students enrolled (5 PhD and 1 Masters)	30 June 2016
R2.5.7	Further 6 HDR completed (5 PhD and 1 Masters).	
R2.5.8	Final versions of first set of training material completed.	
R2.5.9	Two more sets of training material for professional development programmes completed.	30 June 2017
R2.5.10	Further 6 HDR students completed (4 PhD and 2 Masters).	
R2.5.11	Two more sets of training material for professional development programmes completed.	30 June 2018
R2.5.12	Further 6 HDR students completed (5 PhD and 1 Masters).	
R2.5.13	Final set of training material for professional development programmes completed.	30 June 2019
R2.5.14	Further 6 HDR students completed (6 PhD).	

3.2.1 Research Program No. 2 - Low Carbon Precincts - Utilisation Milestones

Utilisation No.	Description	
U2.1	Adoption of PIM across the precinct design sector: Leading to design quality & productivity improvements. The Precinct Information Model (PIM) identified as Key Output 2.1 will serve as a repository of information to be used across the entire range of activity areas within this CRC.	
Utilisation Milestones		Due date
U2.1.1	Prototype information repositories based on the evolving PIM schema in use across several Living Laboratories to test the emerging tools and community engagement models.	30 June 2015
U2.1.2	The PIM schema is defined and applied as a core technology across the range of tools and information management processes adopted by the CRC.	30 June 2016
U2.1.3	Precinct information models in at least two major urban regions in Australia and overseas.	30 June 2019

Utilisation No.	Description	
U2.2	<p>Automated precinct assessment tool:</p> <p>This tool is intended to be used by a variety of stakeholders. Built environment professionals will use it to make better-informed precinct planning and design decisions. Governments (state and local) will have and apply a scientifically validated and industry accepted software tool that can be nominated in urban planning regulations to drive enhanced cost & environmental performance of new development as well as re-development. COAG, the Department of Climate Change and Energy Efficiency and similar agencies will have and apply the tool to help measure the outcomes of their policy initiatives).</p> <p>Usages relate to Output 2.2.</p>	
Utilisation Milestones		Due date
U2.2.1	Prototype CRC partner tools trialled by State, local government, NGO agencies and private sector.	30 June 2015
U2.2.2	National workshop program introducing the tools and data, and how to use it completed, providing a basis for formal adoption in national planning schemes.	30 June 2017
U2.2.3	Performance assessment of tools in use.	30 June 2019

Utilisation No.	Description	
U2.3	<p>Network utility demand forecasting:</p> <p>Both utility suppliers & developers will use the forecasting tool to improve strategic decision-making for supply of network services & transport infrastructure.</p> <p>Usages relate to Output 2.3.</p>	
Utilisation Milestones		Due date
U2.3.1	Trials of prototype demand forecasting tools participated in by utility partners in the CRC.	30 June 2015
U2.3.2	Utility partners using the new demand forecasting tools and able to report benefits of early access.	30 June 2017
U2.3.3	Broad adoption of the forecasting tools across non-partner utilities and infrastructure companies with a target of 40% uptake.	30 June 2019

Utilisation No.	Description	
U2.4	<p>Co-benefits calculator:</p> <p>Used by Governments to quantify the economic benefits of policies that facilitate active transport (cycle, walk, transit), to incentivise communities to use active transport by revealing the direct benefit to their health (lowering personal costs of health care as well as health care taxes) and the reduction in their carbon footprint, and by Developers to make optimal decisions and identify trade-offs between conflicting options.</p> <p>Usages relate to Output 2.4.</p>	
Utilisation Milestones		Due date
U2.4.1	Policies (national, state and local) where the co-benefits calculator can be used identified.	30 June 2014
U2.4.2	Communities to work with co-benefits calculator (living laboratories) identified.	
U2.4.3	Prototype of the co-benefits calculator for different government, developer and community users launched.	30 June 2016
U2.4.4	Co-benefits calculator piloted in performance assessment of one or more government policy initiatives, with evaluation of its performance completed. It is used in specific policy interventions in the Living Laboratories.	
U2.4.5	Co-benefits calculator piloted in private sector (for developers), including initial evaluation of results – used in specific precinct plans to demonstrate low carbon living in selected Living Laboratories, with evaluation of its performance completed.	30 June 2017
U2.4.6	Applications of co-benefits calculator across all three domains (government, private sector, community) completed and reported.	30 June 2018
U2.4.7	Calculator adopted as mainstream tool for government, private sector decision making and community incentivisation for active transport implementation.	30 June 2019

3.3 Research Program No. 3 - Engaged Communities - Output Milestones

This program will focus on understanding and influencing behaviour and purchasing decisions. Policy scenario analysis will quantify the effectiveness of alternative options leading to policy adoption by government partners. New low carbon living strategies that mobilise cultural and social capitals will be demonstrated. CRC research findings will be fully road tested in “living laboratories” to ensure that results are robust, tangible and appealing. Results will be used to develop community education and training resources including for mass media dissemination.

Output No.	Description
R3.1	<p>Transition scenarios and affordability:</p> <p>Develop a high granular model for forecasting building stock uptake of energy end use products and solutions subject to alternative policy interventions (i.e. forecasting model). Research activities will be prioritised into subsectors (e.g. Transport, Residential Building, Commercial Buildings, etc.).</p>
Output Milestones	
R3.1.1	Review of housing affordability, household expenditure data requirements completed.
R3.1.2	Industry consulted and first subsector to be examined defined.
R3.1.3	Low carbon built environment industry roadmap prepared.
R3.1.4	Subsector 1 – building stock and demographic data sets gathered & options analysed.
R3.1.5	Low carbon policy journal launched.
R3.1.6	Affordability options analysed and social survey completed.
R3.1.7	1 st annual Industry barriers and interventions scenario workshop and report completed.
R3.1.8	Subsector 1 model output – impact assessment report completed and workshop held.
R3.1.9	Subsector 2 – chosen and modelling launched.
R3.1.10	Contribute papers and content to online policy hub.
R3.1.12	2 nd annual industry barriers and interventions scenario workshop and report completed.
R3.1.13	Subsector 2 - impact assessment report completed and workshop held.
R3.1.14	Subsector 3 – chosen and modelling launched.
R3.1.15	Contribute papers and content to online policy hub.
R3.1.16	Low income household barriers and opportunities surveys completed.
R3.1.17	3 rd annual industry barriers and interventions scenario workshop and report completed.
R3.1.18	Subsector 3 - impact assessment report completed and workshop held.
R3.1.19	Subsector 4 – chosen and modelling launched.
R3.1.20	Contribute papers and content to online policy hub.

R3.1.21	4 th annual industry barriers and interventions scenario workshop and report completed.	
R3.1.22	Subsector 4 - impact assessment report completed and workshop held.	30 June 2018
R3.1.23	Subsector 5 – chosen and modelling launched.	
R3.1.24	Contribute papers and content to online policy hub.	
R3.1.26	Subsector 5- impact assessment report completed and workshop held.	30 June 2019
R3.1.27	Contribute papers and content to online policy hub.	
R3.1.28	Final program workshop held and report completed.	

Output No.	Description	
R3.2	Drivers & barriers to community engagement: Develop community engagement and social psychological behaviour change tools that mobilise cultural and social capitals toward low carbon living.	
Output Milestones		Due date
R3.2.1	Review of low carbon communities, psychology and sustainability practices completed.	30 June 2013
R3.2.2	Review of household economic and behavioural models completed.	
R3.2.3	Recruitment of survey community groups and local partnerships completed.	
R3.2.4	Initial results from social psychological decision making and social networking modelling and experiments published.	30 June 2014
R3.2.5	Initial low carbon living community action tool developed.	
R3.2.6	Community planning & visualisation tool compared with alternative tools and models.	
R3.2.7	Mass media dissemination strategy developed.	
R3.2.8	Deliberative democracy process completed.	30 June 2015
R3.2.9	1st tranche community group action research and monitoring report completed.	
R3.2.10	Social psychological decision-making framework tested in different population groups.	30 June 2017
R3.2.11	Strategies developed for engaging communities in low carbon planning and visualisation.	30 June 2016
R3.2.13	Second tranche of survey community groups recruited and 2nd generation community plan incorporating new knowledge developed.	
R3.2.14	Social psychological decision-making research completed.	30 June 2018
R3.2.15	2 nd tranche community group action research and monitoring report completed.	30 June 2017
R3.2.16	Third tranche of survey community groups recruited and appropriate community plan developed.	

R3.2.18	3 rd tranche community group action research and monitoring report completed.	30 June 2018
R3.2.19	Fourth tranche of survey community groups recruited and appropriate community plan developed.	
R3.2.20	Surveys and research completed.	30 June 2019
R3.2.21	Final program workshop held and report completed.	

Output No.	Description	
R3.3	Living laboratories: Hold community trialled demonstrations on how to integrate (i) the Program 1 technologies, tools, building innovations, (ii) the Program 2 precinct designs and (iii) Program 3 behavioural dimensions of low carbon living at the local level.	
Output Milestones		Due date
R3.3.1	Key stakeholders identified.	30 June 2013
R3.3.2	Key parameters/benchmarks and Living Laboratory research design methodologies identified.	
R3.3.3	Two Living Laboratory sites commenced.	
R3.3.4	Monitoring capability established in first two Living Laboratories.	30 June 2014
R3.3.5	Two more Living Laboratories commenced.	
R3.3.6	Reporting and dissemination strategy developed for key stakeholders.	
R3.3.7	Three more Living Laboratories commenced.	30 June 2015
R3.3.8	Monitoring capability and reporting strategies established for the new Living Laboratories.	
R3.3.9	Two more Living Laboratories commenced.	30 June 2016
R3.3.10	Monitoring capability and reporting strategies established for the remaining Living Laboratories.	
R3.3.11	Major Australian showcasing event completed, with impact on social attitudes measured.	30 June 2018
R3.3.13	Living laboratory monitoring report completed.	
R3.3.15	Final conference held and report, including establishing strategies to ensure the continuation of the penetration of Living Laboratory findings across Australia and internationally completed.	30 June 2019

Output No.	Description
R3.4	<p>Education and capacity building for low carbon living:</p> <p>Develop popular information materials, training courses and education programs for communities, trades and professionals.</p> <p>25 PhD and 5 Masters research students graduated from projects within the CRC.</p>
Output Milestones	
R3.4.1 Survey and gap analysis of existing low carbon education and training programs of selected CRC participants completed. R3.4.2 4 HDR students enrolled (4 PhD).	30 June 2013
R3.4.3 Initial design of educational, training and monitoring programs for the specific communities across the CRC completed. R3.4.4 Policy impediments and incentives for effective education and training assessed. R3.4.5 8 HDR students enrolled (7 PhD and 1 Masters).	30 June 2014
R3.4.6 Pilot educational, training and targeted professional development program for the built environment industry established. R3.4.7 Assessment of the effectiveness of training and education at community level programs completed. R3.4.8 8 HDR students enrolled (7 PhD and 1 Masters).	30 June 2015
R3.4.9 Assessment of effectiveness of the CRC industry education and training programs completed. R3.4.10 Provision of enhanced education and training strategies via feedback from CRC research outcomes completed. R3.4.11 8 HDR students enrolled (7 PhD and 1 Masters), 5 HDR students completed (4 PhD and 1 Masters).	30 June 2016
R3.4.12 Assessment of behavioural changes as a result of program initiatives completed. R3.4.13 Strategies for expanding successful educational and training programs nationally developed. R3.4.14 2 HDR student enrolled (2 Masters), 8 HDR students completed (7 PhD and 1 Masters).	30 June 2017
R3.4.16 Strategies for exporting these educational and monitoring skills to the Asia Pacific region through agencies such as UNEP developed. R3.4.17 8 HDR students completed (7 PhD and 1 Masters).	30 June 2018
R3.4.18 Final assessment of outcomes from the education, training and monitoring programs developed within the CRC completed. R3.4.19 9 HDR students completed (7 PhD and 2 Masters).	30 June 2019

3.3.1 Research Program No. 3 - Engaged Communities - Utilisation Milestones

Utilisation No.	Description	
U3.1	<p>Communities, households and businesses will directly or indirectly use outputs from the program, including education and training, sustainability and healthy living practices information, and partake in other incentive and engagement programs adopted by CRC partners (Outputs 3.1, 3.2, 3.3, and 3.4).</p> <p>These uses will be initially apparent in the Living Laboratories. Particular areas of usages will involve energy consumption, housing valuation, healthy living practices, water consumption, modes of travel, recycling and waste disposal.</p>	
Utilisation Milestones		Due date
U3.1.1	Precinct scale usage from first Living Laboratories in selected local government areas commenced.	30 June 2014
U3.1.2	Co-creation methodologies established in selected living laboratory precinct.	30 June 2015
U3.1.3	Additional precinct scale usage from additional Living Laboratories in selected local government areas.	30 June 2016
U3.1.4	Training course delivered for property developers and potential service providers to encourage use of CRC outputs in design of products and services.	
U3.1.5	Training courses delivered.	30 June 2017
U3.1.6	Training course delivered.	30 June 2018
U3.1.7	Media campaign launched to encourage use of CRC outputs.	30 June 2019

Utilisation No.	Description	
U3.2	<p>Governments at all levels will use the databases, social psychological tools (Output 3.2) and scenario modelling framework (Output 3.1) to inform the development of policy in relation to areas including energy, transportation, health, public amenities and quality of life.</p> <p>The enhanced understanding of the perceptions, attitudes and drivers/barriers to social and behavioural change will assist Government to build more effective community engagement and coherent urban policies and programmes for more sustainable cities and communities.</p> <p>Utilisation activities will be prioritised into subsectors (e.g. Transport, Residential Building, Commercial Buildings, etc.).</p>	
Utilisation Milestones		Due date
U3.2.1	Industry workshop consultation and roadmap delivered to Government to encourage policy dialogue.	30 June 2014
U3.2.2	Subsector 1 defined by government partner and project agreement for policy/ program analysis completed.	
U3.2.3	Subsector 1 government partner(s) uses CRC outputs in adapting their	30 June 2015

	policies and/or fulfilling their reporting requirements.	
U3.2.5	Subsector 2 government partner(s) uses CRC outputs in adapting their policies and/or fulfilling their reporting requirements.	30 June 2016
U3.2.7	Commercialisation strategy developed for extending the provision of services (using the modelling framework) to a wider stakeholder group.	
U3.2.8	Subsector 3 government partner(s) uses CRC outputs in adapting their policies and/or fulfilling their reporting requirements.	30 June 2017
U3.2.10	Subsector 4 government partner(s) uses CRC outputs in adapting their policies and/or fulfilling their reporting requirements.	30 June 2018
U3.2.12	Subsector 5 government partner(s) uses CRC outputs in adapting their policies and/or fulfilling their reporting requirements.	30 June 2019
U3.2.13	A commercial framework is established for ongoing access to data and modelling services for Australian government departments.	

Utilisation No.	Description	
U3.3	Educational institutions and professional associations in Australia and Asia Pacific will use the research outputs (Output 3.4) to deliver improved information and educational courses addressing carbon reduction in the built environment.	
Utilisation Milestones		Due date
U3.3.1	Information, education and training programs operating in selected CRC precincts (through network partners).	30 June 2014
U3.3.2	Information, education/training programs adopted across at least one city council jurisdiction.	30 June 2016
U3.3.4	One or more professional education and training packages (facilitated by CRC partner - UNEP) are adopted in select regions in the Asia/Pacific.	30 June 2019
U3.3.5	Usage of CRC information, education and training materials reviewed.	

Utilisation No.	Description	
U3.4	Local councils and other community agencies adapt and deploy the case-study community engagement models from the projects (Outputs 3.02, 3.03) that seek to encourage communities and empower local action by promoting and leveraging off local support structures.	
Utilisation Milestones		Due date
U3.4.1	At least one council signed on as a project participant and committing resources to a living laboratory project.	30 June 2014
U3.4.2	At least three councils signed on as project participants and committing resources to separate living laboratory projects	30 June 2015
U3.4.3	Engagement strategy developed for transferring CRC living laboratory information to non-CRC councils and community groups	30 June 2016

U3.4.4	Media materials prepared for engaging with local government and a national road-show to city councils completed.	30 June 2017
U3.4.5	At least three non CRC councils or community groups have adopted CRC community engagement strategies.	30 June 2018
U3.4.6	Establishment of a self-funded support organisation to assist Australian councils and communities with implementation of CRC community engagement strategies.	30 June 2019

4.1 Transition Plan

Transition Milestones		Due date
T1.1.1	Transition plan developed and submitted to Commonwealth.	30 June 2015
T1.1.2	Transition plan reviewed and submitted to Commonwealth.	30 June 2016
T1.1.3	Transition plan reviewed and submitted to Commonwealth.	30 June 2017
T1.1.4	Final Transition plan reviewed and submitted to Commonwealth.	30 June 2018