LOW CARBON LIVING CRC

Tools Catalogue

Version 4, March 2019

In this catalogue, a 'tool' means a new technology designed to perform a specific function; a means to an end. The definition does not include models which are simplified representations or concepts of a system, device or idea.

For technical inquiries, please refer to the contact details in the table below. For all other inquiries, including in relation to use and intellectual property, please contact Stephen Summerhayes on 9385 0394 or at s.summerhayes@unsw.edu.au.

Tool	Scale	Format	What this tool does	Contact
Home energy analysis and forecasting tool – Solar Analytics (RP1023)	Building	Software program	• Integrates data collected from residential and small commercial energy users with weather and energy generation to forecast energy load and on-site storage needs • Allows residential and small commercial energy consumers to manage and reduce energy costs	Dr. Renate Egan r.egan@unsw.edu.au
Designing buildings with reduced embodied and lifecycle carbon emissions (RP1034)	Building	Excel spreadsheet	• A carbon value engineering tool that integrates carbon ($kgCO_2eq$) and life-cycle cost ($) metrics • Optimises embodied and lifecycle carbon reductions and minimises cost through dematerialisation	Dr. Philip Oldfield p.oldfield@unsw.edu.au
Quantifying the comfort and health benefits of energy efficient homes – the comfort index (RP1019)	Building	Excel spreadsheet	• Bridges the gap between building codes for energy efficiency and comfort in house design and construction • Provides a comfort index that guides builders and consumers as to the comfort and health of energy efficient building upgrades	Jesse Clarke jclarke@csr.com.au
A multi-zone thermal model to assess the energy flows for heating and cooling of residential homes (RP1010)	Building	Software program (in Design Builder)	• Predicts the energy required to heat or cool a house for given heating and cooling applicances • Validated using measurements from the CSR House living laboratory (140 sensors) over one year, including site monitored weather, thermal imaging and blower tests	Jesse Clarke jclarke@csr.com.au
Next generation whole-of-home energy efficiency and comfort tool (RP1024)	Building	Software program	• A building assessment tool (that builds on the NatHERS software) for all major household energy (e.g. heating/cooling, lighting, water heating, home office, cooking, laundry, general plug loads) • Understand how passive design features, solar integration, smart energy efficient appliances, energy storage and emerging low carbon materials can be utilised to achieve cost effective, comfortable and energy efficient low carbon housing • Inform the changes required to building design, materials, construction, and appliances for low carbon housing to be technically feasible and cost effective • Understand the most economical balance between building envelope design, appliance efficiency and onsite solar energy generation/storage	Prof. Wasim Saman Wasim.Saman@unisa.edu.au
Quantifying the costs and benefits of cool roofs on large-footprint buildings (RP1037, RP1037u1)	Building	Excel spreadsheet	• An evidence-based cool roof design and cost-benefit calculator • Allow designers/owners to quantify the costs and benefits of cool roof products from the point of view of both 'passive' reduction of heat load through the roof and from building-scale heat island effects	Prof. Paul Cooper pcooper@uow.edu.au
Embedded network and microgrid modelling tools	Building	Web-based app	• Increase uptake of renewable energy technologies in houses and units	Dr. Robert Passey r.passey@unsw.edu.au

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			• Analyse electricity generation and distribution under different technical and ownershp arrangements of PV and batteries	
Indoor climate information to inform decisions on space cooling and heating using passive and active methods	Building	Web-based app	• Influence demand-side energy management by informing homeowners (via a customisable web-platform) on their energy consumption and indoor climate conditions	Dr. Paul Osmond p.osmond@unsw.edu.au
A platform for developer – client conversations on low carbon buildings (SP0006)	Precincts and building	Excel spreadsheet	• A transparent decision support tool to identify, integrate, measure, optimise and communicate the economic, social, environmental and governance value of built infrastructure projects • An inclusive process to enhance the quality of decision-making • Identifies value in projects across the economic, social, environmental and civic spectrums • Compares the relative strengths and weaknesses of alternative project initiatives within a project-specific context to create maximum value	Dr. Maria Balatbat m.balatbat@unsw.edu.au
Integrated carbon metrics – embodied carbon – the Embodied Carbon Explorer tool (RP2007 RP2007u1)	Precinct and buildings	NECTAR IE Virtual Lab	• Tracks the embodied carbon flows along the production and supply chains of materials and industry sectors • Assists monitor and report on the carbon impact of design and planning interventions, including carbon neutral buildings and cities	A. Prof. Tommy Wiedmann t.wiedmann@unsw.edu.au
Integrated carbon metrics – operational carbon – the Precinct Carbon Assessment tool (RP2007, RP2007u1, u2)		Web-based app	• A tool that, using the life-cycle of operational carbon emissions, calculates different low carbon scenarios and provides a 3D visualisation	
Integrated demand forecasting and carbon estimation planning tool for residential energy, transport, waste and water – ETWW (RP2002)	Precinct	Excel	• Integrates demand forecasting and carbon estimation across the residential energy, transport, waste and water domains • Allows comparison of the energy demand and carbon estimates of alternative designs and the modelling, analysis and outputs to be traced and interrogated • Interactions between the demands for household energy, water, travel and waste production can be assessed	Dr. Nicholas Holyoak nicholas.holyoak@flinders.edu.au
A health and productivity co-benefits calculator for low carbon precincts (RP2028)	Precinct and building	Web-based app	• Quantifies the health and productivity impact from alternative precinct designs and surrounding transport/land use configurations, including active transport	Prof. Mark Stevenson mark.stevenson@unimelb.edu.au
Precinct regeneration through community co-design of low carbon designs (RP3034)	Precinct	Software program	• Utilises a 3rd party visualisation and assessment software tool from CRCSI (ENVISION) to help engage communities • Provides a set of new processes, standards and certification procedures to enable local governments, state agencies and property developers to work with community groups to co-design sustainable, medium density, low carbon housing precincts (urban regeneration)	Dr. Stephen Glackin sglackin@swin.edu.au
A decision support tool for microclimate and urban heat island mitigation (RP2023)	Precinct	Web-based app	• Provides a range of urban heat island mitigation options using an urban heat island performance index and object-oriented building and precinct models	Dr. Lan Ding lan.ding@unsw.edu.au

Tool	Scale	Format	What this tool does	Contact
			• Allows an examination and visualisation of the relationship between urban forms and microclimate to assess urban areas and potential urban heat island cooling strategies	
Agent-based traffic simulation (RP2021)	Precinct	Software program	• A tool to evaluate the traffic and emissions impacts associated with different low carbon mobility solutions. It is based on existing commercial tools but it has been calibrated and validated for several suburbs in Melbourne and has been used in this project to estimate the impacts of autonomous vehicles	Assoc, Prof. Hussein Dia hdia@swin.edu.au
Shared-use mobility benefits calculator (RP2021)	Precinct	Software program	• A tool to assist decision-makers identify the best mix of urban mobility measures required to achieve desired carbon reduction targets. The tool will include active transport, car-sharing, ride-sharing and public transport solutions as measures that can be tested and evaluated	Assoc, Prof. Hussein Dia hdia@swin.edu.au
Active transport gamification tool (myfootprint) (RP2021)	Precinct	Software program (Android app)	• A citizen-focused app to help users develop a better understanding of the impacts of their travel decisions, particularly mode choice. It will provide information on the cost, carbon footprint, and health benefits associated with different types of trips being. Through a gamification approach, it will provide the user with incentives to use low carbon mobility solutions rather than relying on private vehicle travel.	Assoc, Prof. Hussein Dia hdia@swin.edu.au
Pre-testing policy interventions addressing energy efficiency and low carbon (RP3002, RP3028, RP3035, RP2021)	Project and program	Software program	• A predictive agent-based simulation tool for each of the following sectors to understand and inform the effectiveness of behaviour change programs and increase the adoption of energy efficiency products: ○ Commercial ○ Residential ○ Residential water ○ Transport	Dr. Magnus Moglia Magnus.Moglia@csiro.au
Using social psychology to predict low carbon behaviour change – the readiness index (RP3012)	Project and program	Excel	• A practical and validated survey tool (set of interview questions) to categorise and assess the psychological readiness of individuals / communities to low carbon interventions • Enables improved understanding and effectiveness of behaviour change programs. It can also be used to better target promotion strategies for low carbon products and services	Prof. Yoshihisa Kashima ykashima@unimelb.edu.au
Assessing the sustainability performance of urban green infrastructure (RP2014)	Infrastructure	GIS	• An indicator based multi-scale model (16 indicators) that measures the sustainability performance of existing and proposed green infrastructure • Assesses multiple key benefits of GI, and how each of these factors contribute to reaching sustainability targets.	Parisa Pakzad p.pakzad@unsw.edu.au
Energy benchmarking of wastewater treatment operations (RP2017u1)	Infrastructure (Water utilities)	Tableau	• Web-based data visualisation tool for benchmarking energy use and carbon emmisions of wastewater treatment operations	Dr. Michael Short michael.short@unisa.edu.au
Financial assessment tool to assist large energy consumers with energy contracting (RP1032u1)	Infrastructure (Energy)	Web-based app	• Open source financial modelling and assessment tool for energy contracts focussed on corporate PPAs and energy efficiency and demand-side management	Dr. Jose Bilbao j.bilbao@unsw.edu.au