Next Gen Rating Tools Project

Research Program

Professor Wasim Saman
Next generation Rating Tools Project

**Project Duration** 2 years

<table>
<thead>
<tr>
<th><strong>Project Participants:</strong></th>
<th><strong>Project Stakeholders:</strong></th>
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<tr>
<td>University of South Australia</td>
<td>State and Territory Governments</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Local Governments</td>
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<tr>
<td>Department of Environment and Energy</td>
<td>Australian Building Codes Board</td>
</tr>
<tr>
<td>SA Government</td>
<td>BlueScope Steel</td>
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<tr>
<td>ASBEC</td>
<td>Australian Building sustainability Association</td>
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<tr>
<td>Energy Inspection</td>
<td>Australian Window Association</td>
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<tr>
<td>CSR Building Products</td>
<td>Australian Institute of Architects</td>
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<td></td>
<td>Housing Industry association</td>
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<td></td>
<td>Property Council</td>
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<td>Energy Consumers Australia</td>
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State and Territory Governments
Local Governments
Australian Building Codes Board
BlueScope Steel
Australian Building sustainability Association
Australian Window Association
Australian Institute of Architects
Housing Industry association
Property Council
Energy Consumers Australia
Project Objectives

- To review and update assumptions for contemporary lifestyles using available evidence base in all Australian climates.
- To incorporate a comfort metric and economic outputs.
- To broaden the scope of rating software to include all major domestic energy end-uses.
- To incorporate solar energy, energy storage technologies, and other demand management technologies.
- To incorporate advanced construction and mechanical ventilation systems.
- To improve usability through the development of CAD interoperability.
- To investigate the suitability for assessing mandatory and best practice performance standards.
- To investigate compliance issues.
- To thoroughly validate and trial the design tools to ensure the accurate assessment of energy and carbon impacts in all Australian climates. (Next Stage)
Project Activities

A. Review assumptions and settings
B. Cooling model improvements, comfort evaluation
C. Developing holistic, CAD integrated design tool
D. Review compliance issues
E. Dissemination and integration into regulatory framework
A. Review assumptions and settings

- Using available monitoring data and other evidence to examine assumption of energy use patterns and temperature settings to review tool assumptions and reflect current energy use patterns
- Include all key energy consuming energy services: heating/cooling water heating cooking, laundry…
B. Cooling model improvements, comfort evaluation

- Monitoring data point out that higher star rating has not affected energy requirement for cooling
- Need to reassess the cooling model evaluation particularly in tropical/subtropical zones
- Need for an indicator to examine comfort level during extreme weather as well as for overall annual energy needs for heating/cooling
C. Developing holistic, CAD integrated design tool

CAD Integration
Extending existing tools to include all major domestic energy use components
Inclusion of rooftop generation/storage
D. Review compliance issues

- Recent research has highlighted the need for compliance processes
- Project will work with governments on procedures for improving compliance with new tools
E. Dissemination and integration into regulatory framework

Working with industry bodies, education providers and governments to Develop, test and roll out training materials, procedures
Integrate into existing courses and programs
Focus on the professions/trades involved in various stage of design, assessment, building and commissioning
Using CRC communication channels to disseminate project outcomes
<table>
<thead>
<tr>
<th>Project Description</th>
<th>Lead Researchers</th>
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<tbody>
<tr>
<td>Advanced Comfort Index for Residential Homes</td>
<td>A/Prof Alistair Sproul/CSR</td>
</tr>
<tr>
<td>Validating and Improving the BASIX Energy Assessment Tool for Low-Carbon Dwellings</td>
<td>Dr Lan Ding/ Kevin Yee</td>
</tr>
<tr>
<td>High Performance Housing - Monitoring, Evaluating and Communicating the Journey</td>
<td>Prof Peter Newman/Josh Byrne</td>
</tr>
<tr>
<td>Reframing Building Regulation</td>
<td>Prof Peter Newman/Robert Enker</td>
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<tr>
<td>Adelaide Living laboratory: Lochiel Park, Bowden and Tonsley</td>
<td>Dr Kathryn Davidson</td>
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<tr>
<td>Energy Fit Homes: Empowering Consumers</td>
<td>Dr Nina Hall</td>
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</table>
Thank You

Questions?

Wasim.saman@unisa.edu.au
## Next generation Rating Tools

Project Leader: Wasim Saman  
Start Date: October 2016  
Duration: 4 years  
Budget:?

**Major Project Partners:**

| Department of Industry and Science  
| University of South Australia  
| University of NSW  
| Queensland University of Technology  
| CSIRO  
| Energy Inspect  
| Weeks Group  
| Green Vision Developments  
| Henley Homes  
| SA Government, Renewal SA  
| Victorian Building Authority  
| CSR  
| Australian Institute of Architects  
| Association of Building Sustainability Assessors  
| BlueScope Steel  
| Sustainability House |
Research Challenge:

What do you get when you cross a national administrator, state governments, a scientific agency, non-profit industry organisations, software developers and house builders? NatHERS – an energy modeller’s nightmare.
The construction and operation of buildings:
- consumes up to 50% materials
- uses up to 40% energy
- causes around 40% GHG emissions
- causes peak energy demand

- The rest of the world is moving forward
  - UK - net zero carbon homes by 2016
  - EU - nearly net zero energy buildings by 2020
  - California - net zero energy by 2020
  - South Korea - net zero energy by 2025
Project Objectives

• To review and update all NatHERS software assumptions for contemporary lifestyles in all Australian climates.
• To develop and incorporate comfort metric and economic outputs.
• To broaden the scope of rating software to include all major energy end-uses.
• To incorporate solar energy, energy storage technologies, and other demand management technologies.
• To incorporate advanced construction and mechanical ventilation systems.
• To improve usability through the development of CAD/BIM interoperability.
• To thoroughly validate and trial the design tools to ensure the accurate assessment of energy and carbon impacts in all Australian climates.
• To investigate the suitability of the tool for assessing mandatory and best practice performance standards.
Deliverables

Exhaustive consultation with industry, state and commonwealth governments and other stakeholders

Deliverable

• National energy database and data analysis of available energy monitoring data.
• Developing a holistic, system integrated ZCH design approach building on existing tools for building thermal modelling and appliance performance and use pattern data, including measured PV and solar thermal performance data and cost analysis
• Versions of the tool suitable for use by designers, material and appliance suppliers, households and regulators
• Publishing training and educational material for up-skilling the building design, certification and construction industry as well as technical papers and reports.
• Building the case for cost saving for building retrofits focusing on achieving near zero-energy consumption and comfort for the occupant, as well as costs/benefits for builder/developer.
Industry Engagement

A project participants' workshop was held in May 2013 which included a number of presentations from industry, government and research participants. Reviews of available monitoring data, energy rating needs and tools were presented. The workshop participants provided direction of future project plan.
Outputs

• Details on CRC Reports
  • RP1006: Viable integrated systems for zero carbon housing Progress Report: 2013
  • RP 1006: Viable Integrated Systems for Zero Carbon Housing: Lochiel Park Monitoring Case Study, April 2014

Peer reviewed publications related to the project:

Details on conferences presented
Scientific Collaborations

Details on the links with international /national - leading research groups similar to CRCLCL

Direct:
Queensland University of Technology

Indirect
Oxford University
University College London

Research Disciplines involved in the project
- Engineering
- Information Technology
- Psychology
- Economics
- Mathematic
- Construction technology and management
Calculations of carbon mitigation (showing assumptions etc)
The project is expected to support regulatory and consumer move towards low carbon housing, leading to significant and sustainable carbon emission reduction through improved dwelling design and solar integration. Carbon emissions savings of 0.40Mt by 2020 and 7.6 MT by 2030

Assumptions for new dwellings:

<table>
<thead>
<tr>
<th>Household energy saving</th>
<th>150 MJ/m² per annum</th>
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<tbody>
<tr>
<td>House size</td>
<td>200 m²</td>
</tr>
<tr>
<td>House construction in Aust</td>
<td>140000</td>
</tr>
<tr>
<td>GHG conversion factor (ave)</td>
<td>0.90 kgCO2-e/kWh</td>
</tr>
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<table>
<thead>
<tr>
<th>Action</th>
<th>Uptake</th>
<th>%</th>
<th>MJ saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta version released</td>
<td>0.1</td>
<td>4,200,000</td>
<td></td>
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<tr>
<td>Commercial version released</td>
<td>1</td>
<td>42,000,000</td>
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<tr>
<td>10% new housing by 2020</td>
<td>5</td>
<td>210,000,000</td>
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</tr>
<tr>
<td>10% new housing by 2020</td>
<td>10</td>
<td>420,000,000</td>
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</table>
Average Annual Household Energy - purchased from Utilities

AUS AVG. DEWHA (2008)
SA AVG. ESCOSA (2010)
LP AVG. (monitoring)

61.2% reduction

Average Annual Household Greenhouse Gas Emissions - by location

AUS AVG. ABS (2010)
SA AVG. ESCOSA (2010)
LP AVG. (monitoring)

64.5% reduction
Increased costs
- Additional construction costs
- Additional technologies

New benefits
- Direct energy savings
- Reduced heating/cooling equipment needs
- Improved thermal comfort
- Positive contribution to GHG action
- Increased asset value
## Value Proposition bottom-line for Households

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<table>
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<tr>
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<tbody>
<tr>
<td>Benefit</td>
<td>$41,355</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>$16,420</td>
<td></td>
</tr>
<tr>
<td>Net Present Value</td>
<td>$24,935</td>
<td></td>
</tr>
<tr>
<td>Benefit/Cost Ratio</td>
<td>2.52</td>
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</table>
Energy Fit Homes: Empowering Consumers

What information do consumers need about energy performance offered for sale or rent? At what decision points? From what sources? In what form?

Work Plan:
Benchmark existing rating systems/tools
Understand consumer wants and needs
Consult industry and government
Develop an implementation pathway

Consumers Survey outcomes:
92% would like energy efficiency information as part of sale and lease processes

89% reported that an energy efficient home would be more attractive to buy or rent

56% would be willing to pay for energy efficiency information (44% would pay up to $250)

92% would like energy efficiency information in building inspection reports, 83% at house inspections and 72% in home sale/rental advertising
NATIONAL ENERGY PRODUCTIVITY PLAN 2015-2030
Boosting competitiveness, managing costs and reducing emissions

December 2015

IDENTIFIED AU