Residential Carbon Emissions Measurement Platform (CEMP) Project

taking Australian-owned building assessment technology to the world
There is an urgent need to collaborate to develop a 3rd generation tool (across jurisdictions and between public and private sectors)

- COAG recognises the threat and the role of assessment tools in combating climate change
- COAG recognises a number of tool/jurisdictional initiatives (including this CRC initiative)
- COAG recognises the role of the NCC to improve building stock

- Sector resources to develop tool/platform solutions are limited
- Urgent need to focus resources, across and within jurisdictions, in the most efficient and effective manner

- Are the limited resources available (both public and private) being used in the most efficient and effective manner?
- If not, what improvements can be made?

- Share information, regarding the different initiatives and seek to optimise the collective investment for the ultimate benefit of the community
- CSIRO and EI to support and partner with CRC to deliver 3rd generation tool for global application

Cooperative Research Centres (CRC) Low Carbon Living

Presentation to CRC Low Carbon Living launch September 2016
Low Carbon Living CRC: CSIRO, CRC and Energy Inspection to work together to deliver a new 3\textsuperscript{rd} generation rating tool (for global application)

- CSIRO and Energy Inspection $3 million CEMP investment to deliver the new 3\textsuperscript{rd} generation rating tool
- CEMP project has been underway since 16\textsuperscript{th} January 2016; EI/CSIRO is currently spending over $100K per month on CEMP development effort
- CRC participants will have access to the new tool development work (as appropriate)
- CRC will play a role in supporting the development, testing, validation and acceptance of the CEMP tool
CSIRO / Energy Inspection CEMP project driven by the need to measure and manage residential carbon abatement pathway (funded by existing NCC/NatHERS derived revenue flows)

UN identifies urgent need for net zero global emissions by mid century (note: CRC link to COP)

Residential carbon emissions are significant - and deliver the highest returns on carbon abatement investment

A credible measurement/data collection tool and IT platform is urgently required for existing housing stock

$3 million CSIRO / Energy Inspection public/private partnership to build a credible and affordable CEMP to enable government to manage the residential carbon abatement pathway
CSIRO’s asset contribution to CEMP

CSIRO’s AusZEH house research led (over >5 years) to the development of the AusZEH Design tool. This software can model:

1. Thermal performance
2. Appliances (fixed and plug-in)
3. Lighting
4. Solar PV and storage
5. Carbon emissions
6. Water consumption

And allows a user to:
1. Adjust occupancy, thermostat and infiltration
2. Model adaptive thermal comfort
3. Model using future climate projections
4. Model heat stress and
5. Heat Island effects

The science underpinning these algorithms has been peer reviewed and published in journals.
CSIRO’s ongoing R&D support to facilitate CEMP

Since the move to a fee-per-certificate cost-recovery model for Chenath the CSIRO has a stable and ongoing revenue stream from which to fund further research and development. We are currently working on:

1. Refining the AusZEH Design tool and Chenath
2. Working with Energy Inspection to develop a best-in-class front end for AusZEH Design
3. Developing a national database of housing performance data (including the Energy Use Data Model, H-Star portal, Liveability Real Estate data as well as data sharing agreements with other parties
4. Using that data to provide policy advice and research services and to enhance regulatory outcomes (ie. in 2016 we will work in developing automated error checking of NatHERS ratings)
Energy Inspection’s asset contribution to CEMP

1. Energy Makeovers Roadmap (developed 2009 onwards – refer handout)
   o NatHERS based home assessment tool which identifies thermal shell projects and appliance projects and ranks those projects by financial payback, reduction in energy consumption, reduction in carbon emissions and impact on NatHERS star rating

2. Sustainability and Efficiency Evaluation of Dwellings (SEED) (developed for Green Loans assessors 2010 with ABSA – refer handout)
   o A residential assessment tool designed to provide the following report for householders:
     ✓ Building shell projects (weather sealing, insulation and glazing)
     ✓ Appliance projects (lighting, hot water, heating/cooling, fridge, solar PV and other)
     ✓ Water projects (bathrooms and tanks)

3. Third party software (sourced)
   o Sketch plan software for fast laser “measure up” to develop NatHERS plan
Recent private and public investment strengthens NatHERS

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Accurate</td>
<td>CSIRO licensee, Hearne.software, sought to exit their AccuRate Reseller Licence two (2) years early</td>
<td>July 2015: Energy Inspection acquired the reseller licence</td>
</tr>
</tbody>
</table>
| BERS                | Solarlogic, owner of BERS, not willing to invest to gain BERS accreditation for new version of the Chenath engine (3.13) | • April 2015: Energy Inspection purchase BERS software and begin significant investment to transition BERS to version 3.13 of the Chenath Engine and the industry’s new Universal Certificate model  
  • April 2016: Energy Inspection gained NatHERS accreditation for BERS Pro v4.3.0.1 (3.13) |
| FirstRate5          | Sustainability Victoria seeking to divest FirstRate5           | June 2016: Sustainability Victoria decide to retain ownership of FirstRate5 |
Extending the new 3\textsuperscript{rd} generation tool as an “asset rating” tool / platform for existing dwelling disclosure (including mandatory)

<table>
<thead>
<tr>
<th>Type of assessment</th>
<th>New build assessments</th>
<th>Potential for “existing dwelling” assessments</th>
<th>Potential “existing dwelling” upgrades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary</td>
<td>Negligible</td>
<td>For example Green bond market (existing residential mortgage market $1.6 trillion)</td>
<td>Leveraging existing Energy Efficiency Obligation (EEO) schemes (such as the VEET scheme and the NSW ESS) estimated to create up to 10,000 new energy efficiency/solar PV/battery storage installation/supplier jobs Australia-wide</td>
</tr>
<tr>
<td>Mandatory (NCC rating tool pathway)</td>
<td>138,000</td>
<td>National potential estimated up to 1 million assessments / year for the next decade to generate an estimated 1,600 new on-site assessor jobs</td>
<td></td>
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</tbody>
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Situation:
• Rising threat of power outages if Australia is to meet its global carbon reduction commitment as closures of brown and black coal power stations will be required across the eastern states.
• At Paris COP21 UN meeting, Australia committed to 26-28% carbon reduction by 2030 (cf 2005 levels).
• According to a forecast being prepared for upcoming COAG meeting, to achieve its obligatory target 800MW of brown coal generation in Victoria and 560MW in Queensland will need to be closed.
• In NSW the aging Liddell Power Station has committed to closing by 2022.

Complication: High chance of blackouts at peak demand times (2pm to 8pm) when there is heavy cloud cover and low wind velocity. AEMO’s Mike Cleary states that, “NSW and Victoria are potentially at risk of breaching their reliability standard....over the next decade.”

Solution: AEMO found that “a range of policies from using batteries to store excess output during period of low demand through to more connections between the states could help alleviate shortages.” Clearly an acceleration of the roll out of energy efficiency and solar storage to buildings would assist to reduce grid peak demand scenarios.
Experience shows strong business case for owners/tenants is not enough to ensure action; regulatory action is required to ensure emission reduction targets are met.

Source: Extract from ASBEC’s Low Carbon, High Performance report, May 2016


Figure 4. Built environment emissions and opportunities to achieve zero carbon buildings (MtCO2e)

Mtc02e

By 2030...

By 2050...

If no further action

If all energy efficiency and fuel switching actions taken

If high uptake of distributed energy

-23%

-57%

-98%

-106%

2005 2010 2015 2020 2025 2030 2035 2040 2045 2050

* Distributed energy potential presented in this chart is based on the modelled potential uptake of distributed solar PV from the Future Grid Forum Rise of the Prosumer scenario (Graham et al, 2015).

Source: ClimateWorks team analysis
## CEMP is intended to enable mandatory disclosure

<table>
<thead>
<tr>
<th>Criteria (needed to ensure market acceptance)</th>
<th>Reason for inclusion</th>
</tr>
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</table>
| NatHERS thermal rating (sub rating)         | • pass “retired barrister” test (as property value is impacted)  
• must achieve minimum thermal rating to count solar PV / storage |
| Accurate measurement of carbon emissions    | • Emissions measurement must be accurate, credible and verifiable for residential mandatory disclosure purposes (pass the “retired barrister test”) |
| (fixed asset rating tool)                   |                      |
| National application and acceptance         | • reduce cost of administration and operation  
• acceptable to key industry players (for example, government jurisdictions and key industry participants such as ASBEC/HIA/Property Council/et al) |
<p>| Acceptable to existing CERT IV assessor     | • 1,500 assessors nationally subject to AAO administration under federal government contracts |
| community                                   |                      |
| Provide portal building data (for existing | • facilitate and enhance policy decision making by jurisdictions / COAG |
| buildings)                                  |                      |
| Able to facilitate the accurate modelling   | • Necessary to enable further legislation / regulatory options to mandate “upgrades” to existing housing stock before sale and/or lease (post introduction of residential mandatory disclosure) |
| of the financial, energy consumption, carbon |                      |
| emission and “comfort” impacts of potential |                      |
| upgrade projects                            |                      |
| Able to use for pre and post construction   | • Ensure that consumers “get what they paid for” |
| assessments (optional air blower test)      |                      |</p>
<table>
<thead>
<tr>
<th>Who</th>
<th>Objective</th>
<th>Status / contact dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDAV</td>
<td>Gain feedback re CEMP project / align with members needs</td>
<td>19th May 2016 (first meeting held)</td>
</tr>
<tr>
<td>ASBEC/ClimateWorks/Property Council</td>
<td>Align CEMP project plan to be congruent with ASBEC/ClimateWorks vision for improving the energy performance requirements</td>
<td>May 2016: CEMP Joint Steering Committee has adopted ASBEC roadmap to deliver building net zero emissions by 2045</td>
</tr>
<tr>
<td>VIC government</td>
<td>Collaborate to establish VIC assessment market offering value and consumer choice</td>
<td>15th July 2016 held, second meeting scheduled for 16th August</td>
</tr>
<tr>
<td>ABCB</td>
<td>Align CEMP project plan to be congruent with NCC objectives</td>
<td>29th July 2016 / Canberra</td>
</tr>
<tr>
<td>ACT government</td>
<td>Investigate “the potential application of expanded NatHERS software functions to the ACT’s mandatory disclosure and building energy standards” (extract from Environment Minister Corbell’s invitation letter)</td>
<td>29th July 2016 / Canberra</td>
</tr>
<tr>
<td>NatHERS Administrator</td>
<td>Align CEMP project plan to be congruent with NatHERS “whole-of-house” strategy / objectives</td>
<td>End July 2016 / Melbourne</td>
</tr>
<tr>
<td>NSW government</td>
<td>Align CEMP project plan to be congruent with NSW government strategy / objectives</td>
<td>9th August 2016</td>
</tr>
<tr>
<td>SA government</td>
<td>Align CEMP project plan to be congruent with SA government strategy / objectives</td>
<td>15th August 2016</td>
</tr>
<tr>
<td>QLD government</td>
<td>Align CEMP project plan to be congruent with SA government strategy / objectives</td>
<td>17th August 2016</td>
</tr>
<tr>
<td>Other jurisdictions (WA, TAS, NT)</td>
<td>Align CEMP project plan to be congruent with jurisdictional strategy / objectives</td>
<td>22nd August 2016</td>
</tr>
<tr>
<td>ABSA</td>
<td>Gain feedback re CEMP project / align with members needs</td>
<td>23rd August 2016</td>
</tr>
<tr>
<td>MBA</td>
<td>Seek to align CEMP project plan with MBA objectives</td>
<td>23rd August 2016</td>
</tr>
<tr>
<td>HIA</td>
<td>Seek to align CEMP project plan with HIA objectives</td>
<td>24th August 2016</td>
</tr>
<tr>
<td>Royal Institution of Chartered Surveyors (RICS) and Australian Institute of Architects (AIA)</td>
<td>Seek to align CEMP project objectives with institutions’ objectives</td>
<td>Pending</td>
</tr>
<tr>
<td>Real Estate Industry body</td>
<td>Seek to align CEMP project plan to be congruent with industry strategy</td>
<td>Pending</td>
</tr>
</tbody>
</table>
CEMP to take advantage of cloud based applications

• Immediate outcomes:
  • Ability to share and collaborate
  • No local project files to manage
  • No software versions to manage
  • Integration with other cloud based applications e.g. mail, dropbox

• Long term outcomes:
  • User analysis to inform application design.
  • Application of machine learning algorithms to optimise design process

• Project, user and software are no longer geographically constrained
Building Assessor

Synchronizes and validates Assessment.

Assessor community will have a range of application options to suit new vs existing, complex vs simple, single vs volume assessments.

Centralised register of assessments and outcomes.

Common business logic and reference data to ensure integrity of assessment process.

Assessment Register

Web, Email, Post Assessment

Centralised team to manage quality of assessments and assessors.

Components provided by industry.

Construction components (Windows, materials)

90% of Assessments provided within 2 hours.

Assessment Reports in different formats

Administrator

Australian Government
Refer handout
CEMP user interface development

Using storyboard to develop and communicate concepts. We will talk through just one area of thinking.

Our focus is:

ACCURACY + PRODUCTIVITY = INDUSTRY VALUE