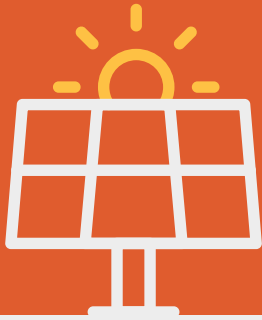


Annual Impact Report

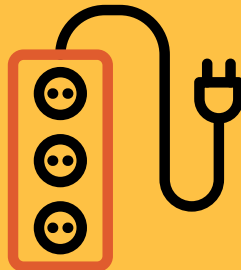
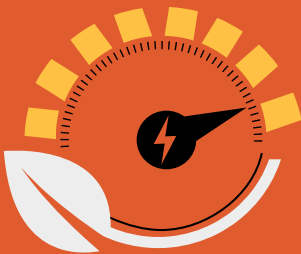
Energy Upgrades for Australian Homes

October 2024





23 24



**RACE for
2030**
RELIABLE
AFFORDABLE
CLEAN
ENERGY

ANNUAL REPORT
ENERGY UPGRADES FOR AUSTRALIAN HOMES
A RACE FOR 2030 PROJECT

RACE for Homes

Research Theme H2: Enhancing home thermal efficiency

ISBN:978-1-922746-65-8

Industry Report

Prepared for RACE for 2030.

October 2024

Acknowledgements

The research team would like to thank our Industry Reference Group for their insights and inputs into this report and our broader research activities.

Thanks also go to our Community and Industry Partners who are collaborating with the working groups for their feedback and input.

Acknowledgement of Country

The authors of this report would like to respectfully acknowledge the Traditional Owners of the ancestral lands throughout Australia. We recognise their continuing connection to the land, waters and culture and pay our respects to them, their cultures and to their Elders past, present, and emerging.

What is RACE for 2030?

RACE for 2030 CRC is a 10-year co-operative research centre with AUD350 million of resources to fund research towards a reliable, affordable, and clean energy future. <https://www.racefor2030.com.au>

Disclaimer

The authors have used all due care and skill to ensure the material is accurate at the date of this report. The authors do not accept any responsibility for any loss that may arise by anyone relying upon its contents.



Research and Industry Project Partners



CLIMATEKIC
Australia



energy efficiency
COUNCIL



MONASH
University



NSW
GOVERNMENT



RMIT
UNIVERSITY



Government of South Australia
Department for Energy and Mining



University of
South Australia



UNSW
SYDNEY



Welcome

The past 12 months have been a collaborative learning journey in which we not only built the foundations of the project, but also nurtured and developed our connections with each other, our funders, industry partners and Community Partners

Australian homes are responsible for 10% of Australia's emissions. Therefore, upgrading them to be better insulated, electrified, solar- and battery-powered and energy-efficient is a vital piece of Australia's climate and energy efficiency ambitions. A year ago we started a journey to help accelerate Australia's transition to energy-efficient homes. This is a complex and difficult challenge that is not to be underestimated.

Australia has over 10 million homes, the majority of which have been built prior to the implementation of national energy efficiency standards and are mostly inefficient. These homes not only have different designs and building features, they also are in very diverse climates, from the tropical north to the desert in the middle, and to the cold winters in the south. Moreover, these buildings are occupied by people in diverse communities, with different preferences,

aspirations, and potential to engage in this transition.

This complex tapestry means that the pathway to widespread uptake of energy upgrades is not simple and requires different approaches. For this reason, we developed an impact-oriented research program with a systems perspective that puts people, communities and places at the centre and sees their role, as well as the role of groups that run upgrade programs for them, as critical to achieving the type and scale of change needed.

The past 12 months have been a collaborative learning journey in which we, a collective of interdisciplinary researchers, not only built the foundations of the project, but also nurtured and developed our connections with each other, our funders, industry partners, and Community Partners.



Rob Raven
Chief Investigator
Monash University



Liam Smith
Chief Investigator
Monash University

Our research teams have focused on reviewing and synthesising existing evidence across policy and regulations, community implementation and business models, behaviour change, building stock analysis and co-benefits modelling, supply chain analysis, platform development and working with our Community Partners.

We have also made good progress in better understanding who the key end-users of our project are (government and community leaders of home energy upgrade programs), what their needs are, and how to ultimately make knowledge, data, tools and evidence available in a way that is easily accessible and meaningful.

Last but not least, we have developed and deepened our first partnerships with home energy upgrade program organisers and made a real impact on the ground.

Watch this space for more to come.

We are looking forward to the next year of this exciting journey. Engaging in systems change requires the collaboration of people and organisations with many different skills and resources. The tasks ahead may sometimes seem daunting and unfeasible, but that does not make the work less necessary or inspiring. We are proud to be part of an ambitious team of researchers, partners, and funders that all share the urgency to accelerate the development of innovative solutions for systems change for one of the most pressing problems of our times – ensuring energy-efficient homes for all Australians.

Rob Raven

Deputy Director
(Research)
Monash Sustainable
Development Institute
Monash University

Liam Smith

Director
BehaviourWorks Australia
Monash Sustainable
Development Institute
Monash University

Co-Chief Investigators

Energy Upgrades for Australian Homes



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Year 1 Highlights



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COMMUNITY PARTNERS ENGAGED



31
INDUSTRY REFERENCE GROUP MEMBERS



10
PRESENTATIONS OF PROJECT AT EVENTS



11
PROJECT PARTNERS



37
INTERVIEWS CONDUCTED



2
INDUSTRY REFERENCE GROUP WORKSHOPS



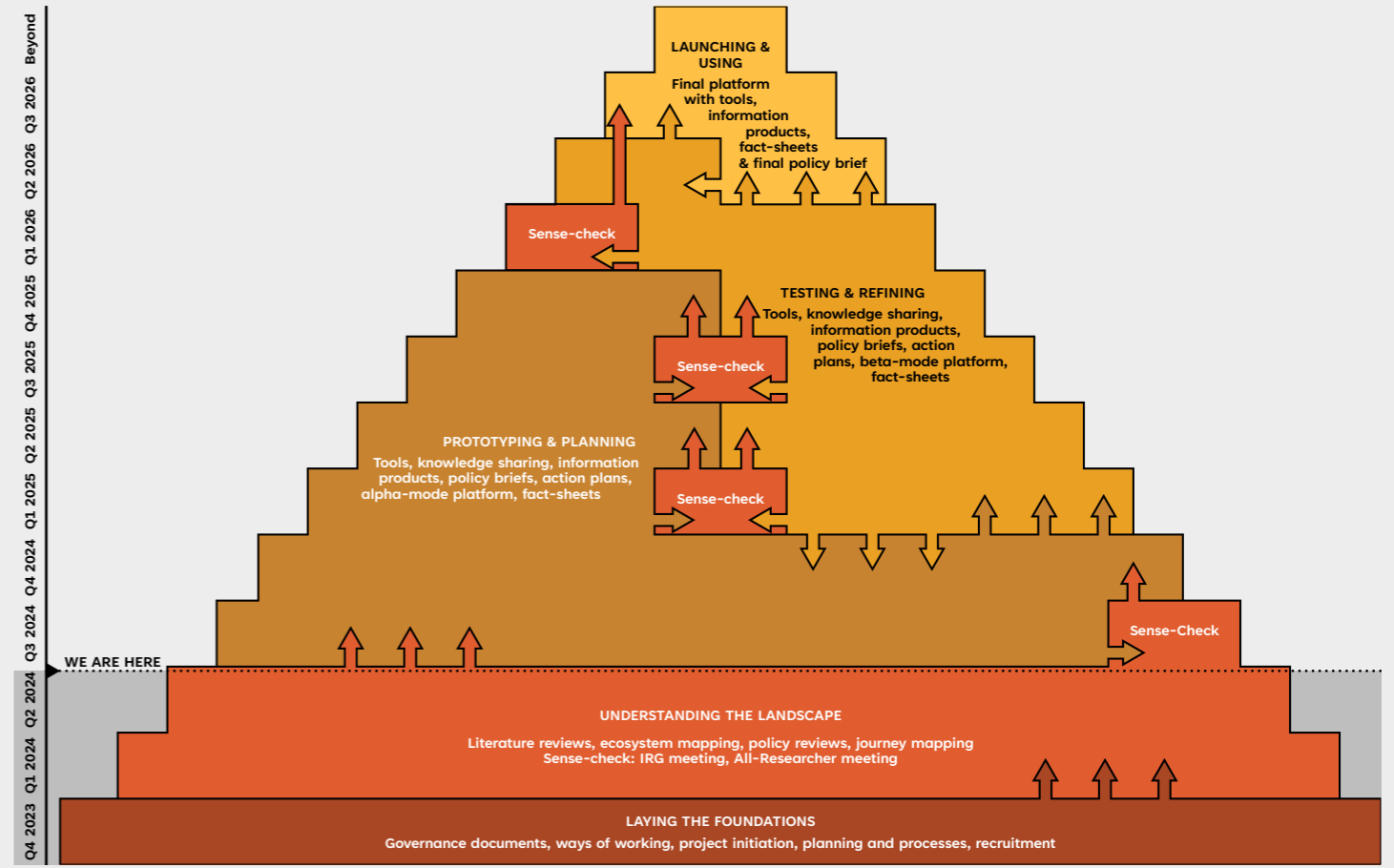
18
KNOWLEDGE PRODUCTS DEVELOPED



40
RESEARCHERS INVOLVED



7
WORK PACKAGES ESTABLISHED



Project progress

We have gained valuable insights into the challenges and opportunities for home energy upgrades by learning about what is working well, what is not, and where opportunities exist to drive change.

Our first year has focused on understanding the challenge and exploring what is most needed by those seeking to deliver home energy upgrade initiatives. This will allow us to develop an online home energy upgrade platform that will share lessons learned from practice, tools, resources and guidelines to accelerate the roll-out of effective and impactful home energy upgrade initiatives.

policy recommendations, and place-based approaches. We are producing these resources in collaboration with organisations that are developing and launching programs to help Australians upgrade their homes.

Our first Community Partners are located in Geelong, Victoria and in Anangu Pitjantjatjara Yankunytjatjara (APY) Lands in South Australia, and we are seeking more local partner organisations to test and refine our solutions.

The overarching goal of the project is to enable 1 million home upgrades by 2030, focusing on developing practical tools,

About the Energy Upgrades for Australian Homes project

The Energy Upgrades for Australian Homes aims to enable energy upgrades for 1 million homes across Australia. These upgrades will improve thermal comfort, manage energy bills, and reduce energy usage and carbon emissions, helping Australia move towards a more sustainable future.



Australia's homes are struggling with poor energy and thermal performance, with around 80% rated at two stars or less out of 10 for energy efficiency. This often means homes are too cold in winter, too hot in summer, and can even be unsafe. To address this, governments and community groups are launching programs to help people upgrade their homes, supported by \$1.3 billion in federal funding. However, challenges such as a lack of information, financial barriers, technical constraints and inadequate policies persist.

The Energy Upgrades for Australian Homes project, part of the RACE for 2030 Cooperative Research Centre (CRC), is tackling these barriers by working across the entire system.

The immediate aim of the project is to generate an extensive evidence base and a validated toolkit for assessing, designing, and implementing home energy upgrades in communities across Australia.

A prototype online home energy upgrades platform will be developed to consolidate the lessons, tools, guidelines, and resources and ultimately accelerate change through the diffusion and use of the platform by industry and communities to facilitate the upgrade of 1 million Australian homes by 2030.

For this, we have brought together a cross-disciplinary team of researchers to uncover systemic, social and behavioural insights to develop solutions that are practical and relevant to people and communities.

Our industry-led, applied research project is an ambitious three-year collaboration between five research institutions and five industry stakeholders led by Monash University and coordinated by Climate-KIC Australia.

The project is currently testing and learning from real-world findings with two Community Partners: in Geelong, Victoria and APY Lands, South Australia. Throughout this project, we aim to work with at least six Community Partners representing diverse communities and climatic conditions across the country.



Working with Community Partners

To upgrade millions of homes, we are partnering with local upgrade programs that respond to the unique needs of their communities and housing.



Around Australia, people in community groups, local and State governments are working hard to help households increase the energy efficiency and thermal comfort of their homes through home upgrade programs. Our Community Partners are the organisations developing and delivering home upgrade programs. By working alongside them, we're uniquely positioned to learn from experience, gather evidence on the challenges they face and what they need to succeed, and help spread these lessons to amplify the impact of current and future programs.

We are currently working with two upgrade programs (and will extend to six over the coming year) from across Australia to understand how the programs work and to provide them with a research capability they could not otherwise access. Our Community Partners will have access to expert advice and the best available evidence to develop their programs and undertake rigorous monitoring and evaluation to determine the impact of their programs.

The upgrade programs that we partner with will represent a diverse cross-section of communities, geographies, housing stock, upgrade interventions and climatic conditions. This will allow us to work with Community Partners to develop tools and resources that can be applicable to diverse regions across Australia, and tailorable to meet different community needs, priorities and expectations.

We are developing practical tools and resources that respond directly to the needs of program organisers. These tools include things like building stock models, co-design toolkits, evaluation surveys, and evidence-based advice on difficult questions like connecting with hard-to-reach communities.

Community Partners can use these resources, which will be available on the Home Energy Upgrades Platform, to run high-impact programs. The results of evaluation can also help them iterate and improve future programs, and scale their learnings to others around the country.

We are also setting up a Community of Practice, open to anyone who is running an energy upgrade program (whether solar, battery, insulation, draught-proofing or other energy saving upgrades). This will be a space where program organisers can get early access to project resources, while connecting with each



other and learning from successful programs.

In our first year, we have begun working closely with our first two upgrade programs in **Geelong Sustainability** and the **APY Lands**.

Over the next two years, we will continue to work alongside Community Partners to test and refine the tools and resources we create. For example, the prototype building stock tool being developed by CSIRO will be used to assist partners to inform their choice of home energy upgrade solutions. This tool will be continuously validated, informed and improved by working alongside partners.



Electric Homes Program, Geelong

Geelong Sustainability's Electric Homes Program is providing high quality, efficient energy upgrades to a wide variety of households across the Greater Geelong community.

KEY DATA



CLIMATE

Urban, temperate



NO. OF HOUSEHOLDS

1,000



TARGET CUSTOMER/ HOUSING SEGMENT

All types, tenures and incomes



BUSINESS MODEL

Connections with vetted delivery partners

Location



5 Local Government Areas in G21 Region
Geelong, Victoria

Overview

We worked closely with the Geelong Sustainability to help design a survey for evaluating the experiences of the participants in the program. Our work is helping to identify ways to reach more people in the community, and to achieve conversion rates.

We hope to identify barriers to further increase the scale of home electrification, and validate the costs of electrification across a range of building and household types.

Progress to date

- Engaged with local communities to understand their needs
- Coordinating delivery of audits and upgrades, with industry partners
- Testing and evaluation of adequacy or need for additional regulations, incentives, qualified/certified trades, sources of finance and methods of communication
- Cost/benefit analysis across different housing types

UPGRADES PROVIDED



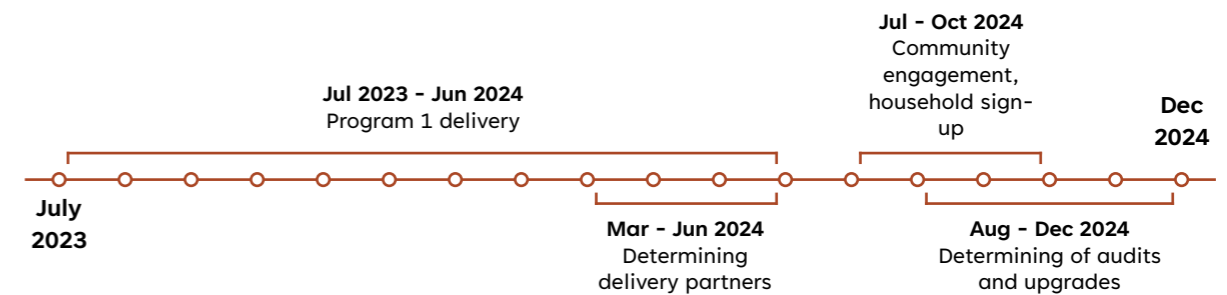
Solar, batteries, heat pump hot water, reverse cycle airconditioning, insulation



Equity and justice

The initiative uses part of customer payments to buy systems for low-income households.

Timeline



PARTNERS

- Geelong Sustainability
- Reclaim Energy
- RACV Solar
- Jeztek Plumbing
- City of Greater Geelong
- Borough of Queenscliffe
- Colac Otway Shire
- Golden Plains Shire
- Surf Coast Shire

Energy Efficiency Retrofit Pilot, Anangu Pitjantjatjara Yankunytjatjara (APY) Lands

The South Australian Government and UniSA's Energy Efficiency Retrofit Pilot aims to produce a practical model to deliver effective energy efficiency upgrades for remote arid housing.

KEY DATA

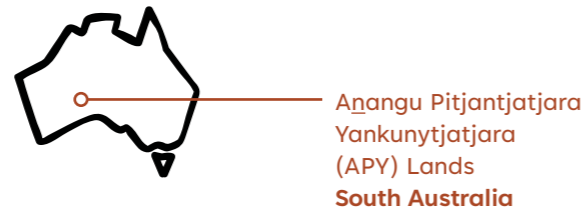
 CLIMATE
Remote, arid desert

 NO. OF HOUSEHOLDS
6

 TARGET CUSTOMER/
HOUSING SEGMENT
Public housing, low-income, Aboriginal communities

 BUSINESS MODEL
Assessment and installation of energy efficiency upgrades

Location



Overview

The APY Lands project focuses on understanding how current housing stock can be improved for energy efficiency, finding solutions to provide adequate heating and cooling in a hot and arid climate, educating households to optimise their use of homes, educating the workforce. Based on lessons learned, we will develop a model for energy efficiency upgrades in remote housing that can be replicated.

Progress to date

STAGE 1

- Undertook home energy assessments in select homes
- Developed retrofit strategies
- Household interviews and community engagement

STAGE 2

- Implementing building envelope retrofit strategies
- Developing and delivering appropriate training for the local workforce to deliver upgrades
- Developing an education package for households
- Developing recommendations for enabling upgrades for remote and regional Indigenous communities in hot arid conditions

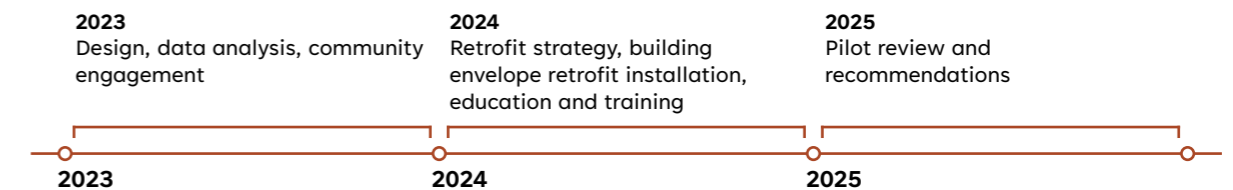
UPGRADES PROVIDED



Building envelope, HVAC retrofit



Timeline



PARTNERS

- SA Department of Energy and Mining
- University of South Australia
- South Australian Housing Trust
- Aboriginal Affairs and Reconciliation
- Pointsbuild
- CodeSafe Solutions
- Powertech
- Insulation Council of Australia & New Zealand (ICANZ)
- Healthabitat
- Efficiency Matrix
- Kingspan
- Nganampa Health Council
- The Air Tightness Testing & Measurement Association

Our research approach

Our approach to upgrade millions of Australians homes to be more energy efficient by 2030 is to build a platform with tools to enable community groups, local and State governments to set up energy upgrade programs at scale.

We have developed an impact-orientated research program with a systems perspective that puts people, communities and places at the centre and sees their role, as well as the role of groups that run upgrade programs for them, as critical to achieve the type and scale of change required to reach net zero.

By combining research, real-world testing and co-design, and partnerships, we aim to deliver practical, evidence-based solutions for upgrading homes across different climates and communities in Australia. We have brought together researchers, experts, partners in industry, all levels of government and community groups to:

✓ **Learn from real-world experiences:** We are partnering with existing upgrade programs across Australia. These partners give us invaluable insights into what works on the ground. For example, we have worked with Geelong Sustainability to evaluate their first phase of home upgrades to inform their next steps.

✓ **Develop solutions for large-scale change:** Using what we have learned, we are designing ways to overcome barriers and create opportunities for widespread home energy upgrades. We're looking at everything from supply chains to household experiences. Our goal is to find practical solutions that can work across different climates and communities.

✓ **Create useful tools and resources:** We are building an online platform that will host all our findings, tools, and resources. It will be designed for people developing and implementing local energy upgrade programs. While the full platform will be ready in 2026,

we will be sharing insights and resources with our partners and Community of Practice along the way.

✓ **Combine research with real-world testing and collaboration:** We are working to create a comprehensive, evidence-based approach to scaling up home energy upgrades across Australia.



How we organise our work

Our researchers are working across six packages of work and alongside existing programs and partnerships in this busy and evolving landscape. We're tapping into existing networks, including through our diverse Industry Reference Group, to develop and test interventions across the system.

Our research is organised thematically:

1. Identifying policy pathways for home energy upgrades to enable widespread residential energy efficiency upgrades
2. Exploring transformative and equitable community implementation models to develop evidence and tools for collaborative place-based partnerships to scale equitable household uptake of home energy upgrades
3. Supporting household energy efficiency upgrade behaviour change to understand different drivers and barriers, and applying these insights to develop tools and resources with our Community Partners
4. Developing a Residential Building Retrofit tool to inform decision-making of home owners and building regulators
5. Investigating the energy efficient products supply to strengthen the supply chain and simplify and enhance the supply of products
6. Working with Community Partners to co-design and co-develop tools and resources that will be available on an online Home Energy Upgrades Platform to support program organisers in designing, implementing equitable and place-based home energy upgrade programs

We have established a robust project governance framework that brings these work packages together and connects to industry and home energy upgrade organisers. The following pages explore the progress made in each of the work packages during the project's first year and what's coming.



Policy pathways for Australian home energy upgrades

Identifying policy reforms to enable widespread residential energy efficiency upgrades.



PROGRESS TO DATE



ACTIVITY

- Policy mapping and analysis
- Stakeholder consultations
- Literature review
- Development of preliminary observations
- Development of options paper
- Development of concept for web-based platform for programs



USERS

- Government policymakers
- Energy retrofiting industry
- Financial institutions
- Community organisations



ENGAGEMENT

- Energy efficiency consultants
- Finance experts
- Renewable energy providers
- Resilience experts
- State government
- Federal government
- Experts across energy markets, strata title, solar PV deployment, and policy settings for energy efficiency

Overview

We're exploring the policy, regulatory, and governance frameworks that influence home energy efficiency in Australia. Our goal is to find opportunities for reform that will improve existing homes' energy performance across the country. Our research will inform policy pathways to achieve widespread home energy upgrades and help meet Australia's emissions-reduction targets.

Most Australian homes were built before energy standards existed, so we need to upgrade millions of houses. We're looking at current policies across Australia and abroad. So far, this research is revealing a haphazard approach to subsidies and support for energy upgrades.

We're exploring financial incentives, regulations, and implementation challenges for both owned and rented homes, noting the unique challenges faced by different types of households. We're also investigating new and innovative financing mechanisms to address high upfront costs. Drawing on international examples, that includes options such as those that tie loans to properties rather than individuals.

Our research and discussions with experts are helping us to build a holistic understanding of the current state of play and the potential for policy reform. The work aims to provide policymakers, industry stakeholders, and community organisations with evidence-based recommendations for creating an enabling environment for large-scale home energy upgrades.

KEY DATA



RESOURCES

- Desktop Analysis
- Preliminary Observations



EVENTS

- Impact X Summit: Climate and Nature 2030

Progress towards outcomes

Our first year of research has yielded substantial progress towards identifying policy reforms to enable widespread residential energy efficiency upgrades. A comprehensive policy mapping exercise has provided a clear picture of the current landscape, highlighting both best practices and significant gaps across different jurisdictions.



This analysis has revealed key areas for potential reform, including financing mechanisms, incentives for landlords, and minimum energy efficiency standards.

Engagement with a diverse range of stakeholders, including government departments, financial institutions, and industry groups, has provided valuable insights into the practical challenges and opportunities for implementing energy upgrades at scale. Preliminary findings suggest that addressing the high upfront costs of retrofits and creating incentives for landlords to upgrade rental properties are critical priorities.

The research has also identified promising policy models from international examples, such as the Property Assessed Clean Energy (PACE) program in the United States, which could be adapted to the Australian context. Exploration is underway to determine how these models could be integrated with recent federal initiatives, such as the Made in Australia policy supporting domestic manufacturing of solar panels and batteries.

Moving forward, we will develop more concrete policy recommendations and work closely with other RACE projects to ensure the findings inform home energy upgrade programs and practical implementation strategies. Improving engagement with federal government stakeholders is also a priority to ensure the research aligns with and informs national policy directions. Ultimately, our goal is to contribute to the development of a cohesive, effective policy framework that can drive the large-scale energy upgrading of Australian homes.



RESEARCH TEAM

- Ben Milligan (Research Co-Lead), UNSW
- Eliza Northrop (Research Co-Lead), UNSW
- Bronwen Morgan, UNSW
- Cameron Holley, UNSW

Transformative and equitable community implementation models

Developing evidence and tools for collaborative place-based partnerships to scale equitable household uptake of home energy upgrades.



PROGRESS TO DATE



ACTIVITY

- Academic evidence review
- Household experience survey and analysis
- Ecosystem mapping
- Commenced interviews with Community Partners
- Stakeholder engagement
- Strategic Community Partner planning platform development workshops



USERS

- Community organisations
- Local governments
- Other intermediaries and policymakers
- Commercial energy upgrade service providers (including Community Partners)



ENGAGEMENT

- 6 speaking engagements
- 17 external stakeholders engaged
- 1 interview with 2 program representatives of Geelong Sustainability

Overview

We are working with and supporting community, government and businesses to improve the way home energy upgrade programs are designed and delivered for all kinds of households.

We know that local organisations and councils are great at understanding what different families need, especially those who might be harder to reach or more vulnerable, and we're working with organisations to uncover and share learnings.

To make these upgrades happen on a large scale, we need everyone working together. This means finding new business ideas that work for all sectors and pushing for changes in how things are usually done, including finding new ways for community organisations, governments and businesses to collaborate, advocate and share knowledge.

We want to engage widely to gain insights and test new ideas. We're working with our Community Partners to co-design and experiment with innovative and equitable

KEY DATA



RESOURCES

- State of Energy Research Conference 2024 Presentation
- International Sustainability Transitions Conference 2024 Presentation
- Multilevel Ecosystem Map – Research and policy view



EVENTS

- All Energy Conference 2023
- State of Energy Research Conference (SoERC) 2024
- Coalition for Community Energy (C4CE) Congress 2024
- International Sustainability Transitions Conference 2024
- UTS Home Energy Upgrades Climate Action Week Workshop 2024

business model designs and community implementation approaches.

To make sure we're on the right track and responding to real-world challenges and needs, we're engaging broadly with community, governments and businesses, including through industry forums, to share ideas and learn from each other as we develop program design tools, guidance and resources.



Progress towards outcomes

Our research is demonstrating and supporting communities to work together to make homes more energy efficient, focusing on fairness, equity and positive change.

In our first year, we've learned about what makes community home energy upgrade programs successful, and how different jurisdictions are shaped by their policy and markets.

Our research has highlighted the important role of intermediaries in developing markets, and we've drawn on international and local examples to demonstrate the importance of equity considerations when designing and delivering programs. We have begun work to understand the needs of the users who will be accessing resources through the online Home Energy Upgrades Platform. This will ensure that the resources we create are meeting real-world needs to improve home energy upgrades.

We have created an ecosystem map that shows different policies across Australia and how they help different groups – like low-income households, renters and people living in apartments – access home energy upgrades.

We are also sharing stories about successful home energy upgrade program approaches to help other upgrade program managers learn and start their own programs.

Over the next two years, we will work with Community Partners to design new tools and guides based on what we are learning. This will help more communities run successful home energy upgrade programs.



RESEARCH TEAM

- Paris Hadfield (Research Co-Lead), Monash University
- Ed Langham (Research Co-Lead), UTS
- Jaime Comber, UTS
- Kerryn Wilmot, UTS
- Rob Raven, Monash University

Supporting household energy efficiency upgrade behaviour change

Identifying key household energy upgrade behaviours, understanding their different drivers and barriers, and applying these insights to develop tools and resources with Community Partners.

PROGRESS TO DATE



ACTIVITY

- Systematic literature review
- Interviews with 19 households that have undertaken home energy upgrades and synthesis of findings into journey maps
- Interviews with 2 hot water heat pump industry experts to understand the experience of households seeking emergency hot water replacements
- Impact evaluation survey for Community Partner Program developed



USERS

- Program organisers
- Researchers
- Government



ENGAGEMENT

- 19 interviews with households
- 2 interviews with industry experts
- 1 community partner group supported

Overview

We are working to understand what motivates households to upgrade their home's energy efficiency, and what might be holding them back.

Our goals are to:

- Understand how ready home owners and communities are to join energy upgrade programs, both now and in the future
- Find the best ways to encourage more people to make these energy-saving improvements to their homes

To do this, we are exploring the key steps that people take when undertaking home energy upgrades to identify what helps them take action, and what gets in their way.

Progress towards outcomes

The findings from our research will be used to create community and householder behaviour change tools, resources and approaches for energy policy-makers and practitioners to support an increase in the reach, scale and scope of upgrades programs to reach millions of Australian homes by 2030.

In our first year, we have gathered foundational information and insights. Now we are ready to work with our Community Partners to test innovative ways to encourage households to participate in home energy upgrade programs.

KEY DATA



RESOURCES

- Systematic literature review
- Draft behaviour framework



RESEARCH TEAM

- Mark Boulet (Research Co-Lead), Monash University
- Celine Klemm, Monash University
- Melissa Hatty, Monash University
- Jaime Comber, UTS
- Ed Langham, UTS
- Kerryn Willmot, UTS
- Leena Thomas, UTS
- Nimish Bitoria, UTS
- Kamyar Soleimani, UTS



Residential Building Retrofit Tool

Developing a Residential Building Retrofit Tool for home owners and building regulators.

PROGRESS TO DATE



ACTIVITY

- Developed a preliminary Residential Building Retrofit Tool
- Conducted ~50 batch simulations for heating and cooling energy for 200,000 real dwelling designs with various retrofit scenarios



USERS

- Home owners
- Researchers
- Local councils
- State and federal governments
- Building product companies and associations
- Building regulators

Overview

A building stock tool will be created using data from 1 million real homes built between 2018 and 2022 across Australia's various climates. Covering 80-90% of all homes approved during that period, this online model will help home owners find cost-effective retrofitting options, assist researchers in exploring new technologies, and support governments in developing policies to promote retrofitting, especially for older homes built before energy efficiency regulations were in place.

Upgrade program organisers will be able to select and compare alternative retrofitting options by comparing a range of factors including costs, savings in energy use and carbon emissions, payback periods, and the co-benefit cost savings from improving the health of people living in warmer and more comfortable homes.

Progress towards outcomes

A preliminary residential building stock model online tool has been developed based on 200,000 real dwelling designs. The tool is anticipated to be used by individual home owners for cost-effective retrofitting options, as well as program organisers and policy makers from council to federal government for designing residential building energy efficiency policies.

The residential building stock model online tool prototype will be tested with Community Partners to select and compare alternative retrofitting options in terms of the costs in implementation and savings in the energy use and carbon emissions, the payback periods, and the co-benefit cost savings due to the health improvement.

KEY DATA



RESOURCES

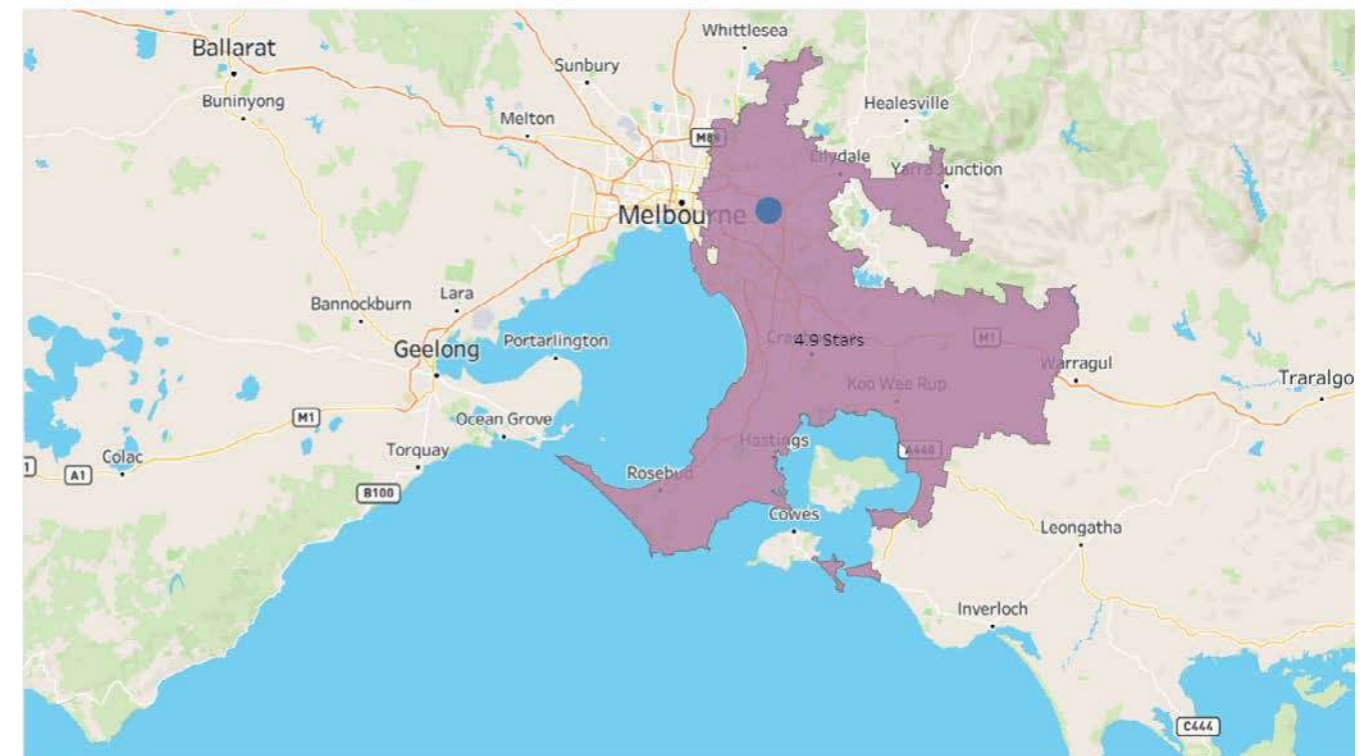
- Costs of Retrofitting



Upgrade Cost and Saving Calculator

Tell us about your home!

State: VIC | Postcode: 3131 | Years: (Multiple v... | Dwelling: House | Wall Type: Brick/Veneer | Floor Type: CSOG | Occupancy: Full | Heating Fu...: Gas | Show Results



RESEARCH TEAM

- Dong Chen (Research Lead), CSIRO
- Ming Liu, CSIRO
- Mahsan Sadeghi, CSIRO
- Melissa James, CSIRO
- Michael Ambrose, CSIRO
- Zhengen Ren, CSIRO
- Anthony Wright, CSIRO

Upgrade Cost and Saving Calculator

There are many upgrades that you can do to your house and each will have a different impact on the energy efficiency of your home and the cost savings you can expect. Select the upgrades that you are interested in and see the results below.

Select your upgrade options

Energy Costs	Avg. Heating Cost	Avg. Cooling Cost	Avg. Total Cost	Avg. Upgrade Costs
Main objective	\$1,012.50	\$277.63	\$1,290.13	\$0.00
Design based on year built	\$625.84	\$202.32	\$828.16	\$2,038.31
Ceiling/Roof insulation/Upgrade Only	\$717.80	\$114.47	\$832.27	\$1,117.12
Infiltration reduction/Ceiling/Roof insulation/Upgrade Only	\$625.11	\$175.95	\$801.06	\$2,588.31
Infiltration reduction/Ceiling/Roof floor insulation/Upgrade Only	\$566.70	\$102.02	\$668.72	\$2,432.71
Infiltration reduction/Ceiling/Roof floor/Window/Upgrade Only	\$432.47	\$116.94	\$549.41	\$6,150.37
Window/Curtain/Shading/Upgrade Only	\$369.88	\$203.88	\$573.76	\$6,739.03
Infiltration reduction/Ceiling/Roof insulation/Window/Upgrade Only	\$424.20	\$103.30	\$527.50	\$6,234.65
Infiltration reduction/Ceiling/Roof floor insulation/Upgrade Only	\$426.37	\$119.55	\$545.92	\$1,919.49
Infiltration reduction/Ceiling/Roof floor/Window/Upgrade Only	\$402.43	\$184.52	\$586.95	\$2,019.34
Infiltration reduction/Ceiling/Roof floor/Window/Upgrade Only	\$463.76	\$114.49	\$578.25	\$2,176.14
Infiltration reduction/Ceiling/Roof floor/Window/Upgrade Only	\$393.27	\$85.83	\$479.10	\$2,992.83

Upgrade Saving	Difference in Avg. Heating Cost from...	Difference in Avg. Cooling Cost from...	Difference in Avg. Total Cost from...
Main objective	\$0.00	\$0.00	\$0.00
Design based on year built	\$386.66	\$75.31	\$461.97
Infiltration reduction only upgrade	\$348.69	\$85.86	\$434.55
Window/Curtain/Shading upgrade only	\$642.62	\$370.87	\$1,013.49
Ceiling/Roof insulation/Upgrade Only	\$296.74	\$85.86	\$382.60
Infiltration reduction/Ceiling/Roof insulation/Upgrade Only	\$389.47	\$102.02	\$491.49

Review of energy-efficient products' supply chains

Strengthening the supply chains for energy-efficient home products.

PROGRESS TO DATE



ACTIVITY

- **Desktop research (baseline supply chain analysis):** Nationwide product information on supply chain focused on manufacturers, distributors, and retailers.
- **Supply chain stakeholders' survey:** Survey development to collect primary data based on the limitations of available information online based on the desktop research.
- **Supply chain stakeholders' interviews:** Protocols to conduct the interviews have been developed to investigate the end-to-end supply chain of energy-efficient products.



USERS

- Product manufacturers
- Product retailers
- Product wholesalers



ENGAGEMENT

- Interviews and surveys to be conducted pending ethics approval.

Overview

Strengthening the supply chains for energy efficiency products will improve sector coordination. We want to ensure that households can access the products and services they need to upgrade their homes. By examining the supply chains that support home energy upgrade programs, we aim to simplify and enhance the supply of energy efficiency products.

We are mapping the strengths and weaknesses of the supply chains, and gathering data on issues with the supply chains through surveys and interviews with manufacturers, retailers and wholesalers. This will highlight supply chain challenges from the stakeholders' perspectives, and shed light on their relationship with buyers. Our goal is to identify and address barriers to smooth product delivery in the Australian market.

We are collaborating with industry partners to identify new ways of working to simplify supply chains and improve customer experience.

Progress towards outcomes

We have collected information about the supply chains including identifying the primary manufacturers, retailers, and wholesalers of energy efficiency products. We will soon be conducting surveys and interviews that will provide information on the current state of the energy efficient products supply chains, and assess their maturity.

We are already working with our Community Partner Geelong Sustainability to share insights about the supply chains for energy products. As our research progresses, Community Partners can expect to gain a better understanding of the supply chain strengths and weaknesses, as well as assisting them in making informed decisions on the strategies to be implemented.

KEY DATA



RESOURCES

- Home energy supply chain key products review and monitoring



RESEARCH TEAM

- Muhammad Abdulrahman (Research Lead), RMIT
- Priya Rajagopalan, RMIT
- Aswini Yadlapalli, RMIT
- Charles Lau, RMIT
- Kamrul Ahsan, RMIT
- Priyabrata Chowdhury, RMIT
- Shahrooz Shahparvari, RMIT
- Vinh Thai, RMIT
- Dmytro Ostapenko, RMIT
- Felipe Jara Baeza, RMIT
- Ke Xing, University of South Australia
- Connie Susilawati, QUT

Community Partner support and platform development

Supporting program organisers in designing, implementing and evaluating more equitable and place-based home energy upgrade programs.



Overview

We facilitate collaboration between our research teams and Community Partners, offering evidence-based support for the design, implementation, and evaluation of more effective home energy upgrade initiatives. By working closely with practitioners and addressing the needs of our Community Partners, we ensure that research outputs are relevant and applicable to home energy upgrade programs throughout Australia.

The insights gained from this collaborative process inform the development of our online Home Energy Upgrades Platform, and identify an appropriate organisation to take the platform forward. This platform is tailored to address the specific needs and challenges faced by program organisers and home energy upgrade advocates. The platform will empower and support users in designing and implementing equitable, integrated, and place-based home energy upgrade programs by providing actionable knowledge, tailored program design and implementation support, and online peer-to-peer learning and collaboration opportunities.

Progress towards outcomes

During our first year, we have focused on establishing strong relationships with our Community Partners, identifying their support requirements, and determining how they want to collaborate. Informed by these insights, we have coordinated a range of research activities that have assisted Community Partners in delivering more effective home energy upgrade programs. Currently, we are seeking additional home upgrade programs to partner with and to broaden our reach.

Additionally, we have worked closely with home energy upgrade program organisers to gain a comprehensive understanding of the challenges they face when designing, implementing, and evaluating programs. As the project progresses, we will work on consolidating research outputs and translating new knowledge into practical advice, evidence-based tools, and dedicated support services that will be easily accessible at our online platform.

PROGRESS TO DATE



ACTIVITY

- Developed tailored research support plans for Community Partners and facilitated research support activities
- Developed a home energy upgrade program monitoring and evaluation toolkit
- Assessed the needs and challenges of home energy upgrade program organisers)
- Started with the design of platform services that address those needs and synthesise research outputs



USERS

- Current and prospective Community Partners working on home energy upgrade initiatives
- Program organisers from community groups, local and state government



ENGAGEMENT

- 15 Interviews with program organisers from community groups, local government and state government
- Developed an article on effective program design for *Monash Lens*
- Engaged with external stakeholders (local councils and cross-council bodies, community energy groups and NGOs, industry)
- Engaged with Community Partners



EVENTS

- All Energy Conference 2024 Panel Session



KEY DATA

RESOURCES

- *Monash Lens* article
- Prototyping support canvas
- Platform target audience needs and requirements dashboard
- Platform target audience persona dashboard
- Literature review on OSS, intermediaries, business models
- Literature review on community partner program monitoring and evaluation toolkit
- Platform and one-stop-shop database



RESEARCH TEAM

- Chris Riedy (Research Lead), UTS
- Jaime Comber, UTS
- Jeremy Cox, UTS
- Ed Langham, UTS
- Rob Raven, Monash University
- Liam Smith, Monash University
- Christoph Brodnik, Monash University

How we work together

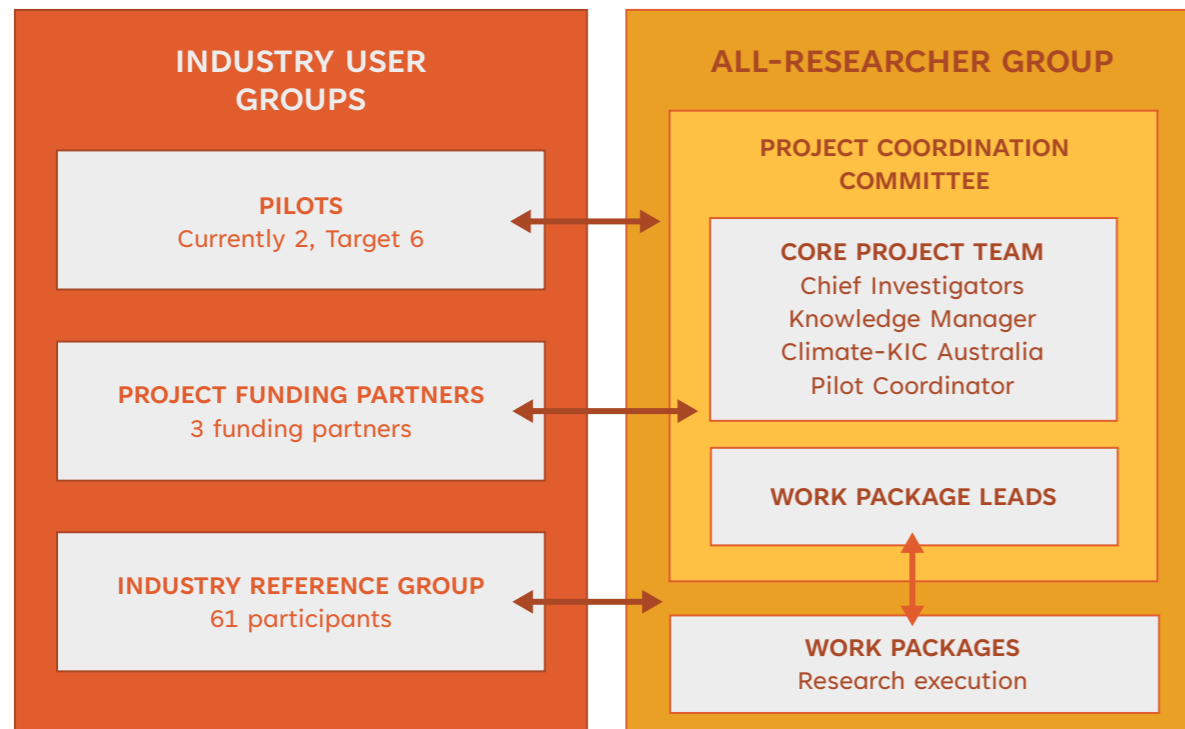
We have established a robust project governance framework to ensure residents and home energy upgrade organisers are at the core.

The Energy Upgrades for Australian Homes project seeks to create change by engaging directly with current and future end-users, and we have established a governance framework that places them at its core.

We are currently working with two Community Partners who are delivering home energy upgrade programs, to test ideas in practice, and this will be extended to six community partner programs by the end of the project.

We meet with an Industry Reference Group, which has 31 members twice a year to share updates and test ideas emerging from the project. We also connect with the members on an ad hoc basis.

Internally, our seven thematic work packages come together with RACE through forums such as the Project Coordination Committee (every two months) and our All-Researcher Workshops (once a year). This structure ensures that industry feedback is deeply integrated into the project, that users of the research are working directly with researchers, and that all work packages are collaborating together generating systems-level insight.



Organisations represented in the Industry Reference Group

Air Tightness Testing & Measurement Association (ATTMA)	Housing Industry Association (HIA)
Australian Sustainable Built Environment Council	Insulation Council of Australia and New Zealand (ICANZ)
Blue Mountains City Council	Master Builders Association (Master Builders)
Renew	Australian Glass and Windows Association
Brotherhood of St. Laurence	Merri-Bek City Council
Knauf Insulation	Department of Energy, Environment and Climate Action, VIC
Canberra Region Joint Organisation	Australian Institute of Refrigeration Airconditioning and Heating
Cessnock City Council	Energy Consumers Australia
Housing Industry Association	Australian Institute of Landscape Architects;
Clean Energy Council	Smart Energy Council
Australian Sustainable Finance Initiative	Green Business Council of Australia
Climateworks Centre	Solar Victoria
Energy Efficiency Council	Sustainability Victoria
Department of Climate Change, Energy, the Environment and Water (Commonwealth)	Department of Climate Change, Energy and Environment and Water, NSW
First Nations Clean Energy Network	Department of Energy, Mines, Industry Regulation and Safety, WA
Coalition for Community Energy: C4CE	

How to connect with us

If you are interested in developing an energy upgrade program, sharing your insights or supporting the project directly, reach out to us to talk about ways we can work together.



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LET'S PARTNER

- Local councils or community groups who are running home energy upgrade programs
- Financial institutions who have established Sustainable Upgrades home loan programs
- State or federal government departments who have or are developing home energy upgrade programs
- Industry partners who are working across the supply chain
- NGOs leading other home energy upgrade programs.
- Anyone else interested and working across the ecosystem

Energy Upgrades for Australian Homes

RACE for
2030
RELIABLE
AFFORDABLE
CLEAN
ENERGY



Australian Government
Department of Industry, Science,
Energy and Resources

AusIndustry
Cooperative Research
Centres Program