Institute for Sustainable Futures

Scaling Green Retrofit Housing Finance

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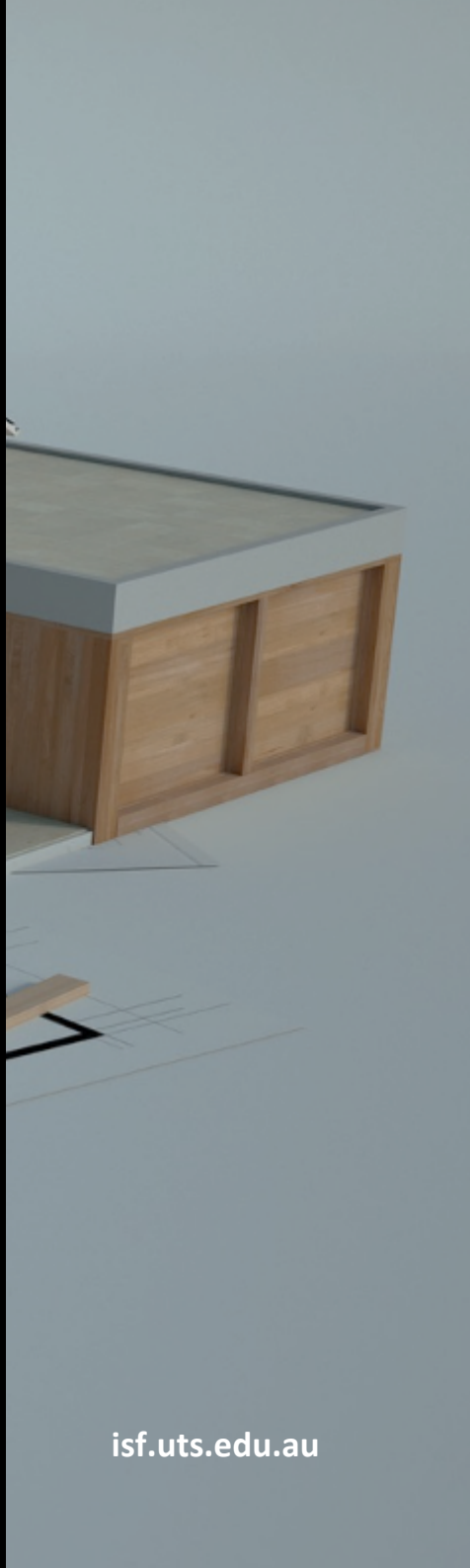

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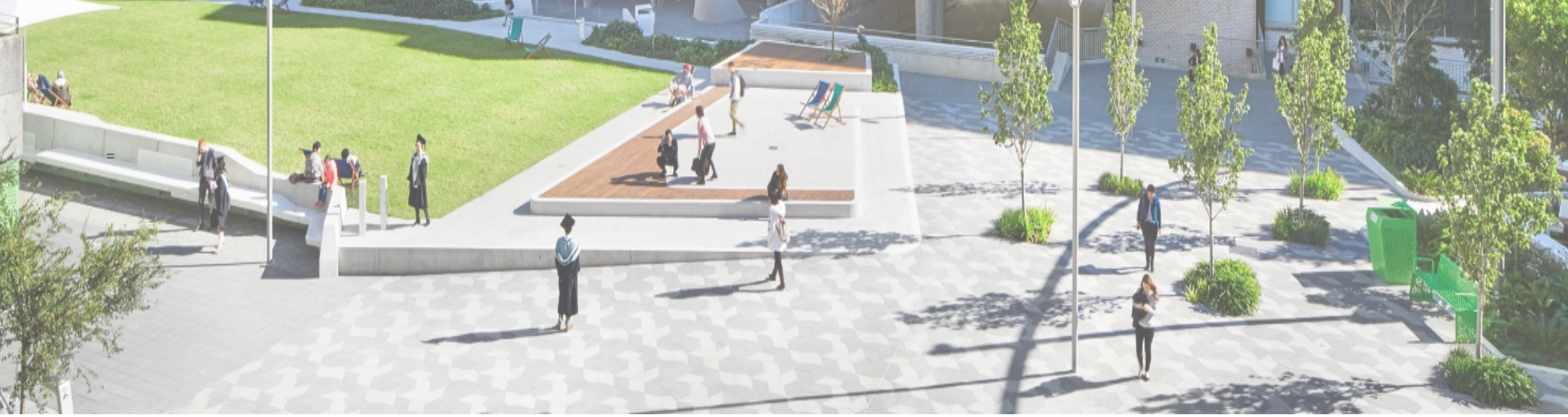

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The Institute for Sustainable Futures (ISF) is an interdisciplinary research and consulting organisation at the University of Technology Sydney. ISF has been setting global benchmarks since 1997 in helping governments, organisations, businesses and communities achieve change towards sustainable futures. We utilise a unique combination of skills and perspectives to offer long term sustainable solutions that protect and enhance the environment, human wellbeing, and social equity. For further information visit: **www.isf.uts.edu.au**

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Executive Summary

Introduction

It is projected that by 2050, despite the introduction of sustainability standards for new buildings, 7 million existing homes will not have been subject to improved energy efficiency measures.[i]

Finance plays a key role in residential housing. In August 2022 Authorised Deposit-taking Institutions (ADIs)[ii] issued 35,441 new loans for occupied housing. Almost four times as many loans were issued for existing homes than newly constructed ones. As ADIs integrate climate-related financial risks into residential lending portfolios it is important to develop innovations that support households to efficiently and cost effectively finance green retrofits. Affordable, accessible credit that enables households to sustainably retrofit homes can support the transition to net zero emissions in a way that reduces household costs of living and is consistent with credit risk management frameworks. Affordable, accessible credit also supports a just transition.

With energy prices spiking, if a household is not able to make energy efficiency investments to their homes that help to reduce their energy bills, there is a danger that households would be exposed to what we describe as a "net zero poverty premium." Poverty premiums refer to the cost of being poor.

Research insights

Our key research insights can be summarised as:

1. The structure of lending influences household decisions.
2. Green retrofits can reduce household costs.
3. Green retrofits should improve credit risk for banks.
4. Scaling green retrofits requires regulatory support for banks to innovate.
5. Green Retrofit Housing Loans would benefit from regulatory guidance.

Structure of lending influences household decisions

A significant impediment to households accessing finance for green retrofits is the way lending products are structured. The form of credit influences the cost of credit. Residential housing loans and residential investment loans are the most cost-effective sources of financing as loans are secured against the housing asset. The rate of interest ultimately has an impact on demand for credit. If customers are not able to access the lowest available interest rates, then there will be less demand for green retrofits.

The challenge for households is that when a housing loan is approved by an ADI to purchase, or refinance, an existing house, the need for the householder to make future green retrofits is not included as part of the loan contract. If customers are required to reapply for their loan to access finance this acts as a significant disincentive and pushes customers towards products that have shorter terms for repayment or higher interest costs. This has the potential to deter households from making decisions to invest in a green retrofit.

Green retrofits can reduce household costs

There is a range of evidence that suggests that green retrofits can reduce household costs over the lifetime of the retrofit:

- In Victoria, where more than half of all energy used in homes comes from piped gas,[iii] the Victorian Government's own estimates are that switching from gas to efficient electric appliances could reduce average household energy bills by around $1,250 per year.[iv]
- Research by the Institute for Sustainable Futures has found that domestic hot water use is responsible for around a fifth of Australian residential greenhouse gas emissions and a quarter of household energy use. The phasing out of gas water heaters in homes would provide consumers with combined annual savings of $4.7–6.7 billion by 2040.[v]
- Climate Council analysis reveals that electrifying a home's cooking, heating and hot water combined with practical efficiency upgrades would save between $1,119 and $2,872 each year and also reduce greenhouse gas emissions by an average of 37.5 tonnes over a decade.[vi]

- Climate Works Renovation Pathway Project has identified that across the various housing types most common for Australia, households could expect to see energy consumption savings in the range of 55–65% on average from thermal shell improvements and efficient and electrified appliances.[vii]

Green retrofits may improve credit risk for banks

Integrating green retrofits into residential lending practices has the potential to improve credit risk for an ADI portfolio in two ways. A reduction in energy bills for households improves an ADI's serviceability ratios, whilst the increased value of a house as a result of the retrofit improves an ADI's loan to valuation ratios. Further, ADIs are being driven to decarbonise their residential lending portfolios to meet their net zero commitments - scaling retrofits is an essential component.

The report provides a brief explanation of the way in which ADIs manage credit risk for residential lending, explaining why prudential credit risk management frameworks influence financing decisions made by ADIs.

Scaling green retrofits requires regulatory support for banks to innovate

The research has considered the role that Australia's financial regulatory system can play in supporting housing loan customers to efficiently and cost effectively access finance for the purposes of investing in green retrofits. A key question the research examines is how the Australian Prudential Regulation Authority (APRA) can support ADIs to provide their customers with access to finance at the most cost-effective rate of interest, which is the rate of interest on housing loan products.

Green Retrofit Housing Loans would benefit from regulatory guidance

Recognising the role that regulation plays in supporting the financial stability of Australia's financial system the research considers the potential for regulatory nudges. If it can be demonstrated that green retrofits have the potential to improve residential credit risk by reducing customer energy bills, this would provide an evidence base for APRA to issue guidance to ADIs on the ways in which ADIs can increase housing loan for the purposes of green retrofits.

Research methodology

The Institute for Sustainable Futures (ISF) was funded by the Lord Mayor's Charitable Foundation to design a *financing sustainability retrofit pilot program* to test financial system innovations that can facilitate vulnerable Victorian households to access affordable credit to invest in sustainability retrofits. This report builds upon the research project which sought to identify ways to unlock innovative, low interest credit facilities for sustainability upgrades in vulnerable households at scale.

We undertook desktop research and informal stakeholder consultation, engaging with representatives across the domains of finance and energy efficiency, to develop an in-depth understanding of the housing loan and retrofit financing markets. We developed a Concept Paper to test ideas with financial system experts. A key result of this engagement was to understand the importance of aligning reforms with prudential regulation frameworks that ensure that Australia's financial system can withstand market fluctuations.

Conclusion and Recommendations

For Australia's financial system to be able to offer households the opportunity to finance green retrofits at the most cost-effective interest rate, housing loan interest rates, there is a need for Australia's financial system regulatory architecture to support innovation in a way that is consistent with Australia's strong prudential regulatory framework. To provide APRA with confidence to issue ***Green Retrofit Housing Loan Guidance*** that would enable ADIs to increase existing housing loans under agreed conditions we propose that APRA build a ***Green Retrofit Finance Housing Model*** to test the impact of loan extensions and deferrals on credit risk.

We propose that APRA identify a cohort from the lowest loan repayment quartile that have ***low loan to valuation ratios, high liquidity buffers and mortgage payments that are not in arrears*** that would be eligible for a pilot. These three factors combine to identify low risk customers from an ADI perspective. Low-income mortgagors are of mortgagor incomes.[viii] There are 766,220 loans identified by the Reserve Bank of Australia as the lowest loan repayment quartile group.[ix]

Residential housing is critical to meeting net zero emissions targets

The Australian Government's target to reduce emissions will require decarbonisation of residential buildings that have already been constructed.

The Australian Government's target to reduce emissions by 43% from 2005 levels by 2030 and achieve net zero emissions by 2050[x] will require a decarbonisation of all sectors of the Australian economy. A key area of focus will be residential buildings which are collectively responsible for around 24% of overall electricity use and 12% of total carbon emissions in Australia.[xi]

Progress is being made. Recent reforms to the National Construction Code (NCC) increase new minimum energy efficiency standards for new homes from 6 to 7-star ratings when using the Nationwide House Energy Rating Scheme (NatHERS).[xii] However by 2050 it is projected that 7 million existing homes and a third of commercial buildings will not have been subject to improved energy efficiency measures in the NCC "resulting in missed opportunities for energy and emissions savings, and health benefits".[xiii]

Preliminary modelling quoted by the COAG Energy Council indicates that, "implementing proposed policies for improving the energy efficiency of existing houses (NCC Class 1 only) in 2025 in all jurisdictions could deliver a net present value of $3.4 billion and reduce greenhouse gas emissions by 40.3 Mt CO2-e by 2050" [xiv]. The COAG Energy Council identifies that occupants of older buildings tend to have higher energy bills and vulnerable households face unique challenges. Policies therefore need to account for impacts on vulnerable households.[xv]

The COAG Energy Council considered a number of enabling mechanisms to support energy efficiency decision-making at different stages of the building cycle, including financial incentives. They concluded that targeted financial initiatives would encourage greater energy efficiency, addressing, "motivation, awareness, and the capital constraints associated with energy efficiency upgrades." This would also ease the financial burdens associated with regulated minimum rental requirements for landlords and tenants.[xvi]

With energy prices spiking, if a household is not able to make energy efficiency investments to their homes that help to reduce their energy bills, there is a danger that households would be exposed a "net zero poverty premium." As Australia transitions to net zero emissions it is critically important that the benefits of innovation are equitably available across Australian society.

Initiatives that have focused on green retrofits for vulnerable households have commonly focused on grant based or incentive mechanisms. A key challenge the research seeks to address is how finance can be made accessible for low-income earners for the purposes of investing in green retrofits. This is particularly important with State and Federal Governments facing fiscal challenges. Demonstrating that finance can play a role unlocking green retrofits for low-income earners can provide an alternative to grant-based schemes and support a just transition.

Green retrofits reduce household costs

There is a range of evidence that suggests that green retrofits can reduce household costs over the lifetime of the retrofit.

In Melbourne alone, 95% of homes were built before 2005, which are collectively responsible for emitting 80-90% of the city's total energy consumption and carbon emissions.[xvii] Taking into account the current annual construction of new housing stock in Australia (≈ 1%), more than 70% of the current residential building stocks will remain in use by 2050 whilst new buildings will only contribute roughly 10 – 20% of additional energy consumption.[xviii]

To deliver on Australia's climate targets and improve the cost of living, improving the quality of Australia's nearly 11 million existing homes will be equally as important as increasing the performance of new builds. Improving the energy efficiency of the city's existing housing stock by switching from gas to electricity and installing household renewable energy solutions would lead to a significant reduction in greenhouse gas emissions and cuts to household energy bills.

In April 2023, Climateworks Centre's preliminary cost-benefit analysis of energy performance upgrades suggested that the average home would conserve more in energy costs than the additional mortgage cost, leading to a net saving.[xix] In addition:

- The Australian Built Environment Council (ASBEC) estimates that raising a home from a 2 to 5 star energy rating can result in a 54% reduction in energy required for space heating and cooling in Victorian homes.[xx]
- In Victoria, where more than half of all energy used in homes comes from piped gas,[xxi] the Victorian Government's own estimates are that switching from gas to efficient electric appliances could reduce average household energy bills by around $1,250 per year.[xxii]
- Research by the Institute for Sustainable Futures has found that domestic hot water use is responsible for around a fifth of Australian residential greenhouse gas emissions and a quarter of household energy use. The phasing out of gas water heaters in homes would provide consumers with combined annual savings of $4.7–6.7 billion by 2040.[xxiii]
- Climate Council analysis reveals that electrifying a home's cooking, heating and hot water combined with practical efficiency upgrades would save between $1,119 and $2,872 each year and also reduce greenhouse gas emissions by an average of 37.5 tonnes over a decade. [xxiv]
- Climateworks Renovation Pathway Project has identified that across the various housing types most common for Australia, households could expect to see energy consumption savings in the range of 55–65% on average from thermal shell improvements and efficient and electrified appliances.[xxv]

This section briefly outlines the findings from selected studies on green retrofit opportunities that enable households to make investments to reduce energy use, emissions and household bills. Information on payback periods for green retrofits is not available in a single place. From a consumer perspective this can make it challenging to identify those green retrofits that have the shortest payback periods, which provides the best opportunity to reduce energy costs within available budgets.

As roughly 40% of household energy is used for heating and cooling, improving the performance of a home's 'thermal shell' – external walls, roofs and floors – is a critical part of the equation when it comes to energy and bills savings. It is also crucial to reducing peak electricity demand in an electrified future. Some priority retrofits have been highlighted below which deliver the most cost-effective bill savings whilst providing emissions reductions.

The Climate Council has released analysis on electrification of homes and practical changes such as insulation and draught sealing in its report Switch and Save: How Gas is Costing Households. The report identified that households in poor performing homes will experience cost-saving benefits regardless of which measures they choose to initially implement, and these savings will only increase as more measures are taken to improve home energy performance. The list of thermal efficiency upgrades is not exhaustive but has been prioritised based on cost effectiveness and the availability of national data. Tables 1-3 outline the bills savings, energy savings and payback periods of a range of retrofits for households using gas in Melbourne. Table 1 refers to analysis from the Climate Council Switch and Save report. It presents findings on how much households can save over the long term from

switching to electricity. Tables 2 and 3 refer to Infrastructure Victoria's report, *Towards 2050: Gas Infrastructure in a zero emissions economy*, which is the first independent, state-wide analysis of the implications of the energy transition for Victoria's extensive gas infrastructure assets.

Table 1 Annual bill savings based on total gas bill vs electricity bills with lower and high priced appliances for households in Melbourne

Annual bills savings low priced appliances	Annual bill savings higher priced appliances + solar hot water
$943	$1207

Source: Climate Council (2022), Switch and Save: How Gas is Costing Households.

Table 2 Annual savings, residential gas users in Melbourne – detached houses /townhouses (per household)

Retrofit	Annual gas savings (GJ)	Annual energy savings (GJ)	Annual emissions reduction (t CO2e)	Payback period (years)
Space heating	33	30	6	17
Water heating	19	11	1	10
Draught sealing	6	6	2	4
Total	58	47	9	

Source: Infrastructure Victoria (2022), see also Northmore Gordon and Energeia (2021) Cost benefit analysis of energy efficiency activities in the gas sector

Table 3 Annual savings, residential gas users in Melbourne – apartments (per household)

Retrofit	Annual gas savings (GJ)	Annual energy savings (GJ)	Annual emissions (t CO2e)	Payback period (years)
Space heating	14	13	2	40
Water heating	9	7	1	17
Draught sealing	3	3	1	2
Total	26	23	4	

Source: Infrastructure Victoria (2022), see also Northmore Gordon and Energeia (2021) Cost benefit analysis of energy efficiency activities in the gas sector

Sustainability Victoria Study

In 2015, Sustainability Victoria conducted an On-Ground Assessment (*OGA*) study involving the collection and analysis of energy efficiency data from a representative sample of 60 existing dwellings of pre-2005 builds with a package of retrofits.[xxvi] The average House Energy Rating (HER) of the 60 study houses was 1.81 stars, making these residences significantly less energy efficient than the mandated 6-star requirement for new builds.

Following the *OGA* study, in a series of trials in 2019, Sustainability Victoria implemented individual energy efficiency retrofits in fourteen houses to assess the actual costs and energy savings; assess householder acceptance of the upgrades and impact perception; and identify practical considerations. This also involved a refresher of the original results updated with changes to energy and prices and greenhouse gas coefficients, and the reduction in the costs of relevant retrofits. On average, the costs of a retrofit package totalled $13,037, resulting in an average annual energy bill saving of $663 and an average reduction in energy-related greenhouse gas emission of 2.05 tonnes per year.

It is important to keep in mind that the costs in this analysis were based on the commercial costs of implementing the upgrades in 2019, exclusive of government incentives or rebates. Similarly, the bills savings were based on the energy and water tariffs during the time the analysis was undertaken. Since 2019, the costs of energy have increased significantly and are forecast to continue on an upwards trajectory, meaning that the value of the savings have increased and will increase in real terms over time. Some energy efficiency opportunities require significant investment to

implement. For instance, the current high cost of induction cooktops causes relatively long payback periods.[xxvii]

Table 4 Average impact of the different types of retrofit across all 14 houses

Retrofit type	Average cost ($)	Average annual energy saving		Average greenhouse gas saving (kg/yr)	Average energy bill saving ($/yr)	Average payback period (Years)
		Gas (MJ/yr)	Electricity (kWh/yr)			
Building shell and heating	$10,228	19,844	54	1,162	$441	23.2
Water heater	$1,533	172	361	435	$102	15.1
Refrigerator	$1,061	-	308	363	$98	10.8
Lighting	$214	-	71	84	$22	9.5
Total	$13,037	20,016	794	2,045	$663	19.7

Health benefits

Sustainability Victoria has recently quantified the health benefits that can be achieved through improved thermal efficiency through its Victorian Healthy Homes Program. The program was a randomised controlled trial designed to measure the impact of an energy efficiency and thermal comfort home upgrade on temperature, energy use, health and quality of life. It found that for an average upgrade cost of $2,809 per household, savings over a three-month winter period would equate to $887 in healthcare savings and $85 in energy savings. There was an observed improvement in mental health, reduced breathlessness and improved quality of life. This study also suggested the cost of these modest upgrades could be recouped within three years, with ongoing annual savings. Savings were heavily weighted in favour of healthcare, for every $1 saved in energy, more than $10 is saved in health.

Residential solar

Payback times for solar depend on the amount of solar energy that is directly consumed by the household vs export to the grid ('solar self-consumption ratio').

The payback period for solar PV panels in Melbourne depends on a variety of factors, including the initial cost of the system, the amount of electricity produced by the panels, the cost of electricity from the grid, and any government incentives or subsidies available.

The initial cost of the system is typically the largest factor in determining the payback period. In Melbourne, the cost of a solar PV system varies depending on the size and type of the system, but a typical 5kW system can cost around $5,000 to $8,000. If the system is financed through a loan or lease, the monthly payments will also affect the payback period.

The amount of electricity produced by the panels is also an important factor. Melbourne receives a good amount of sunlight throughout the year, but the amount of electricity produced by the panels will vary depending on factors such as the angle and orientation of the panels, shading, and weather conditions. A well-designed and installed solar PV system can produce enough electricity to offset a significant portion of a household's electricity usage. Household energy behaviours will affect the solar self-consumption ratio, such as whether hot water systems, air conditioners, pool pumps and other high energy use equipment is operated during times of high solar availability in preference to seeking what are now generally very low feed-in tariffs for excess household solar generation.

The cost of electricity from the grid is another important factor. In Melbourne, the cost of electricity from the grid varies depending on the retailer and the plan, but it is

generally around 20-30 cents per kilowatt-hour (kWh). The higher the cost of electricity from the grid, the shorter the payback period for the solar PV system.

Finally, any government incentives or subsidies available can also affect the payback period. In Australia, the federal government offers a solar rebate known as the Small-scale Renewable Energy Scheme (SRES), which provides a discount on the upfront cost of a solar PV system. Some state governments also offer additional incentives or rebates. Given all these variables, solar payback periods are very context dependent and there are online calculators available to assist with determining payback periods in specific circumstances. However, they may not incorporate full information such as the tilt and orientation of the roof, total system efficiency, or whether there would be any shading on the panels.

Credit risk is critical to residential lending

The financial system is increasingly recognised as being key to mitigating and adapting to the impacts of climate change.

Finance plays a key role in residential housing. In August 2022 Authorised Deposit-taking Institutions (ADIs)[xxviii] issued 35,441 new loans for occupied housing. Almost four times as many loans were issued for existing homes than newly constructed ones. As ADIs integrate climate-related financial risks into residential lending portfolios it will be important to develop innovations that support households to efficiently and cost effectively finance green retrofits.

The challenge for households is that when a housing loan is approved by an ADI to purchase an existing house that is not covered by the NCC's minimum energy efficiency standards for new homes, the need for the householder to make future green retrofits is not included as part of the loan contract. If customers are required to reapply for their loan to access finance this acts as a significant disincentive. It is likely that higher cost products, or products with shorter terms for repayment will be favoured. This has the potential to deter households from making decisions to invest in a green retrofit.

Given the importance of finance for existing residential dwellings as a proportion of all housing loans, and the importance of existing residential housing in meeting Australia's net zero emissions, the question of how households can access finance for green retrofits is important. Key to this question is understanding ADI credit risk management frameworks.

Structure of finance products influences demand

Where a householder considers finance for the purposes of retrofitting an existing home there are likely to be behavioural and financial factors that will influence decisions including the rate of interest charged, the length and complexity of application processes, and uncertainty around which green retrofits are suitable for an individual household. For households that wish to make smaller investments the design of financial products may also influence decisions.

A significant impediment to households and investors accessing finance for green retrofits is the way lending products are structured. The form of credit influences the cost of credit. Residential housing loans and residential investment loans are the most cost-effective sources of financing as loans are secured against the housing asset. Personal loans have higher interest rates with the rate depending on credit risk. Unsecured credit cards have the highest interest rates with rates around 20% depending on the financial institution.

Intuitively, the rate of interest that a customer pays for finance has an impact on demand for credit. If customers are not able to access the lowest available interest rates, then it can be expected that this will result in less demand for green retrofits and it may deter vulnerable households from making green retrofits to their homes.

Credit risk management frameworks influence lending

The provision of credit to households is influenced by the credit risk management practices of ADIs.

Credit risk management practices of ADIs are influenced by financial system regulation. A key mechanism for the Australian Government to regulate banking practices is through the issuance by APRA of prudential standards. Prudential Standard APS 220 Credit Risk Management (APS 220) and Prudential Standard CPS 220 Risk Management (CPS 220) are relevant to the way in which ADIs approach credit risk management for residential loans. APRA also provides guidance on residential mortgage lending to ADIs through Prudential Practice Guide APG 223 Residential Mortgage Lending.

APRA allows banks to use an internal ratings-base (ISB) approach to assess the credit risk of borrowers. APRA defines an internal ratings-based system as "consisting of all of the methods, processes, controls, data collection and technology that support the assessment of credit risk, the assignment of internal credit risk ratings and the quantification of associated default, exposure and loss estimates". A bank must have specific rating definitions, processes and criteria for assigning exposures to grades or pools within a rating system. APRA's guidance for ADIs is that rating

definitions and criteria must be both plausible and intuitive and result in a meaningful differentiation of risk.

Assessment of credit risk linked to capital requirements

Assessment of credit risk is important because it ultimately determines how much capital an ADI needs to hold. The higher a bank's total risk-weighted assets, the more capital it will need to meet the minimum capital adequacy ratios set by APRA. APRA's guidance is that portfolios that have higher inherent risk, for example where the portfolio is usually operating at the higher end of risk limits, would typically be accompanied by stronger controls, including provisioning and capital levels reflective of the risk of the portfolio.

Management information systems are critical to residential credit risk management

APRA's guidance is that an ADI with material exposure to residential mortgage lending should invest in management information systems that allow for appropriate assessment of residential mortgage lending risk exposures. Such systems should include a range of risk metrics associated with a loan at the time of issue and ongoing. The lender should monitor, analyse and report key metrics against risk appetite at both the individual loan and portfolio level, presenting data to the Board and senior management.

Serviceability assessments are a foundation of residential credit risk

APRA's guidance is that "accurately assessing a borrower's ability to service and ultimately to repay a loan without undue hardship, including under periods of economic stress, is an inherent component of sound credit risk management, particularly for residential mortgage lending".[xxix] An ADI's serviceability tests are used to determine whether the borrower can afford the ongoing servicing and repayment costs of the loan for which they have applied. APRA expects an ADI to undertake a new serviceability assessment whenever there are material changes to the current or originally approved loan conditions i.e. any change that increases the total repayments over the life of the loan. APRA considers a borrower's living expenses to be a key component of a serviceability assessment as, "expenses materially affect the ability of a residential mortgage borrower to meet payments due on a loan". APRA indicates that ADIs typically use the Household Expenditure Measure (HEM) 4 in loan calculators to estimate a borrower's living expenses.

Loan to valuation ratios (LVRs) key indicator of credit risk

From a financial credit risk perspective, there is the potential that if sustainability standards become an expectation of consumers when purchasing a home, a green retrofit may increase the value of a house relative to a house that has not been subject to a retrofit. For an ADI, the value of a house underpins residential lending decisions. If the value of a home increases because of a green retrofit, then an ADI's credit risk improves. As an example, if a house that is valued at $600,000 has a $20,000 investment in a green renovation (such as retrofits, energy efficiency, heat pump water and space heating and cooling, rooftop solar etc) and was revalued at $620,000 then an ADI's loan to valuation ratio (LVR) has improved.

Residential housing is subject to climate-related financial risks

Climate-related financial risks for residential lending will involve consideration of physical climate risks, transition climate risks, and liability risks.

ADIs are being encouraged through regulatory guidance to incorporate climate-related financial risks into risk management practices.

The Basel Committee on Banking Supervision which is the primary global standard setter for the prudential regulation of banks released the *Principles for the effective management and supervision of climate-related financial risks* in June 2022.[xxx] These promote a principles-based approach to improving both banks' risk management and supervisors' practices related to climate-related financial risks.

The Principles build upon the work of the Network for Greening the Financial System (NGFS). NGFS is a network of more than 100 central banks and prudential regulators focused on managing "both the opportunities and vulnerabilities for financial institutions and the financial system as a whole" in responding to environmental and climate change challenges. A key focus of NGFS is the publication of climate-related financial risk scenarios that provide a framework to assess and manage the future financial and economic risks that changes to climate might bring.[xxxi]

In Australia APRA's *Prudential Practice Guide CPG 229 Climate Change Financial Risks* was finalized on 26 November 2021.[xxxii] APRA classifies the financial risks of climate change as physical climate risks, transition climate risks, and liability risks.

APRA has indicated that it will be conducting climate vulnerability assessments (CVAs) across the whole of the finance sector. APRA has indicated that Climate Vulnerability Assessments would be aimed at[xxxiii]:

- Assessing the vulnerability of institutions, the financial system and the economy to both physical and transition risks arising from climate change; and
- Understanding how financial institutions may adjust their business models in response to the unique challenges proposed by different scenarios.

Residential lending is an integral part of many ADI portfolios. Integrating climate-related financial risks into residential credit risk management frameworks is already a focus of many ADIs.

Physical risks will include extreme weather events including storms, and heat. An example cited in the Senate Standing Committee on Environment and Communications Report, *Current and future impacts of climate change on housing, buildings and infrastructure* (13 August 2018) is a Melbourne study which examined the relationship between the ability of a building to mitigate heat stress in the absence of air-conditioning. The study found that for a typical duplex house, the occupants of 0.9 star houses experienced extreme heat stress condition for almost 25 hours whilst occupants of 5.4 star houses were exposed to extreme conditions for only 6 hours. The heatwave event examined resulted in excess mortality of 374 deaths. Over time, such factors may impact on house values. They certainly impact on household wellbeing. Additionally, houses at risk of damage from extreme weather events are likely to become uninsurable, which means that owners will be unable to obtain mortgages for those properties.

Transition risks for residential lending could include the change in value of a house as a result of changing preferences or regulations. An area of focus is likely to be the impact of NatHERS ratings on the valuation of an individual property.

There is an appetite to innovate in Australia and internationally

As lenders integrate climate-related financial risks into residential lending portfolios it will be important to develop innovations that support households to efficiently and cost effectively finance green retrofits. Affordable, accessible credit that enables households to sustainably retrofit homes can support the transition to net zero emissions in a way that reduces household costs of living and is consistent with credit risk management frameworks. This section presents details of case studies of financing products that we investigated in Australia and overseas.

Coalition for Energy Efficiency of Buildings (UK)

In the UK, the Green Finance Institute convened the Coalition for the Energy Efficiency of Buildings (CEEB) to develop the market for financing net-zero carbon and climate-resilient buildings.[xxxiv] An area of focus for the CEEB is driving systemic change through reducing greenhouse gas emissions produced by the UK housing stock and improving overall energy performance standards in residences. A range of market mechanisms and enabling frameworks were considered, including exploring the relationship between energy performance and property value, developing 'Help to Green' Equity Loans to enable homeowners to borrow against the equity in their property to invest into energy efficiency improvements and 'Further Advance' loans that provide additional borrowing on an existing mortgage (see below).[xxxv] The outcome of the market review was a portfolio of 20 'demonstrator' projects comprising financial products and services, appealing across a range of housing tenures, socio-economic and geographic profiles.

Energy Efficient Mortgage Initiative (EU)

The European Union supported Energy Efficient Mortgage Initiative (EEMI) has established the Energy Efficient Mortgage Label, intended as a clear and transparent quality label for consumers, lenders and investors. It is aimed at identifying energy efficient mortgages in lending institutions' portfolios, which are intended to finance the purchase/construction and/or retrofit of both residential and commercial buildings, with a focus on building energy performance.[1]

Energy Efficient Mortgages (US)

In the United States, innovative green loan products have a long history of development. In 1995, the Federal Housing Administration (FGA) introduced Energy Efficient Mortgages that allow borrowers to reduce their utility costs by financing the cost of energy efficient improvements made to their homes. The program allows current or potential homeowners to significantly lower their utility costs by enabling them to incorporate the cost of adding energy efficient improvements into their new home or existing housing. [xxxvi]

Add-to-my-Mortgage

One of the CEEB demonstrator projects is the Add-to-my-Mortgage Platform - a digital platform to streamline the process for homeowners to apply for a Further Advance (e.g. additional borrowing on their mortgage) at the 'point of sale' of energy efficiency measures.[xxxvii]

The Add to My Mortgage Project developed and trialled a digital lending platform and tested it with consumers, vendors and mortgage lenders over two years from February 2020. The platform allowed consumers to pay for green home upgrades at the point of sale with the funding being a further advance on the consumer's existing mortgage, from their existing mortgage lender. The Final Report of the project claims that it, "was (and is) a unique proposition worldwide."[xxxviii] Our research has not uncovered any other green home lending products that are based on an advance on an existing mortgage.

[1] https://www.energy-efficient-mortgage-label.org/

The project explored whether it was possible to use mortgage further advances for green home Point-of-Sale financing with a view to unlocking consumer demand and scaling retrofits. It also aimed to give consumers confidence in the retrofit process and provide lenders with reliable information on the measures used to improve energy efficiency in their residential mortgage portfolios. The Project involved 12 mortgage lenders including 4 of the UK's "Big Six".

Despite significant challenges due to issues such as Covid-19 and supply chain issues for solar PV, the project successfully tested the green lending platform and product. It involved robust vetting of green vendor partners and a methodology for evidencing the energy efficiency improvements made to a home. The platform enables consumers to go through an initial qualification for additional mortgage borrowing in a few minutes using pre-populated data.

Key challenges included the "legacy" nature of the mortgage lending industry (policies and processes) which has made it extremely difficult for the project to put in place a fully digital lending journey with mortgage lenders. As mortgage further advance transactions are much rarer in the UK than full mortgage applications, lenders do not have the capacity to develop new processes for this kind of lending. The project wanted to explore whether it would be possible for additional mortgage borrowing to be "deemed affordable" and approved without the need for full affordability verifications by lenders where the cost savings could be demonstrated to be greater than the additional mortgage repayments. Significantly, the Financial Conduct Authority (FCA) considered mortgage affordability rules to be so important that it was unlikely they would support an innovation of this kind.

The project found that:

- Green upgrades must make financial sense for consumers i.e. the additional monthly repayment cost must be lower than the related bill savings – "Pay As You Save".
- Green vendors must have a reliable point of sale finance option to scale their businesses incorporating a variety of finance options, not only mortgage advances
- It is extremely difficult for mortgage lenders to innovate on mortgage lending in the UK with additional lending being slow and complex to organise
- Affordability and safeguarding rules make it difficult for the UK Financial Regulator to innovate on mortgage lending to make it easier for borrowers.

Green Mortgages

There are a number of green mortgage products in the market, both in Australia and overseas. These typically provide beneficial loan rates for energy efficient/sustainable houses. The CEFC's green home loan products targets new builds with a7+ stars NatHERS rating. Delivered in partnership with Bank Australia, the Eco Plus Clean Energy Home Loan offers discounted interest rates to qualifying home borrowers.[xxxix] In the UK, Barclays Green Home Mortgages offer lower mortgage rates to borrowers buying a highly energy efficient home.[xl]

CommBank has introduced a green home loan offer, which incentivises existing customers for reducing their homes' environmental footprint. Customers on Commbank's Green Home Offer can enjoy a discount on their Standard Variable Rate for Owner Occupied or Investment Home Loans. The discounted rate applies to the entire home loan, not just a smaller 'green' portion used to fund sustainable upgrades.[2]

Bank Australia's Eco Pause is a loan product that allows residential borrowers to take a break from their mortgage repayments for up to three months or halve them for six months to make green upgrades to their homes. Interest still accrues on the loan during the pause. To be eligible for Eco Pause, borrowers must be owner-occupiers, have a variable rate home loan with Bank Australia and demonstrate that they are making energy or water efficiency improvements to their home by providing documentary evidence. Loans below a loan to value ratio of 90% are automatically eligible. Loan repayments may need to be recalculated at the conclusion of the break to ensure the loan term does not exceed the maximum permitted by Bank Australia or the Lenders Mortgage Insurance (LMI) insurer. The product is a relatively streamlined way for borrowers to access green home financing and provides

[2] https://www.commbank.com.au/articles/newsroom/2023/03/CBA-CEFC-working-together.html

financing at a lower interest rate than typical green loan products. However the available financing is limited to the value of the loan repayments.

Brighte is a digital platform providing consumer financing products for home energy upgrades and a network of accredited vendors to reduce consumer risk. Brighte is partnering with the ACT government to offer 0% interest loans to roll out home electrification and energy efficiency products. Uptake has been greatest for products that have a positive payback. The platform provides a one-stop-shop for consumers connecting financing with vendors. However, in contrast to the Add-to-my-Mortgage platform, financing is not yet provided through the platform by external mortgage or other lenders. Future platform developments may include a self-assessment tool to guide customers to basic cost-effective energy upgrades. Brighte applies its own credit risk analysis which includes cost savings calculations based on its collected data. Data privacy may be a challenge for banks working through an external platform like Brighte.

Changes to NatHERS

The announcement[xli] by the Australian Government on 21 April 2023 of the expansion and upgrade to the Nationwide House Energy Rating Scheme (NatHERS) rating system to apply to existing homes is relevant to developing innovative fiancne mechanisms. The Australian Government has committed[xlii] to work with the banking sector to pilot ways to add energy performance into the set of factors valuers assess when they do house assessments, using the NatHERS rating system. The Federal Budget announced that $1 billion will be provided to the Household Energy Upgrades Fund to help provide low-cost loans for double-glazing, solar panels and other improvements.[xliii] These reforms will be critical to enabling Australia's banking sector to allocate capital and align with net zero transition plans. They will also provide an evidence base on the impact that a green retrofit has on the value of home.

The finalisation of standards by Federal and State Energy Ministers would support financing decisions by ADIs. However, we stress the importance of differentiating between disclosure and financing. The establishment of disclosure standards is an important facilitating measure but will not in itself open new financing of green retrofits.

Green retrofit housing loans would benefit from regulatory guidance

Residential lending incorporates multiple products. The research has predominantly focused on the role of household lending, particularly mortgage-related products. Residential investment loans also play a significant role in the housing market. Other products including mortgage insurance and offset accounts are integrated into residential lending. Green retrofits are not currently a key factor in assessment of credit risk, but credit risk is a critical element of the residential lending system.

The research identifies that ADIs are seeking to innovate to provide their customers with the ability to finance green retrofits. A key impediment to the scaling of innovation to low-income households is the need for innovations to be recognised as part of Australia's regulatory framework.

The research has considered the role that Australia's financial regulatory system can play in supporting housing loan customers to efficiently and cost effectively access finance for the purposes of investing in green retrofits. A key question the research examines is how APRA can support ADIs to provide their customers with access to finance at the most cost-effective rate of interest, which is the rate of interest on housing loan products.

Increasing a customer's housing loan to allow investment in a green retrofit is perhaps the most logical pathway for customers to access finance. The challenge with this pathway is that, under existing regulatory arrangements, a customer would need to reapply for the home loan. The time and cost of reapplying for a loan act as a significant disincentive.

An alternative pathway, which is currently offered by an ADI in the market, is to allow a customer to defer loan repayments for a period of time. Customers can then use surplus income that would have been dedicated to the repayment to instead invest in a green retrofit. The challenge with this model is that the loan deferral period is linked to regulatory requirements set by APRA. A key regulatory requirement is to require ADIs to report on the status of loans. A critical indicator of mortgage stress is loans that are in arrears of payment for 90 days. If a customer is approved to pause a loan repayment schedule for the purposes of investing in a green retrofit then the current regulatory framework will limit the pause to APRA's 90 days criteria for housing loan arrears reporting. A customer is still required to be approved by their ADI to defer repayments which acts as a disincentive.

In both cases customers face significant barriers to financing green retrofits. Essentially a customer must apply for approval from their ADI. Further, because green retrofits are not locked into prudential regulation practices, ADIs do not have data on the impact that a green retrofit has on household costs and house valuation.

Investing in green retrofits has the capacity to support a household to reduce energy costs, thereby improving the ability of a household to service housing loan commitments, decreasing credit risk and also climate-related financial risk. An ADI's serviceability assessment, which is based on the Household Expenditure Measure (HEM), can demonstrate that a green retrofit improves the capacity of a customer to service a loan in the long term. Loan to valuation ratios are also improved if data can demonstrate the impact of a green retrofit on the value of a house.

We argue that there is a need for regulatory guidance that allows ADIs to either increase the amount of a housing loan or pause mortgage repayments to invest in a green retrofit. A customer that pauses mortgage repayments to invest, with the approval of their bank, in a green retrofit should not be considered in the same way as a loan that is in arrears for other reasons.

To build confidence of regulators, government and ADIs that green retrofits have the potential to improve residential credit risk we propose that APRA builds a Green Retrofit Finance Housing Model that would provide confidence to issue Green Retrofit Housing Loan Guidance that would enable ADIs to increase housing loans, under agreed conditions, for the purposes of financing a green retrofit.

Green Retrofit Finance Housing Model

Designing a Model

If it can be demonstrated that green retrofits have the potential to improve residential credit risk by reducing customer energy bills, APRA would have an evidence base to issue prudential guidance to ADIs on increasing existing housing loans for the purposes of green retrofits.

We propose that APRA build a ***Green Retrofit Finance Housing Model*** to test the impact of loan extensions and deferrals on credit risk. The Model would use de-identified banking customer data and published energy savings data to model potential customer bill savings and impacts on consumer credit risk.

Modelling allows for the impact of retrofit financing mechanisms on credit risk to be isolated from other influences. A key benefit of conducting a modelling exercise, as opposed to a real-world pilot based on assessment of performance from specific green retrofits, is time. We estimate that for a real-world pilot to demonstrate meaningful outcomes, a 3–5-year pilot would be required. From a practical perspective there is a need to introduce reforms in the next few years to support Australia's transition to net zero emissions. The rationale for APRA to build a model is that they already have access to ADI data on housing loans.

The Model would aim to establish an evidence base that would support APRA to provide guidance to ADIs to scale financing of green retrofits through housing loans.

Indicative retrofit measures

Priority retrofit measures to include in a model include those with high cost-savings and co-benefits such as thermal comfort (for example insulation and draught proofing) and those that enable a customer to switch away from gas to achieve cost savings and emissions reductions. Examples include:

- Draught sealing
- Ceiling insulation
- Replacement of gas or resistive electric water heater with heat pump
- Replacement of gas heater with RCAC
- Rooftop solar PV

A key consideration would be aligning with criteria that may be included in valuations through the Federal Government's program to expand and upgrade NatHERS. The reason for this is that the sustainability features of a house that are included in the NatHERS revision will ultimately align to the data collected by banks.

APRA Guidance and Pilot

A well-designed Green Retrofit Housing Loan Scheme would see more customers become eligible over time.

Initial eligibility criteria could include customers with a loan to valuation ratio of 50% or better and offset account balances equivalent to a minimum of three months mortgage payment.

As a customer achieves eligibility benchmarks, such as level of prepayments or deposits in offset deposit accounts, this would unlock pre-approved authority for an ADI to offer the customer an increase in their loan, or deferral of payments to enable investment in green retrofits. For example, a new homeowner with a loan to valuation ratio of 80% would not be initially eligible. Once their loan to valuation ratio dropped to an agreed level this would trigger eligibility.

We propose that APRA identify a cohort from the lowest loan repayment quartile that have ***low loan to valuation ratios, high liquidity buffers and mortgage payments that are not in arrears*** that would be eligible for a pilot. These three factors combine to identify low risk customers from an ADI perspective. Low-income mortgagors are defined by the Reserve Bank of Australia as the bottom quartile of mortgagor incomes.[xliv] There are 766,220 loans in the lowest loan repayment quartile group.[xlv]

Research methodology

The Institute for Sustainable Futures (ISF) was funded by the Lord Mayor's Charitable Foundation to design a *financing sustainability retrofit pilot program* to test financial system innovations that can facilitate vulnerable Victorian households to access affordable credit to invest in sustainability retrofits. This report builds upon the research project which sought to identify ways to unlock innovative, low interest credit facilities for sustainability upgrades in vulnerable households at scale.

We undertook desktop research and analysis of:

- Cost effective energy efficiency measures
- Current mortgage-based and other green lending products in Australia and overseas
- Credit risk regulation and practice
- Data and definitions of vulnerability
- Feasibility of applying financial products to different consumer cohorts
- Challenges to scaling retrofit financing

We engaged and consulted with individuals and organisations in the following key stakeholder categories:

Finance: ADIs and regulators

Sustainability: energy performance and ratings.

The consultations explored financial system regulation, ADI financing practices and sustainability retrofit practices and developments and also sought to identify potential industry pilot participants and Steering Group members.

We attended relevant industry events including the Australian Sustainable Finance Institute's Industry Workshop: Finance for Home Retrofits.

We synthesised the information and identified key elements of the design of a desktop pilot to test innovative mortgage-based financing. Based on this, we propose in this report a design for a desktop pilot of an innovative financing mechanism that could enable scaling of retrofits.

Conclusion

Initiatives that have focused on green retrofits for vulnerable households have commonly focused on grant based or incentive mechanisms. A key challenge our research seeks to address is how finance can be made more broadly accessible for low-income households for the purposes of investing in green retrofits. This would provide an alternative to grant-based schemes in fiscally challenging circumstances and would support a just transition.

Our insight from the Australian Prudential Regulation Authority's (APRA) prudential regulation framework was that unlocking financing of green retrofits for low-income earners required identifying those green retrofits that are cost effective with the shortest payback periods. If it could be demonstrated that providing finance supported a customer to reduce their cost of living, then this in turn could improve an ADI's credit risk for their housing loan portfolio. If green retrofits improve an ADI's credit risk, then this could justify the issuance by APRA of guidance to support the scaling of finance.

We are currently seeing innovations around financing of green retrofits. This includes ADIs that are developing innovative products as well as new innovative platforms. The Australian Government's recent announcement to align NatHERS with banking lending processes and provide $1 billion to the Household Energy Upgrades Fund to help provide low-cost loans for double-glazing, solar panels and other improvements will support further innovation.

We have however yet to see innovations that are targeting the 766,220 loans that are in the lowest loan repayment quartile group of housing loans. With energy prices spiking, if a household is not able to make energy efficiency investments to their homes that help to reduce their energy bills, there is a danger that households would be exposed to what we describe as a "net zero poverty premium."

There are significant benefits to Australian households and the economy of enabling households to finance green retrofits through their housing loans. These benefits include supporting ADIs to build green housing loan portfolios more quickly and supporting the development of a green retrofit industry that is not subject to booms and busts in response to incentive schemes. For Australian households, the ability to access cost effective finance offers an avenue to reduce costs associated with spiking energy prices.

Our research proposes that APRA builds a Green Retrofit Finance Housing Model that would provide confidence to issue Green Retrofit Housing Loan Guidance that we believe has the capacity to provide low-income earners that are servicing mortgages with the capacity to access finance at the lowest interest rate that is available in the market – housing loan interest rates.

One of the key benefits of establishing a structured regime will be to support sustainable economic activities. A hypothetical eligibility criteria where customers needed 40-50% equity in their homes before achieving eligibility for a Green Retrofit Housing Loan would have a smoothing effect on the demand for green retrofit investments which would in itself support the development of businesses that are not subject to the boom-and-bust cycles that arise from incentive schemes.

There is a need for Australia's financial system regulatory architecture to keep pace and support this innovation in a responsible way. This is in fact the history of Australia's evolving financial system. Past financial system inquiries (Campbell Inquiry 1981, Wallis Inquiry 1996, and Murray Inquiry 2014) have supported the evolution of Australia's financial system. The linkage of deposits to housing loans through offset accounts was an innovation that was effectively locked into our regulatory architecture. The recent experience of Covid-19 where APRA approved temporary loan repayment deferrals[xlvi] demonstrates that there is the potential for the regulatory system to adapt to circumstances.

Our key conclusion is that there is a need to for this spirit of innovation to be applied to meet the challenge of financing Australia's transition to net zero emissions.

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