

HOUSING FINANCE INTERNATIONAL

The Quarterly Journal of the International Union for Housing Finance



- ➔ **Examining the Biden administration's approach to racial disparities in housing wealth**
- ➔ **Swiss franc mortgages: European banks are profiteering from Polish subprime loan plight**
- ➔ **The impact of the Covid-19 pandemic on the housing market and policy in Australia**
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- ➔ **Affordable housing finance for informal workers during the pandemic: context, experience and lessons**
- ➔ **Partnership and financial innovation part II: Reall, affordable housing markets and Covid-19 in urban Africa and Asia**

International Union for Housing Finance

Housing Finance International

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Paying for Covid?

House prices and the pandemic

It is always good to welcome back old friends. Alex Pollock is a long-time supporter of the journal (and of the IUHF) and we are therefore very pleased to see him back at the helm of our North America column. In fact, it is Alex's column in this issue that provides the starting-point for my ruminations on a subject that may seem surprising in the middle of a Pandemic- rising house prices.

House prices are rising rapidly in both the US and Canada as evidenced by the key house price indices, showing 13% rises in the US for the year to March 2021 and a 7% rise in Canada for the year to May. Just as striking are the figures for Australia, where house prices are still rising at the rate of around 6% with a large increase in mortgage credit transactions. In New Zealand, according to our Asia-Pacific regional article, rises have been so rapid at 23% year-on-year, that Prime Minister Jacinda Arden has warned of the risk of a "housing bubble".

Here in the UK, which has had one of the highest rates of Covid-related deaths in the world per head of population, the house price situation is less extreme but nevertheless has confounded many commentators with an annual rise of 9.5% according to the Halifax index for May 2021.

There are, of course, plenty of examples of markets where prices are cooling (such as Indonesia), but there is a collection of relatively mature economies where prices continue to rise substantially, as they have through the pandemic.

One can point to causal factors in individual countries. The impact of the central banks in buying up mortgages in the US and Canada is cited by Alex in his column. In the UK there has been a stamp duty exemption which has undoubtedly fuelled the market and there is some evidence that the pandemic-related downturn in the commercial property market has encouraged investors to switch into residential markets. In Australia, as Alan

Morris points out in his article, lack of action by central authorities and activity by investors are both factors.

However, are specific national factors enough to explain the phenomenon of a number of major markets booming during the pandemic? After all, although some individuals have escaped major losses and even had a chance to save while working at home, the picture for many more has been bleak. In the UK for instance, although many people have paid off debt during 2020 and 2021, a minority have seen their indebtedness increase substantially even without taking into account the widespread use of suspended mortgage payments. Many have seen their incomes drop due to illness or lockdowns, and overall, economic output is lower than it would otherwise have been. These are phenomena that can be seen across the globe.

The question of why these markets have continued to see a rapid growth in prices is not just an academic one. If, as the New Zealand Premier has hinted, these rises have some of the characteristics of a bubble, then there may be the prospect of that bubble bursting as many of the support measures put in place to help individuals and businesses through the pandemic are progressively lifted and governments impose a range of fiscal measures designed to claw back the cost of that support. A large-scale housing market downturn in countries that have so far appeared to be immune would be anything but welcome. This is an area where further research and analysis are urgently needed.

Our first main article in this issue focusses on the USA and examines a key challenge facing the new Biden Administration. In 2020, Joseph Fraker published a significant article on the differing homeownership prospects for white and black homeowners.¹ The article exposed the significantly lower values experienced by black homeowners as well as the much slower rate of house price appreciation. In his latest article *Examining the Biden*

administration's approach to racial disparities in housing wealth, Fraker sets out the challenge for the new administration and assesses their proposals so far.

Many of us considered that the problems of foreign currency-denominated or indexed mortgages and the consequent foreign exchange risks posed to customers were a thing of the first decade of the century. Apparently, that is not the case. In a fascinating article Przemek de Skuba Skwirczynski highlights the grim situation for many in Poland where Swiss franc-indexed mortgages have been issued until relatively recently and have caused major problems for borrowers who thought they were taking on a better mortgage deal. He also goes on to highlight the continuing responsibility of the authorities in Poland to deal comprehensively with the issues.

Australia has had relatively few Covid cases compared to much of the rest of the World and has relied heavily on strict controls on entry and exit from the country. Alan Morris returns to the pages of HFI with his article *The impact of the Covid-19 pandemic on the housing market and policy in Australia*, which looks at the impact of the pandemic on the homeownership, private rental and social housing sectors and the government policy response. He draws particular attention to the expansion in borrowing and rise in house prices.

We continue our series of articles on the all-important topic of decarbonisation of homes with an article by Andy Sutton: *Innovation in housing decarbonisation: United Kingdom*. The article points to definitional issues hampering the UK efforts and identifies the failure of the much-touted Green Deal. We hope to add articles on decarbonisation in Australia and Brazil in forthcoming issues.

Regular readers will remember our competition for articles on affordable housing held jointly with the World Bank last year. The two winning articles were by Andrew Jones and by Widya Estiningrum, Yesi Septiani and Wahyu

¹ HFI Summer 2020 issue

Contributors' biographies

Lubis. Both articles proposed radical schemes to promote development of and/or access to affordable housing for those on lower incomes. Since those articles were written, the pandemic has put unprecedented strains on the affordable sector in many countries. In the light of that we have commissioned two follow-up articles by the authors setting out the challenges of the pandemic and the response by their schemes.

All in all, the Summer 2021 issue presents a challenging set of articles to help the analysis of "interesting times". Enjoy.

Andrew Heywood
June 2021

Claudia Magalhães Eloy is a consultant on housing finance and subsidy policy in Brazil, who currently works for FIPE [Fundação Instituto de Pesquisas Econômicas] and has worked for the World Bank (TA) and for the Brazilian Ministry of Cities and Companhia de Desenvolvimento Urbano e Habitacional of São Paulo (CDHU). Claudia has also participated in the development of the National Housing Plan, in the analysis of the Housing Finance System. She holds a PHD in Urban Planning at the University of São Paulo (USP), a Master in City Planning at the University of Pennsylvania, a Master in Public Administration at Bahia's Federal University (UFBA) and a BA in Architecture and Urban Planning (UFBA), with a specialization in Real Estate Finance at the Brazilian Economists Order (OEB). She also attended Wharton's International Housing Finance Program.

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Andrew Jones is Research & Policy Manager at Reall. He is a PhD-qualified multidisciplinary researcher and policy professional, Andrew works on demonstrating the commercial viability and sustainable developmental impact of Reall's global affordable housing interventions. This includes recent peer-reviewed research on end-user housing finance innovations (Environment & Urbanization, 2020) speaking slots at the 10th World Urban Forum, and leading research on a DFID-funded project to unlock mortgage finance for informally employed people in Kenya and Nigeria through innovative credit assessment.

Wahyu Lubis is a senior associate at PT SMF. He is an economics and policy graduate from University College London with interests in Housing, Energy, and Urban Planning. He is experienced in working with urban development stakeholders – government, NGOs, private sector, local communities, and donors in the governance and public policy field. He is very enthusiastic about having conversations related to his interests, so do not hesitate to contact him via <https://www.linkedin.com/in/wahyulubis/>

Alan Morris is a professor in the Institute for Public Policy and Governance at the University of Technology Sydney. He works mainly in the areas of urban studies, housing and marginality. His most recent book, is *The Private rental Sector in Australia: Living with Uncertainty*, co-authored with Kath Hulse and Hal Pawson.

Alex J. Pollock is a Distinguished Senior Fellow Emeritus of the R Street Institute, Washington DC. He has served as the Principal Deputy Director of the Office of Financial Research, U.S. Treasury; President and CEO of the Federal Home Loan Bank of Chicago; and President of the IUHF. [2.21]

Contributors' biographies

Zaigham M. Rizvi is currently serving as Secretary General of the Asia-Pacific Union of Housing Finance and is an expert consultant on housing and housing finance to international agencies including the World Bank/IFC. He is a career development finance banker with extensive experience in the field of housing and housing finance spread over more than 25 countries in Africa, the Middle-East, South-Asia, East-Asia and the Pacific. He has a passion for low-cost affordable housing for economically weaker sections of society, with a regional focus on Asia-Pacific and MENA.

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Yesi Septiani is an Indonesian citizen, born in 1994. Yesi Septiani joined PT SMF in 2019, as a member of the Graduate Development Program. In 2017, she received her Bachelor of Economics degree from Brawijaya University. Currently, she is as a Senior Officer in the Financing and Mortgage Purchasing Division of PT SMF and responsible for marketing activities for that segment of the Finance Company.

Przemek de Skuba Skwirczynski is an economist who, having graduated from the London School of Economics and Political Science, pursued a career in derivatives

and structured products, and whose work included, amongst others, sales policy for J.P. Morgan, as well as structuring and stress-testing for both UBS and Credit Suisse. [2.21]

Andy Sutton is Sero's Co-Founder and Director of Design & Innovation is a chartered architect, past president of the RSAW, and was previously an Associate Director for the BRE for almost a decade. Amongst other activities, he is active on the Welsh Government's "Decarbonisation of Existing Homes" and "Innovative Housing Programme" steering groups.

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Innovation in housing decarbonisation: United Kingdom

↳ By Andy Sutton

1. Introduction

We're all attached to where we live, so how our homes might change is a topic close to everyone's heart. But change they must – in the UK, carbon emissions from homes and the activities within them equate to nearly 40% of the total national emissions. As one of the first nations to legislate for the Climate Emergency, the UK's Climate Change Act 2008 (extended in 2017) makes the requirement to decarbonise a legal obligation, as well as a moral and ethical imperative: "Net Zero" is the law.

Once built, houses are typically in use for an average of 125 years and with new home construction rates that rarely break 200,000 nationally in any year, this means decarbonising the 29 million existing homes across the UK is, a retrofit problem. What's more, to attain an EPC rating of C (and we will get to that later) Government research indicates this will require close to £60 billion of investment.

Retrofit breaks into several overlapping challenges: a lack of tools and understanding, a lack of financial drivers, and a lack of competency and quality in the delivery of the measures. There is also the challenge of decarbonising the embodied carbon in the materials and construction activities from retrofit (as well as for new build homes). Yet the decarbonisation of homes is not a technical problem. Any home can be decarbonised once these barriers are overcome, we have the technology and expertise to achieve this.

The understanding that the decarbonisation of homes isn't a technical issue is particularly relevant when looking at decarbonisation as a national problem, since other sectors such as aviation, agriculture and heavy industry do not yet have the technological tools they need to achieve net zero. Taken in this context, the

use of carbon offsets (such as tree planting) can be seen as a measure most appropriately reserved for sectors for whom it is currently technically impossible to achieve Net Zero, rather than for those who can deliver zero carbon but are looking for 'easy' alternatives.

2. Tools & Understanding

Despite having the legislation, the UK does not have a clear statutory definition of "Net Zero" for the built environment, which contributes significantly to the confusion of claims made by those wishing to gain good publicity. The UK Green Building Council (UK GBC) published its definition¹ in April 2019, recognising that all carbon emissions arising from the energy use, of and in the home, should be considered as part of that home's carbon footprint – and therefore considered in whether a home achieves Net Zero. It also recognises that when that energy is used it affects the carbon emitted, and as a consequence, the importance of measuring delivery of the Net Zero legal goal in the carbon metric.

UK GBC's definition is gaining momentum, but it does not align with any of the existing regulatory tools and certification schemes. Most important of these is the Building Regulation's "Standard Assessment Procedure" (SAP), the statutory mechanism required to confirm the energy performance of buildings is at, or better than a minimum standard, and the UK's answer to the requirement to have a National Calculation Methodology under European Union regulation.

Every home in the UK must evidence an SAP score, and consequential Energy Performance Certificate (EPC), to demonstrate that if operated in a normalised fashion the fabric and permanent equipment of the home performs below a national energy demand, excluding

any activity from the occupants. Whilst a necessary check for building construction, SAP's use of an energy metric (not carbon) and exclusion of the impact of the residents, places it significantly apart from the UK GBC's Net Zero definition.

There are several certification schemes currently being delivered in the UK, with perhaps the most vocally advocated of these being the Passivhaus standard.² Originating in Germany, it advocates very high building fabric and related system performance to reduce space heating losses, and thereby minimise space heating energy demands, whereby there is no requirement for a traditional heating system. It does this extremely well, designed as it is to tackle the continental climate conditions where external winter temperatures can drop to -15°C.

For the UK, where -5°C is rare, this high level of fabric performance is almost certainly beyond the optimum balance of construction costs and operational returns. Even without hitting Passivhaus building fabric standards, the space heating energy demand of a modern UK home is less than one third of the overall energy demands, with hot water and occupancy "plug in" energy demands both outweighing it.

A common flaw that runs through all the notable certification schemes and the UK regulatory assessment is the principle that a fixed quantity of energy equates to a fixed carbon emission, and therefore that net zero energy can be considered as Net Zero carbon. This is technically false for all energy sources, but by far the most significantly wrong for electricity.

The UK's National Grid is engaged in a permanent balancing act between the generation of power from a blend of renewable, nuclear and

¹ <https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-a-framework-definition/>

² https://www.passivhastrust.org.uk/what_is_passivhaus.php

fossil fuel sources, and the variability of the demand from the users of power. This broadly means that as electrical demand increases, more fossil fuel generation must start generating, since wind and solar are not controlled 'on demand'. The National Grid has been, and continues, to engage in significant decarbonisation of large-scale power generation, but this mismatch between renewable generation and user demand will remain for the foreseeable future. Even when or if the Grid entirely abandons fossil fuels, the mismatch between when power can be renewably generated and when it is demanded will require mechanisms to balance the difference.

The consequence of this balancing act by the National Grid is that one unit of electricity (kWh) can cause the emission of less than 100g CO₂^{eq} if drawn from the Grid at times of high generation and low demand, yet during the same day one unit of electricity can result in more than 250g CO₂^{eq}. Whilst this varies modestly by season, the daily cycle remains. In effect, if you used all your electricity at 3am rather than 6pm, you'd more than halve your home's carbon footprint without any other changes.

None of the UK's regulatory or notable certification schemes recognise this drastic difference in carbon impacts. Instead, all schemes equate 1kWh of electricity exported to 1kWh imported from the Grid. For local renewable generation, that most commonly means suggesting 1kWh at noon (generation peak from a south facing photovoltaic panels balances 1kWh of occupant demand at 6pm (demand peak). Measured in energy, that seems to balance. Measured in carbon, that is effectively suggesting displacing around 100g CO₂^{eq} is the same as emitting around 250g CO₂^{eq}.

The lack of a clear statutory definition of Net Zero for the built environment, compounded with the lack of tools that can recognise and quantify genuine Net Zero, leaves a challenge for the true decarbonisation of homes. For residential, this is further compounded by vested interests lobbying for their own preferred solutions. This is most clearly seen with the promotion of hydrogen as a solution for delivering Net Zero in homes.

Hydrogen, when generated from renewable sources (green hydrogen), is undoubtedly part of the energy solutions we need for achieving the legal targets of 2050. However,

as carefully reported by the UK's Climate Change Committee,³ the use of hydrogen is not primarily for resident properties. There is a wealth of technical reasons for this, from molecular size, in-home safety, domestic energy demand levels, infrastructure network costs and so forth, but perhaps the most convincing is the simplest: switching the majority of domestic heat generation to green hydrogen will require us to build roughly three times more wind turbines, solar farms and tidal power systems than switching domestic heat to electric heat pumps.

The UK, though, has a significant gas grid run by large private utilities. It could therefore be suggested that, for them and their funded agents, hydrogen presents a route to the continued existence of their extensive gas distribution network. The result of this could explain the significant political lobbying for hydrogen to be used beyond high energy demand requirements and into distributed, low energy networks such as homes. For the wider industry, this result adds to the confusion and uncertainty created by the lack of tools and definitions, paralysing many into inaction for fear of taking the wrong action.

3. Financial drivers

Alongside the first challenge, there is a fundamental problem for Net Zero in that financial savings do not typically benefit the same organisation that incurs the financial costs, and we do not yet have robust mechanisms to transfer this from one to the other. For the majority of the UK housing market (around 63% owner-occupiers), that means we don't pay notably more for a house that has low energy bills than we would pay for a home with high energy bills. For the social and private rental housing sectors, this also holds true – rental levels are not notably impacted by likely energy bills.

It could be argued that this isn't because the public don't understand, since the majority of UK self-build properties (where the savings and costs are accrued in the same place), choose to exceed the minimum regulatory standards in order to achieve lower running costs. Sadly, self-build makes a small proportion of the UK's new housing, currently less than 18% of the new build market, and whilst the same mindset can be shown to translate into major refurbishment projects,

it is less clear in general maintenance and improvement activities.

Fortunately, there are signs of this awareness beginning to translate into the housing markets and finances. UK Government's "Clean Growth Strategy" from 2017 embedded the recommendations of the LENDERS project that gave a mechanism to better embed energy bill savings into mortgage affordability calculations.⁴ More recently, the VALUER project has seen early findings from the UK's largest property website Rightmove suggest that energy performance of homes does influence value.⁵ Data is beginning to show that low energy homes have a positive price differential compared to high energy homes, approaching 10% of their value.

This nascent trend in property value being influenced by energy performance is likely to accelerate in coming years, driven by both increasing public awareness and government action. A recent consultation from UK government sought views on requiring mortgage lenders to report on their portfolio's overall energy performance and based on responses this seems likely to be implemented. Whilst the proposed approach relies on the EPC and is therefore imperfect, it does create a positive drive for energy improvements.

As noted initially, from a financial perspective, the ideal outcome is that the capital costs of building or refurbishing to deliver net zero are entirely met (or exceeded) by the additional revenue generated from sales or rental. This may well be the case once a combination of market and regulatory forces have reshaped property and rental values, but it is unlikely to be true in the next decade or two, and arguably not likely until after 2050 given the reactive nature of markets. We are therefore in a transitional period, where the capital costs are not directly recovered. This challenge therefore needs more solutions to support immediate action.

One obvious alternative solution is legislation – simply regulate to require Net Zero and make that the minimum acceptable standard. However, it's unlikely that the UK or any of the four home nations (who all have devolved powers over housing to varying degrees), will be brave enough to adopt such a firm approach.

That's not to say regulation doesn't have a part to play. Since 2002 we've seen regular

³ <https://www.theccc.org.uk/publication/hydrogen-in-a-low-carbon-economy/>

⁵ <https://sero.group/press-room/green-mortgage-for-new-low-carbon-future-living/>

⁴ https://www.ukgbc.org/wp-content/uploads/2017/09/Lenders_Core_Report_1.pdf

steps in Building Regulations requirements on energy performance, and in the latest consultations all four nations are pushing this further for 2022 and proposing another step from 2025. Whilst not currently forecast to step up to Net Zero, these have an important function despite that – it makes the “uplift” from the minimum regulatory standard to genuine Net Zero a smaller step.

For new construction, everything is assessed from the baseline of the minimum regulatory standard, so raising this bar makes Net Zero easier. And it is likely to be the case that in the next twenty years or so, Net Zero eventually becomes the effective minimum anyway. This is less clearly the case for existing homes. Here, the diversity of construction and lifespan of UK homes means the minimum regulatory standard that can be enforced on these properties is much less clear, and much more easily argued around. It is, after all, technically far more challenging to upgrade a 500mm thick, 250-year-old rubble-filled, lime mortared wall than a recently built modern one, but the “existing” home regulations must cover both and need to recognise the complexity and coherence in any chosen solution.

Regulation is therefore only part of the answer for the owner-occupier homes, and until a Net Zero market rebalance comes along in a generation or so we need more levers. Regulation has more promise in the rental tenures (social and private rental), where the UK’s implementation of the EU’s Minimum Energy Efficiency Standards regulation is already about to be ratcheted up to require an improved performance on these homes, albeit using the not-entirely-suitable metric of EPCs.

There is still a need for more levers outside of regulation, though. Taxation might be one of those levers, with council tax or land value transaction tax both regularly discussed as potentially regraded on carbon emissions. Both of these mechanisms would undoubtedly drive the behaviour of all tenures of homes towards Net Zero, if used sensibly, and do not need to represent a reduced tax receipt to governmental coffers. Land value taxation is probably the quicker, though less impactful, of the two.

The issue with taxation is the reluctance of politicians to use the mechanism. Whilst it seems probable that they will eventually have little choice but to do so – given the legal obligation – it also seems inevitable that

this will be left as late as possible and given as much lead-in as possible. In practice, it therefore seems unlikely any meaningful taxation levers will be in effect before 2040, and even that might be optimistic. Ironically, any government bold enough to start the process of carbon taxation vocally and obviously may trigger enough behavioural change in the marketplace that they never need to fully implement their ‘threats’, but there’s no sign of such boldness to date.

With neither regulation nor taxation providing us a panacea for driving decarbonisation in existing homes, we turn back to other financial mechanisms that might help.

The UK’s Green Deal, launched in October 2012, was the biggest effort to date to provide another financial mechanism.⁶ In essence, it sought to tackle the core issue highlighted earlier – retrofit capital costs need to link to operational savings. However, whilst still operational it is broadly seen to have failed through a combination of savings not being realised, high interest rates and complications with property sales.

Despite the failure of the Green Deal in practice, the principle remains the best chance of financial tools supporting decarbonisation, aside from or alongside market value changes. There are several challenges for novel interpretations of this principle.

First is the security of the lending since this drives the interest rate and fundamentally the potential capital that can be offered. Sub-prime mortgages aside, this should not be an insurmountable barrier, given securing lending on properties through mortgages and further advances already typically delivers the best high street interest rates.

For larger portfolio lending, there is a sub-challenge here around tangible assets compared to intangible ones, which is effectively the lenders desire to be able to theoretically recover the asset in the event of non-payment. Tangible assets would typically be larger technology components such as heat pumps, batteries and solar photovoltaics, whereas cavity wall insulation and airtightness measures would be considered intangible ones. Given the accepted ‘right’ approach to decarbonising homes is to reduce energy demands before satisfying those demands with low/zero carbon technologies, the lenders desire for tangible assets

acts as a pressure contrary to this. A more sophisticated view is needed from the lenders here, perhaps blending tangible and intangible with a view on the repayment profile and risk, which will hopefully begin to emerge.

For the owner/occupier that makes up around two thirds of the UK’s homes, this issue is slightly removed. Instead, the question is whether the property value will increase sufficiently since any mortgage or further advance is secured on the whole home not any specific assets. Which brings us back to a need for the market value.

The second challenge to overcome for a successful reimagining of the Green Deal will be to ensure the energy savings are sufficient to cover the capital costs. Originally conceived as the “Golden Rule” for the Green Deal, the principle was that homeowners would at least be no worse off even whilst repaying the loan through their energy bill.

However, the Green Deal used an underlying SAP engine that was insufficiently sophisticated or flexible enough to represent the individual home and how its residents choose to live in it (the user pattern), the retrofit measures performance and installation quality was not well enough understood, and the resident behaviour changes due to home retrofit works were not well enough factored.

In part, this problem arose from a lack of granularity in understanding the unique nature of each home. With exceptionally long average lifespans, existing homes even built nominally the same to start, evolve to become different. These differences can and should significantly affect the appropriate decisions, and thereby the performance and costs of changes being made.

Overall, the issues around Green Deal meant that too many people didn’t save any money at all, and indeed were worse off, and whilst still technically operating – the scheme is generally considered to have failed.

4. Competency & quality

The last of the three main challenges to delivering Net Zero for UK homes is competency and quality. In some instances, UK construction and manufacturing are a global leader, with large scale construction projects delivering some of the safest and most successful

⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47978/1010-green-deal-summary-proposals.pdf

projects in the world. However, this drive for decarbonisation of existing homes is not currently undertaken by large, expert main contracting firms. The majority of work undertaken to UK homes is by the “Repair, Maintenance and Improvement” (RMI) sector, and unless there is significant change, it is this sector that will be delivering much of the work to decarbonise the UK’s 29m homes. The RMI sector is broadly built on the principle of self-certification and is therefore effectively unregulated. Anyone can set up in business as a small builder without any certification or training, and for those working in the sector, regulatory oversight is (at best) a cursory visit from a local council officer for more significant projects with major building works, whilst for individual retrofit measures, even that is unlikely or required by law. Combined with a general public who do not understand good construction and building physics (nor should they), the RMI market has no effective quality control mechanisms.

This does not mean there are not examples of exemplary, conscientious RMI contractors in the UK, but their numbers are almost certainly outweighed by those who are not delivering quality retrofit measures, and this was highlighted by the Each Home Counts Report and the start of the process of a “quality mark” process being developed in PAS 2035 and PAS 2038.⁷ Those failing are not necessarily doing so deliberately, though undoubtedly there are some looking to make a quick buck, but more often by simply repeating the errors of “that’s the way we’ve always done it” due to a lack of awareness, available training and time.

Whatever the reason, the result is that many installers of retrofit measures are not fully competent, and that the work undertaken is therefore of insufficient quality. Whilst not the sole reason, this issue is a major contributor to the Performance Gap – the difference between the designed performance of a building and its actual recorded performance once built. For the UK, this was estimated to be an average of 27%: the average performance of the completed building is more than a quarter worse than it was designed to be! Inevitably, with actual performance varying so significantly from forecast performance, any energy savings or financial mechanisms relying on them become questionable at best.

Aspects of these issues are likely to be solved over the next few years by larger-scale

businesses moving in to provide RMI “decarbonisation” services and trying to create quality assurance and monitoring processes for their workforce. In parallel, schemes such as Trustmark are likely to see an expansion of their quality assurance functions where they provide third party accreditation for the installers. Currently this and similar schemes are fairly ‘light touch’ over the robustness of the checks undertaken, but it seems likely this will change.

5. Key challenges

Achieving Net Zero in the UK’s housing is in essence a question of achieving Net Zero in existing homes. This, in turn, breaks into several specific challenges: using the right definition of Net Zero and the tools to support it; providing financial tools that reliably and cost-effectively translate energy savings into retrofit works; and ensuring the right measures are undertaken with the right competency in the right order to deliver the right outcomes for each unique home. Part of this is ensuring the principle of the 4 C’s to retrofit risk is adopted (Context, Capacity Coherence and Caution) and delivered as part of a Whole House Survey process that recognises difference and factors such as heritage significance.

6. Optimised Retrofit

Amongst the UK’s four home nations there are a number of trials and pilot schemes being undertaken that look at one or more of these key challenges. Perhaps one of the most promising is in Wales, called the Optimised Retrofit Pathfinder.⁸ The project is a collaboration of nearly 30 social landlords who are working with a wider group of universities, organisations and private companies, to develop a consistent, efficient approach to decarbonising homes, starting with the 237,000 social homes in Wales.

In its first year, Optimised Retrofit is undertaking refurbishment measures in more than 1,700 homes, with plans to scale-up significantly in future phases. However, the home retrofits are not seen as the main goal of the project itself, but more the raw material to help develop the best processes to support decarbonisation. This doesn’t mean those first homes are testbeds for novel retrofit

measures (the actual retrofit works are all proven and warranted), but rather that the project is learning from these homes to build better approaches.

Core amongst the novel thinking in the project is the digitisation of the process to improve robustness and efficiency. This starts with a digital tablet based “Whole Home Survey”. The project is rapidly iterating the first version of this survey with the input from the social landlords’ surveyors on the ground, building towards a shared vision of a technically detailed, intelligently automated home survey that can be undertaken in around 45 minutes in one home. The aim is to capture the uniqueness of every home in sufficient detail to allow the right future decisions about how to decarbonise it, and to do this quickly enough that the survey becomes viable for not just social landlords, but for homebuyer surveys, and mortgage or further borrowing assessments.

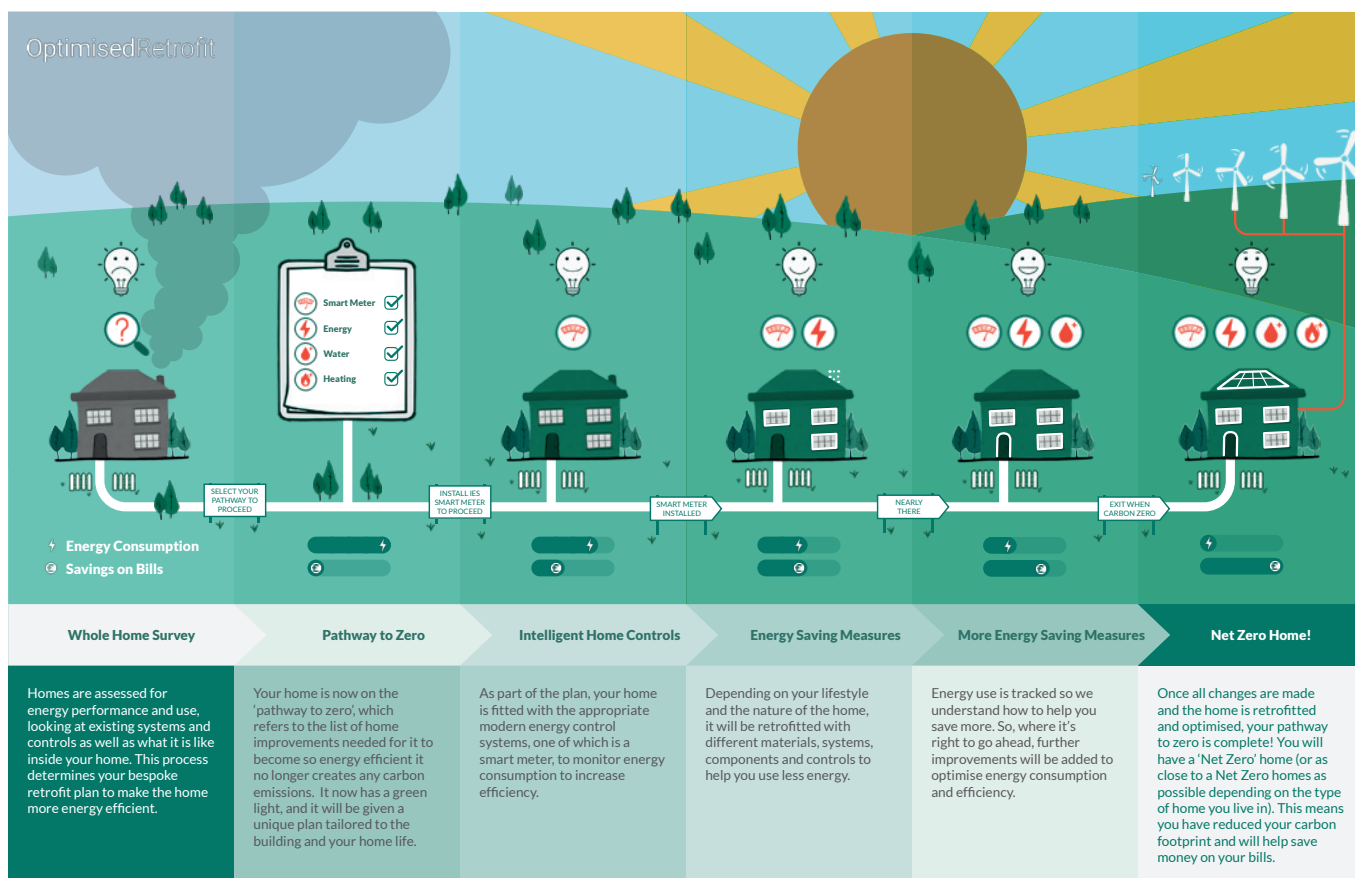
Optimised Retrofit’s partners are then developing a “Pathways to Zero” digital platform. This is designed to tackle the absence of the right tools to understand Net Zero, embedding detailed energy modelling of each home, including occupants forecast usage, alongside medium and long-term forecasts for energy grid decarbonisation. This significant computational complexity is rationalised into a simple user interface and the concept of a “Zero Carbon by [year]”, that can be readily reported for both individual homes or stock portfolios – built with the idea that the general public and financial investors will quickly recognise a “Zero Carbon by 2035” property has fewer investment risks than a “Zero Carbon by 2050” one.

Alongside providing the right tools to assess Net Zero, the Pathways to Zero tool provides the property owner with the technical support to ensure that the right measures are chosen for the right homes. Whilst leaving the final decision to the property owner (or their competent agent), the tool calculates likely energy bills and fuel poverty risks, ventilation and overheating risks, moisture issues and incompatible measures based on climatic conditions or property survey information. The result is a technical safety net that removes the uncertainty of how to take each individual home to Net Zero.

The next of the key innovations is the integration of home energy controls and metering

⁷ PAS 2035 and 2038 are overarching documents in the retrofit standards framework produced by the British Standards Institution. PAS 2035 provides a specification for the energy retrofit of domestic buildings, whilst PAS 2038 does the same for commercial buildings.

⁸ <https://www.optimised-retrofit.wales/>



through a novel hardware installation termed an “Intelligent Energy System” (IES). This package of controls, monitoring and metering is being installed in to every one of the 1,700+ homes. It will monitor energy usage by the main demands (space heating, hot water and plug-in power) as well as basic internal conditions, yielding a very large and granular dataset to better understand the effectiveness of each individual measure, the impacts on behaviour, and therefore how to better forecast these measures in future. The IES will tackle the significant gaps in understanding around the variety of impacts for differing measures, and as a result significantly improve the accuracy in forecast energy bill savings. This has significant implications for the potential to leverage finance from energy bill savings.

Where retrofit measures permit grid balancing, such as hot water tanks or battery storage, the IES can also provide optimisation functions for homes. Through remote automation, the resident's comfort preferences can be delivered according to their settings (via App, web, in-home or even telephone). However, the IES can draw power to deliver these comfort preferences at times of the lowest grid carbon (and happily also currently

lowest price). This has the effect of ‘hunting’ low carbon power, and this can make significant reductions that approach or even exceed halving the home’s carbon footprint.

These digital aspects of the Optimised Retrofit project combine to generate a Building Passport for each home – a record of the home’s condition, planned future Pathway to Zero, and live granular data about the actual performance and carbon footprint. Designed to be a permanent record that can transcend property sales, the passport will also have an aggregated view for stock or mortgage portfolios. To ensure the data stored remains current, an installer App is under development in the Optimised Retrofit project that will combine the function of individual retrofit measure quality assurance with a means to update the Building Passport’s records. Here again, digital processing is being deployed to speed up times and improve technical robustness, whilst ultimately trying to tackle the RMI’s typically poor levels of retrofit measure installation quality.

Alongside 1,700+ home retrofits and the development of novel digital tools, Optimised Retrofit has projects looking to engage and support decarbonisation across a broad

spectrum. Training and retrofit needs are being forecast by year and area to support the RMI sector upskilling, helping them plan their business investment by evidencing a pipeline as well as supporting the training providers to know what and where to offer courses.

For the public sector, procurement of works will always be a key factor. Here, the project is developing a new Dynamic Procurement System that is intended to be easier for smaller businesses to engage with, and to support their ambitions to reskill or upskill into good quality decarbonisation work. Outside of the public sector procurement, this is linked with developing practical mechanisms to understand genuine competency (as opposed to paper qualifications), in order to launch and grow the nation’s “Decarb Army” that is needed to refurbish all the homes in the coming decades.

Optimised Retrofit’s starting point is social homes, driven by Welsh Government’s bold aspiration to lead the UK and decarbonise these homes by the early 2030’s, an ambition so far matched by pledges for the funding to help deliver it. The project is envisaging processes that go beyond social homes, however, ultimately looking at how to streamline

decarbonisation ready for the private owner/occupier sector.

Here, early work with the owner/occupier sector includes a collaboration with the separately Innovate UK funded VALUER research project and expanding this to a larger trial. Using the digitised processes developed in Optimised Retrofit, private homeowners will be offered a home survey and Pathways to Zero assessment. With specifically developed lending products, initially led by Monmouthshire Building Society but with others following, these homeowners will be offered additional borrowing secured on their home linked to the technically appropriate measures proposed. As an alternative or in combination, using the detailed energy forecasting made possible through Optimised Retrofit, Sero will offer the resident an energy bill repayment route to fund the works. The impact of the retrofits will be closely monitored by project

partners Rightmove and the Royal Institution of Chartered Surveyors, building further evidence around the emerging value difference attached to lower energy homes.

The Optimised Retrofit work, which is strongly supported by the Welsh Government, and with nearly 30 social landlords collaborating, represents one of the largest and most comprehensive efforts seen to date to tackle the multiple issues of decarbonisation of UK housing. Whilst born in social homes, the project is clearly building towards an approach that is applicable across all tenures that can be scaled rapidly to support financial portfolio reporting as much as on-the-ground refurbishment works. This is credit to Welsh Government's mindset of building the mechanisms before increasing the funding and could be readily contrasted to the UK Government's recent Green Homes Grant scheme that took the reverse model and failed in under a year.

7. Conclusions

Decarbonisation of the UK's homes is a large part of the UK's legal obligation to achieve Net Zero by 2050, and around 29 million existing homes need to be improved. Minimum regulatory standards, private landlord obligations and future tax changes are all likely to play a part in tackling this – but won't be the whole. Tools are also needed to provide more accurate assessments and pathways for individual home decarbonisation that allow this to occur in harmony with energy grid decarbonisation, and which provide sufficient confidence to the property owner and underlying financier that work will be delivered with the appropriate quality, and energy and carbon savings reliably achieved. Here, the Welsh Government's Optimised Retrofit Pathfinder project is breaking new ground and offers genuine hope for scalable, industry-wide solutions to the challenges faced.



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