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Retrofit Right Making social housing more energy-efficient

What should the sector consider when upgrading windows and doors in social housing? A report on how informed fenestration choices can help decarbonise social housing retrofits

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I. Introduction – upgrades on the horizon

England's residential sector produces more carbon every year than all the country's cars combined.¹

This is undoubtedly an eye-catching statistic, yet it may not be surprising. The need to decarbonise building stock has long moved from a preference to a priority, and sustainability remains a hot-button topic across multiple sectors, including housing.

It is not hard to see why. Achieving net zero emissions by 2050 has been a legally binding target for over half a decade², with additional legislation necessitating a 78% reduction in emissions by 2035 passed in 2021.³



Looking more specifically at housebuilding, the sector has not been idle in its pursuit of greater sustainability. For instance, the Future Homes Standard dictates that all new residential properties must produce 75-80% less carbon emissions from 2025 onwards than under current Building Regulations.⁴ Considered alongside the Government's newly uplifted annual housebuilding targets⁵, there is a clear and ambitious pathway to more environmentally conscious homes.

This is only half of the story, as existing residential properties must also be upgraded to ensure the UK's residential building stock meets mandatory net zero targets. The scale of this retrofitting challenge cannot be underestimated, but these properties must evolve if they are to meet increasingly rigorous energy efficiency regulations.

Social housing faces additional pressure to decarbonise due to its public ownership, with funding available but nonetheless limited. Efficient use of resources is crucial to meet net zero targets, especially for under-pressure local authorities and housing associations with ever-increasing workloads and staff shortages. Informed specification of windows and doors will be key to improving the overall thermal performance of existing properties. This will involve an in-depth look at legislation affecting window and door system specification, and the importance of establishing reliable, high-quality supply chains.

It is with this in mind that we have developed this guide to retrofitting and upgrading social housing for a sustainable future. Exploring these considerations is crucial to providing clarity for local authority and housing associations, and ensuring the UK's social housing is fit for the future.

Martin Hitchin, CEO, REHAU UK

Introducing REHAU

Celebrating its 75-year anniversary this year, REHAU is a leading worldwide provider of polymer-based solutions in the construction, automotive, office furniture, transport, doors and windows sectors.

Starting from 1962, REHAU UK was one of the first companies in the country to manufacture polymer window and door systems. The company continues to enhance its frame portfolio using engineering experience in high-performance industries across the wider REHAU group.

- **112,000 REHAU** frames are manufactured every day across the UK through a network of fabricators
- **1 in 7** of the nation's uPVC windows are made from REHAU profile

In the social housing space, REHAU works closely with a network of housing associations in the UK and provides a number of well-received sector CPDs, including 'Retrofit Windows & Door Solutions for Social Housing'.

1 <https://www.housing.org.uk/news-and-blogs/news/englands-leaky-homes-greater-threat-to-climate-than-cars>
 2 <https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>
 3 <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>
 4 <https://www.gov.uk/government/consultations/the-future-homes-and-buildings-standards-2023-consultation/the-future-homes-and-buildings-standards-2023-consultation>
 5 <https://www.gov.uk/government/news/housing-targets-increased-to-get-britain-building-again>



II. What sustainability challenges does UK social housing face?

The residential sector accounts for approximately 18% of the UK's current carbon emissions, with social landlords owning 17% of the nation's housing stock.⁶ Taken approximately, this means social housing accounts for roughly three percent of the nation's carbon footprint.

These large numbers are mirrored in the sheer size of the UK's social housing portfolio, which includes 4.4 million homes mostly built between 1945 and 1980.⁷ These figures demonstrate that these older properties were not built to modern thermal performance and sustainability requirements, and highlights the challenge facing local authorities and housing associations.

This need to upgrade existing properties is further amplified by the UK's Clean Growth Strategy. It requires social housing providers to attain Energy Performance Certificate C for rented properties by 2035, or 2030 for 'fuel poor' households.⁸ Taken alongside wider net zero emissions reduction regulations, these goals present a challenging roadmap for specification professionals working in the sector.

Encouragingly, there is funding available to achieve the sector's sustainability goals. This includes the £1.8 billion awarded in 2023 through the Government's Social

Housing Decarbonisation Fund, Home Upgrade Grant and Public Sector Decarbonisation Scheme to upgrade social housing and public buildings.⁹ This funding has been bolstered by a later, third wave of £1.25 billion under the Social Housing Decarbonisation Fund¹⁰. Finally, housing associations are planning to invest £70 billion to upgrade the fabric, heating systems and components of existing homes.¹¹

Funding Available to Sustainably Retrofit Social Housing

- **£1.8bn** – awarded through Social Housing Decarbonisation Fund, Home Upgrade Grant and Public Sector Decarbonisation Scheme
- **£1.2bn** – the third wave of funding under the Social Housing Decarbonisation Fund, announced December 2023
- **£70bn** – planned investment from housing associations to upgrade fabric, heating systems and components in existing homes

6 <https://www.thfcorp.com/insight/retrofitting-social-housing-what-you-need-to-know/#:~:text=The%20UK%20buildings%20sector%20accounts,of%20the%20UK%20housing%20stock>

7 <https://www.statista.com/statistics/292252/age-of-housing-dwellings-in-england-uk-by-tenure/>

8 <https://publications.parliament.uk/pa/cm/201719/cmselect/cmbeis/1730/173005.htm#:~:text=The%20Clean%20Growth%20Strategy%20set,the%20same%20standard%20by%202030.5>

9 <https://www.gov.uk/government/news/18-billion-awarded-to-boost-energy-efficiency-and-cut-emissions-of-homes-and-public-buildings-across-england>

10 <https://www.gov.uk/government/news/families-business-and-industry-to-get-energy-efficiency-support>

11 <https://www.housing.org.uk/globalassets/files/climate-and-sustainability--energy-crisis/07085855-9cf8-456c-8099-9506a6839b5d.pdf>



III. How can social housing become more energy efficient?

To best specify high-performing, sustainable window and door systems, local authority and housing stakeholders must first know what 'good' looks like. This is especially pressing given the sector's large overall carbon footprint.

Yet given the ambitious decarbonisation timelines facing the social housing sector and the funding available, there is more scrutiny than ever on the specification process. Put simply, local authorities and housing associations need to make available funding work as hard as possible.

When it comes to making building stock more energy-efficient, the question is, therefore, simple – what cost-effective components will have the greatest impact on a property's thermal performance? As prominent sources of heat loss, window and door systems have a crucial part to play. More specifically, carrying out 'medium retrofits' – fitting high-spec glazing frames on existing homes – could hold the key to markedly improving thermal performance across social housing portfolios in a cost-effective fashion.

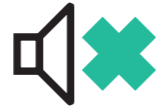
In an environment where thermal performance is key, uPVC frames stand out for their durability, energy-efficiency and low maintenance requirements. By contrast, other popular materials have significant drawbacks where energy efficiency is concerned. Timber frames, for example, can be porous and aluminium may act as a conductor prone to thermal bridging issues, which can be a major cause of condensation.

To decide what constitutes a 'high-quality' window or door system, it is important to get beyond overarching benefits of polymer and into specific performance requirements. Specifically, decisionmakers at local authorities and housing associations should look for the below metrics, standards and other considerations when specifying new frames.



Thermal efficiency

- **Window Energy Ratings (WERs)** use an alphabetical grade to show a window's thermal performance. Polymer frames can easily achieve an A rating when used in combination with the appropriate glazing unit. REHAU frames achieve an A+ plus rating with 36mm or 44mm triple glazing.
- **U-values** measure how effective a material is as an insulator. Part L of the Building Regulations states that developers should aim for a u-value of 1.4W/m² for windows installed on retrofit projects. Windows with REHAU polymer frames typically achieve a u-value of 1.2W/m²K. However, windows fabricated with REHAU five-chamber profiles with a superior thermal transmittance value (U_f) can achieve a 0.8w/m²K U-value when combined with 44mm triple glazing.
- **Fire Safety – BS EN 1634-1:2014** – Specified windows and doors should carry a 30-minute rating in accordance with this standard, which governs fire resistance and smoke control tests. The rating relates to the length of time the frame will withstand temperatures of up to 300°C before being breached.
- **BS EN 12101-2** – In accordance to this standard, specified windows should be able to remove and exhaust smoke in the event of a fire, creating a smoke-free layer above the floor. REHAU frames use automatic opening vents (AOVs) certified to this standard to release harmful fumes from the inside of a building, helping keep escape routes free of smoke and preventing inhalation.
- **Building Regulations Part B** – Fixed polymer windows can provide a fire-rated design installation option for buildings in full compliance with Building Regulations Part B, governing fire safety.



Noise attenuation

- **Decibels (dBA)** – World Health Organisation guidelines for community noise recommends less than 30 A-weighted decibels (dB(A)) in bedrooms for good-quality overnight sleep. Sound insulation in REHAU's polymer frames can reduce noise insulation by up to 40dB – an invaluable feature in high-density housing.
- **Building Regulations Part E** – Building Regulations Part E concerns soundproofing for walls and floors. Though frames are not covered in its remit, good-quality polymer window and door systems will impact property sound insulation requirements.



Security & accessibility

- **PAS 24:2024** – PAS 24 is the standard measuring the enhanced security of windows and doorsets and their resistance against attack. REHAU frames meet PAS 24 requirements when tested against the 'pass or fail' attack simulation required by the standard.
- **Approved Document Q** – Approved Document Q is a set of building regulations that govern the security of new residential dwellings. Specifiers should ensure that all windows and doors meet its requirements in all circumstances.
- **BSI Kitemarks** – REHAU windows holds Kitemark 76189 from the British Standards Institute and its doors hold KM66461, designating the company's status as an enhanced security windows system supplier.
- **Secured by Design Accreditation** – Secured by Design (SBD) is an official police initiative created to improve building security. REHAU polymer frames carry SBD accreditations, demonstrating security credentials beyond PAS 24.
- **Building Regulations Part M, Clause 4** – Building Regulations Part M Clause 4 covers reasonable access to buildings for most people, including wheelchair users. uPVC Doors are available with handles positioned to afford accessibility in compliance with this requirement.

For more information on these considerations for window and door systems, retrofit project stakeholders should engage the expertise of third-party suppliers. By doing so, local authorities and housing associations can streamline frame upgrading processes and better complete retrofit works on time and to budget.

Ventilation and Awaab's Law

Introduced in July 2023 under the Social Housing (Regulation) Act, Awaab's Law requires social landlords to investigate damp and mould issues within 14 days of a complaint¹². In these circumstances, the Housing Ombudsman and Regulator of Social Housing ensures timely repairs.

Adequate window ventilation is crucial to prevent mould. Specifiers should install trickle vents per Building Regulations Part F system 1 ventilation and consider combining them with thermally efficient frames. When replacing windows, background ventilators should always be fitted in line with Approved Document F of the Building Regulations to maintain ventilation rates. It is for this reason that REHAU specifies award-winning link vents from plastic injection moulder Glazpart as part of its frame accessory selection.



IV. Is uPVC sustainable?

uPVC is sometimes perceived to be 'unsustainable' as it is not organic like timber and is seen to lack the long-established recycling infrastructure associated with aluminium. With more focus than ever on a building's whole life cycle (WLC) emissions – defined as the carbon emissions resulting from materials, construction over a building's entire life, including demolition and disposal¹³ – these may be considerable drawbacks.



What is uPVC?

uPVC simply refers to unplasticised poly vinyl chloride – a rigid 'polymer' material used widely across various industries, including construction.

It is the most popular material used to manufacture window and door frames in the UK. It is a common alternative to wood and aluminium due to its durability, affordability and lightweight nature.

If polymer is described as 'co-extruded', this means it has been created by a manufacturing process which combines multiple polymers, virgin and recycled, into a single profile. The recycled material used in the co-extrusion process is sourced from recycling plants, which collect and process uPVC sourced from post-consumer windows and post-industrial waste.

Yet contrary to long-held sector assumptions, advances in recycling and frame design have made uPVC one of the most sustainable construction materials available. Indeed, polymer glazing technology has undergone a revolution in the last twenty years. While polymer's thermal performance levels have long been the material's main strength, design and technological innovations have led to marked enhancements in the following areas:

- Solar gain
- Condensation reduction
- Airtightness
- Indoor comfort
- Security
- Maintenance reduction

These advances have made uPVC windows and doors more energy efficient than ever, reducing carbon emissions. Polymer frames can now achieve the Building Research Establishment's 'A' rating under the building science organisation's Green Guide to Specification. Considering the guide's status as a key resource to help project stakeholders select construction materials and components based on their environmental impact across their entire lifecycle, this is a major landmark.

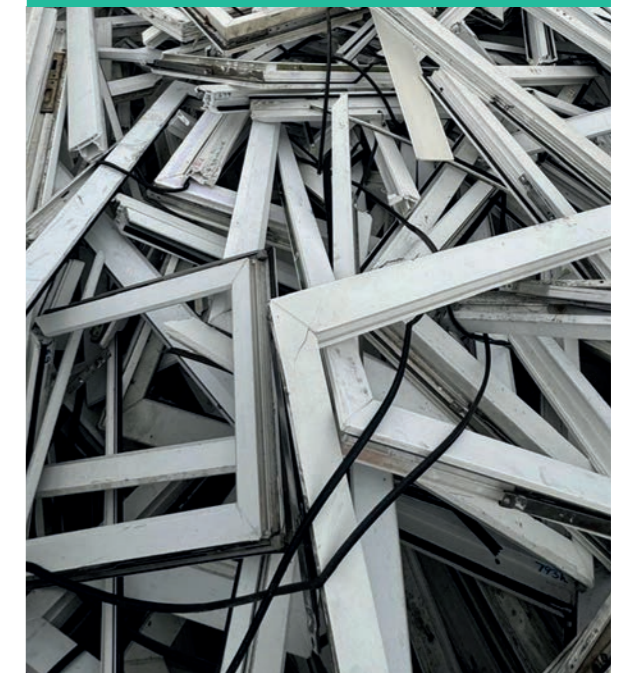
Advances in recycling infrastructure also mean that polymer's impact on the environment is minimal. The material can be recycled up to 10 times before showing any signs of degradation and the process is highly efficient.

Given that the average lifespan of a uPVC frame is 35 years¹⁴, when combined with appropriate recycling infrastructure, polymer is undeniably a sustainable, long-lasting material. For social housing decisionmakers conscious of the environmental impact of potential retrofit works, uPVC's affordability and green credentials underlines its status as a stand-out material of choice.

PVCR – REHAU UK's Polymer Recycling Plant

REHAU has invested in excess of £60 million into its recycling infrastructure, mainly through its PVCR polymer window recycling facility. Based in Runcorn, the plant currently processes 13,200 tonnes of post-consumer polymer windows and doors per annum.

As part of this process, end-of-life polymer window frames and doors are put through intensive separation and cleaning processes at PVCR before going into the co-extrusion process used in the manufacture of new uPVC window profiles.



¹³ <https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance/whole-life-cycle-carbon-assessments-guidance#:~:text=What%20is%20the%20Whole%20Life%2C%20including%20demolition%20and%20disposal.>

¹⁴ [https://www.bpf.co.uk/windows/buying_and_specifying_uPVC_windows_.aspx#:~:text=The%20Building%20Research%20Establishment%20\(BRE,expected%20to%20last%20much%20longer.](https://www.bpf.co.uk/windows/buying_and_specifying_uPVC_windows_.aspx#:~:text=The%20Building%20Research%20Establishment%20(BRE,expected%20to%20last%20much%20longer.)



V. Beyond installation – value-added maintenance technologies

Social housing stakeholders should not solely focus on point-of-purchase when selecting window and door systems for retrofitting works. The ongoing performance and adaptability of specific frames is key to ensuring energy-efficient properties and reducing building stock emissions.

Local authority and housing association maintenance teams have an important role to play in this. Unlike timber frames which require annual upkeep to prevent visual deterioration, polymer frames are virtually maintenance-free.

“Digital IDs provided through REHAU’s Window.ID service have made it possible for us to track key details for frames installed at properties throughout our social housing portfolio. This is crucial as we continue to embed eco-friendly practices, and has allowed us to embed more efficient replacement material ordering practices. It’s really been a gamechanger for us and we’ve every confidence it will be a key part of ensuring we continue to deliver and maintain the right products to our homes, making a difference to both our tenants and the external environment.”

Rob Kraska, Head of Assets & Delivery at Midland Heart

Urban Mining

REHAU UK is committed to the circular economy of resources and improving the recoverability of materials it uses. Its embrace of urban mining to recover uPVC exemplifies this.

Urban mining is the process of extracting valuable materials from waste products that would otherwise be sent to landfill or incinerated. It involves recovering components from the fabric of existing buildings to make use of materials and otherwise long-life, durable products. Companies engaged in urban mining can, therefore, decrease the environmental impact associated with mining raw materials and post-consumer waste.

REHAU receives, previously installed end of life uPVC windows and doors from which it recovers polymer. This material is melted, re-granulated and re-extruded into new window profiles.

Yet in the event of further installation work – for example, following breakages or the installation of accessories including fly screens and sunshades – it is vital this work is completed quickly and effectively. Data-driven digital technologies may provide a way of expediting repair works. With maintenance teams increasingly time-poor and overstretched, this is something social housing project stakeholders should explore in greater detail.

Innovations such as REHAU’s Window.ID can be integrated into window and door systems, providing a digital ID card for specific frames containing relevant information that can be accessed at any time. Data available through Window.ID includes:

- Date of manufacture
- Extruded window system name
- Fabricator and installer company details
- Material specification including hardware and u-values
- Frame size
- Glass structure and size
- FENSA certificates
- Maintenance instructions

The ability to easily access all relevant CE/UKCA marking documents and thermal performance data for individual windows within a housing association or local authority’s social housing portfolio means Window.ID is well-placed to further enhance transparency and traceability across the entire supply chain. From information about the frame’s glazing, test certificates and thermal and sound insulation values, important data can be quickly made available on the Window.ID app.

Additionally, quick access to this key data will greatly reduce the need for time-consuming inspection or measurement appointments. Instead, expert frame specialists can be quickly contacted via an app, which also allows for the quick and efficient ordering of replacement materials. As a result, a potentially lengthy process can be hugely shortened, with housing associations and local authorities also able to make substantial financial savings due to the reduced number of visits required to the affected property.



VI. Sourcing the Supply Chain

When it comes to upgrading existing windows and doors, identifying high-quality, sustainable frames is clearly vital. Yet sourcing high-standard installers and fabricators to manufacture and fit replacement components is also extremely important.

Proprietary polymer window and door systems, including those from REHAU, are often supplied through a network of selected independent fabricators and installers. However, manufacturers may operate certified programmes for guaranteed quality and success through providing technical, project, design, testing and marketing support to these companies.

Expected Standards

- **BS 7412:2024** – the standard giving performance and design requirements for uPVC extruded hollow profiled windows and glazed doorsets
- **BS EN 14351-1:2006 + A2:2016** – the standard identifying material independent performance characteristics for windows and doors (excluding fire performance)
- **BS 6375-1:2015** – the standard governing the weathertightness and performance of windows and doors
- **PAS 24:2022** – the enhanced security standard for windows and doors
- **BS 8213-4:2016** – the standard providing a code of practice for the installation and surveying of windows and external doorsets

By doing so, manufacturers can better assure a high level of quality throughout the supply chain. For example, REHAU interacts with a network of certified fabricators on an ongoing basis, offering assessments on their equipment and facility, assisting in setting operative layouts, ordering materials and carrying out onsite process training.

Involvement at the fabricator and installer level provides greater assurance to local authorities and housing associations that their project will be completed on time, to budget and to an excellent standard. At REHAU, this includes ensuring its approved fabricators and installers comply with relevant standards and carry third-party manufacturing and product accreditations.

With that in mind, social housing project stakeholders should look for manufacturer-approved fenestration professionals to carry out works. More specifically, they should ensure any engaged fabricators and installers adhere and hold to the below standards and accreditations.

Third-party Manufacturing and Product Accreditations

- **ISO 9001 Quality Management System** – the globally recognised standard for quality management systems to help improve organisational performance
- **BS EN 12608:2016+A1:2020** – the standard for uPVC profiles for the fabrication of windows and doors.
- **Building Research Establishment (BRE) Green Guide Impact Rating** – a ranking system assessing the environmental impact of construction components throughout their life cycle, with 'A' and 'A+' seen as excellent
- **Secured By Design (SBD)** – the official police security initiative demonstrating the fabricator's frames go beyond current standards for security
- **Regulation 9.2 of the CDM Regulations 2015** – a regulation demonstrating that the fabricator will ensure action is taken to safeguard health and safety during construction work

VII. Case study – Cavenham Court, Hayes

Situated near Heathrow Airport on the 10-acre Hyde Park Hayes campus, Cavenham Court boasts 113 social housing apartments in its seven-storey structure. Yet it was not first designed with homes in mind, having previously been used as an office block. Converting the building from commercial to residential use for a London borough council posed unique challenges that would affect all elements of its fabric, including windows and doors.

This was the situation facing Midpoint Windows (Midpoint). Given the building's proximity to Heathrow airport, acoustics were of particular importance to residents. A strict 41dB_{Rw} acoustic rating was expected on all windows and doors, which also needed to achieve a minimum wind loading of 801 pascals. Finally, as part of the architect's design, many of the apartments at Cavenham Court required Juliet balconies.

Engaging Expertise

Faced with these requirements, Midpoint sought out the technical expertise of its long-term partner and supplier, REHAU. The polymer solutions manufacturer was engaged to recommend best possible window and door solutions for this social housing project and work closely with its associated fabricators to provide Midpoint with high-performing products.

The architect had originally specified steel bar balconies as part of the building's original design. However, installing these would require drilling into the building exterior to fit handrails, increasing the risk of water ingress and unsightly discoloration over time. The practical benefits of REHAU's SKYFORCE's Juliet balcony solution led to a change in plans. Specifically, as SKYFORCE was developed to fit discreetly into modern facades such as those found at Cavenham Court, its concealed attachment system meant it did not have to be fitted to face brickwork or render detail.

REHAU supplied 96 SKYFORCE balconies and 600 TOTAL70 windows and doors in total over the eight weeks Midpoint were on-site at the Cavenham Court



project. As all TOTAL70 frames are independently tested to achieve the highest BSI ratings for wind, water and air, Midpoint could also enjoy peace-of-mind that all apartment occupants would benefit from the frames' A+ Window Energy Rating (WER) – the highest possible – which would help reduce the cost of heating for residents. Similarly, its noise reduction qualities meant TOTAL70 was well-suited to block out noise from nearby Heathrow airport, while its PAS24 security accreditation provided added reassurance.

Flexible Supply Chains

Alongside supplying balconies, windows and doors, REHAU helped optimise delivery processes and on-site installation processes in line with Midpoint's and the council's requirements. This included providing jigs for its fabricator network so holes could be drilled into door frames and the base bracket installed ahead of their arrival on-site, where the installers would fit the glass, external plates and other finishing details. As a result, fitting time could be reduced to 15 minutes per balcony without a drop in installation quality.

Additionally, REHAU's adaptability was a major benefit for Midpoint, with the company able to utilise its expertise and established, continent-wide, supply chain to procure ancillary components for larger door frames specified in the architect's original designs. This included supplying larger transoms and couplers alongside additional steel reinforcement for these specific systems, while also providing practical proof of the performance levels of these larger profiles.

VIII. Conclusion – what are the next steps?

Upgrading existing social housing stock is vital if the sector is to meet net zero and energy efficiency targets. Indeed, given the funding available and upcoming decarbonisation deadlines, there is an increasingly urgent need to act.

While local authority and housing association stakeholders should begin to make plans to retrofit their social housing portfolios, any steps taken must be considered and well-informed. Replacing key building components such as windows and doors in medium retrofits can be a highly technical process, especially considering the regulations and performance criteria any new frames must adhere to.

Consequently, it is highly advised that specifiers leverage third-party expertise when carrying out retrofitting works in this space. By engaging the assistance of suppliers such as REHAU, project stakeholders can bridge knowledge gaps and ease workload burdens as construction activity ramps up. This combination of sector knowledge, social housing project experience and access to REHAU's extensive, high-quality fabricator customer network could prove integral to sourcing high-quality, thermally efficient windows and door frames.

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