

## Appendix: Other shortlisted entries: Best Net Zero Carbon Initiative

### LiveWest and Ian Williams | Northern Ireland Housing Executive (NIHE)

#### What was the project and what was innovative about the service provided?

**LiveWest & Ian Williams (IW)** - Following the announcement of the UK Government's ambitious target to be net zero by 2050, the installation of retrofit energy efficient measures has been high on the green agenda for many of its customers. In September 2022, IW supported LiveWest by starting the design phase for a retrofit/decarbonisation refurbishment scheme to 52 occupied social homes, funded through SHDF. First line measures were installed, allowing a further difference to be made going forward as part of their new retrofit campaign. Works included: Enabling works, Cavity wall insulation (& extraction?), Loft insulation, High heat retention storage heaters, Solar PV installations, Decentralised mechanical extraction ventilation. Their innovation was demonstrated through:

- Adaptability, IW's ability to adapt to the client's needs and successfully mobilise and fill specialist retrofit roles to support with the design/construction phases despite short notice.
- IW worked with third-party PAS2030 certified consultants with co-ordination achieved through its in-house Level 5 Retrofit Co-ordinator.

Completion within tight timescales/Funding deadline: 10-week planned construction phase programme requiring careful planning/programming to ensure on-time delivery, resulting in a 5-week completion ahead of schedule. Funding would have been lost if not completed on time. The retrofit/decarbonisation refurbishment works also helped to improve housing standards and resident health through reduction of mould/condensation. Necessary innovation as 1 in 5 UK properties suffer from condensation and 50% of the world's illnesses are aggravated by poor indoor air. IW provided quick turnaround ensuring specification agreed and all works completed within target, ensuring valuable use of funding.

**NIHE's Rural-Led Energy Transition (RULET)** is an initiative retrofit whole house approach pilot within ten social houses, led by the NIHE and Ulster University. The pilot's overarching aim was to reduce the risk of low-income households being left behind in the transition to clean, smart, integrated energy systems. Domestic electrical heating systems, when combined with energy storage and smart controls and operated at scale, have the potential to create significant system value which can benefit the householder and landlord. RULET builds on the work of the previous pathfinder pilots which tested low carbon heating and improved thermal performance. RULET is a collaboration of partners across the energy system, namely NI Utility Regulator, NIE Networks (DNO) Energia/PowerNI (energy supplier), heating manufacturers Grant & Sunamp, and smart heating control developer Climote. The following equipment was installed in spring 2022 to test the deployment of: a) Improved energy efficiency measures b) Low carbon heating systems focused on electrification c) Tariff change, initially focused on time of use and dynamic tariffs. This innovative whole house approach had the desired outcome of improved fabric first energy efficiency measures, reduced heating demand/carbon emissions and improved thermal comfort, all undertaken without the need for the tenants to decant.

## **What were the measurable benefits to the client, the contractor, the resident, and the neighbourhood?**

**LiveWest & IW's** retrofit improvement works helped to improve the energy efficiency of its homes, reduce energy bills and help the local environment. Benefits to client were less complaints, with reduction in mould/condensation build up, leading to happier, healthier residents that helps build on the positive LiveWest image. Evidence – zero formal complaints received throughout the works. The streamlined process and reliable stock data is beneficial for future projects as they are able to analyse fabric performance per property, target future works more effectively, and foresee any potential further issues in advance. 100% properties achieved EPC C, average rating increased from EPC E to EPC B as per SHDF requirements which limits budget per property and does not always allow social housing providers to aim for EPC A (if their budgets do not allow for additional financial contributions). Helps LiveWest move towards its Net Zero target. Tangible income stream from the PV installation, LiveWest able to sell any excess energy back to the grid, improving their financial position, increasing the budget to help deliver additional works to their housing stock. Sustainability award winner – this project was Step 1 of the 'Creating Greener Futures Together' retrofit campaign. LiveWest were recently announced as winners of the 'Sustainability Award' at the Exeter Property Awards. Benefits to the residents from their friendly resident liaison officer, Carrie-Ann Martin, who went above and beyond to keep the residents informed, comfortable, and assured throughout the duration of works, improving the overall experience of residents. Concerns dealt with on site, resulting in zero formal complaints. Home improvements – improved living conditions, both visual and physical due to reduction in condensation and mould, creating a more comfortable living environment for residents. Improved air quality – the works can lead to an improved quality of air inside the home, potentially improving residents' health in the long term. Particularly beneficial for those with existing breathing conditions e.g., asthma. Improved understanding – residents provided with handover packs, educating them on how they can manage their own homes and lives to reduce their energy consumption and manage their bills more effectively. Benefit – can help reduce any potential financial strain/stress and improve their quality of life. LiveWest resident, Tom said 'We have noticed a difference in the electricity bill already!' Ease of access – residents are able to download an easy-to-use app to monitor the ongoing solar panel generations. Benefits to neighbourhood/wider community, with local sub-contractor utilised, creating further job opportunities for the local workforce selected for the works. Reduces regional carbon footprint as minimal distance travelled to and from site e.g., their solar panel specialist sub-contractor was Devon based. Locals are inspired to make a difference - residents/locals improved education on reducing energy consumption can help improve overall air quality by implementing measures e.g., walking/cycling rather than driving, and where possible, car sharing/reducing pollutants/use of indoor plants to absorb CO<sub>2</sub>/produce O<sub>2</sub>. Increased financial investment – cost savings as a result of the works/reduced energy consumption can be reinvested back into the community for further improvements. Comfort - retrofitted homes are comfortable, use less energy and put less strain on the power grid. Further evidence of social value by developing a local, qualified workforce – their local trainee surveyor, Joel Smith, was included on the project. By recruiting locally for their trainee surveyor and apprenticeship schemes, they are effectively delivering successful works whilst developing a skilled workforce for the local area, building a future, and creating more opportunities for young people in the local area. Example: IW Surveyor, Joe Allen, has been upskilled and is nearing completion of his retrofit coordinator qualification. Educating the local workforce – upon completion of the project, they sat down with our expert roofing subcontractor, Minerva Roofing, to educate/upskill them on the benefits of reducing energy consumption to help the environment, and support them in achieving PAS2030, a rare accreditation in the South West. By sharing best practice and educating their supply chain, they can create a knock-on effect that passes down the supply chain to creating a greener future for everyone.

Influencing the industry – the increasing demand for retrofits can create an influx of ‘green jobs’, leading to measurable social value benefits via a growth in skills, knowledge, and employment opportunities. Example: Electrical Qualifying Supervisor, Jay Gallie, recruited to help attain their PAS2030 accreditation in Electric Storage Heater Installations, a gap identified through the LiveWest project

**NIHE** - The key focus of this pilot (in line with the Housing Executive’s sustainability ambitions\*) is reducing fuel poverty with lower fuel bills and low carbon heating to reduce carbon emissions, all providing improved thermal comfort. The landlord/client has initial indirect benefits and potentially long-term payback as an energy prosumer. The landlord will see immediate benefits from improved fabric first measures which protect the building from harmful degradation such as mould, condensation, and damp, prolonging the lifespan of the dwellings. The physical and aesthetic transformation of the properties makes them more desirable so that the incumbent tenants are more likely to remain and a new tenant would be easily appointed if a change of tenancy does occur. This reduces loss of revenue from rent arrears, which is also supported by the fact that lower fuel bills ease pressure on making rent payments. The long-term landlord benefits come from reducing energy demand on the electric network which will reduce system constraint\*\*. If this was adopted at scale the landlord could leverage a financial benefit from the constraint reduction, which would reduce the pressure for network reinforcement on the DNO. The contractors delivering installation and maintenance functions will benefit from essential skills and competencies from their experience in low energy construction and retrofit which they can then take forward into future schemes. A project consideration was to ensure there was no need for decanting to occur and don’t present any detriment on the community in terms of no need for decanted site compounds. The local community benefits from reduced fossil fuel heating which has an immediate positive impact of improved air quality. This pilot utilised a detailed quantitative monitoring across all the ten dwellings which focused on the energy use of the household and in particular the heating use. Temperature and humidity of the dwellings were monitored for a period of two years, and this was compared to the data collected during pre-retrofit monitoring. Pre and post retrofit fuel costs were also compared, SAP reports were analysed to determine the reduction of carbon emissions and fabric heat loss. Below is a list of measured improvements showing that major reductions have been made to harmful emissions and wasted energy, as well as significant increases to the time spent at a comfortable temperature and humidity:

1. All properties achieved SAP Band C (average SAP 76.4), from a starting point of SAP Band D & E.
2. The properties achieved more consistent heating profiles by running heating systems at lower flow temperatures for longer periods, thereby improving thermal comfort and reducing damp risk.
3. Reduction in primary energy demand by an average of 100 kWh/m<sup>2</sup> pa.
4. Air permeability results range from 9 m<sup>3</sup>/h/m<sup>2</sup> to 6 m<sup>3</sup>/h/m<sup>2</sup> with minimal interventions.
5. With comparison to the pre-retrofit SAP, the average measured reduction is approx. four tonnes/dwelling/year.
6. Average cost for delivered heat was 7.25p/kWh across the year for ASHP with storage and the Economy 7 time of use tariff. Average cost of delivered heat (i.e., including boiler efficiency of 85%) for gas in 2022/23 was 11.5p/kWh and for oil was 10p/kWh. So, in comparison with the cost of the pre-retrofit fuel (oil), ASHP with storage was 27% cheaper, gas hybrids were 6% cheaper, and oil hybrids 14% cheaper. Overall average saving was approximately 20% for the householders. Ulster University also carried out an independent and objective evaluation to gather views and feedback from residents of the 10 houses and investigate the lived experiences of these residents, before, during and after these changes. This will determine whether the initiative has made a positive or negative impact on their daily living and budgets from a tenant’s perspective. This independent evaluation will be published within the interim report due shortly, but the evaluation conclusion noted (from

whom?), '... consensus that being involved in the project has been life changing and hugely beneficial to each of them. Involvement in RULET initiative has been empowering to the tenants involved and has led to a reduction in fuel poverty. Tenants affirm that they are now living in quality, warm, safe and energy efficient homes. Furthermore, tenants have overwhelmingly expressed higher quality of life, improved health and well-being for themselves and their families, as well as an increased sense of financial security.' An outcome of RULET is to provide key learning points to shape future retrofit programmes for the Housing Executive as both a large landlord and its influencing role as Northern Ireland's strategic housing authority to provide best practice to housing associations, local councils, homeowners, designers, students, policy makers and government bodies. This will be accomplished via an interim and final report on both qualitative and quantitative learnings from a 2-year evaluation period. The interim report will be published shortly.

\* The Housing Executive is the strategic housing authority for Northern Ireland and a landlord at scale, with approximately 83,000 properties. The Housing Executive's vision is to achieve clear climate targets, climate-resilience and focuses on the key impact areas of the built environment, the biosphere, sustainable communities, and transport, as well as the need for educational empowerment, and improved health and wellbeing through sustainable living.

\*\*System constraint – caused by 'bottlenecks' due to local network capacity limits.

## **What were the financial costs and measurable cashable benefits over a defined time period?**

**LiveWest & IW** – total cost of the works they completed across the 52 homes was approx. £924K. A breakdown across just two example properties based on average standard occupancy can be seen below. SAP software was used to calculate the approximate pay back years.

Property 1:

- Cavity wall insulation: cost £663, payback years 26.81, lifetime fuel saving, £2,280, lifetime CO<sub>2</sub> saving 10.08 tonnes,
- 3.4kW solar PV: cost, £7321, payback years 9.24, lifetime fuel saving, £17,250, lifetime CO<sub>2</sub> saving 56.00 tonnes
- High heat retention storage heaters: cost £7259, payback years 10.66, lifetime fuel saving, £6,100, lifetime CO<sub>2</sub> saving 14.60 tonnes A total cost of £15,243, resulting in a lifetime fuel saving of £25,630, and 80.68 tonne reduction in CO<sub>2</sub> emissions.

Property 2:

- Cavity wall insulation: cost £668, payback years 24.21, lifetime fuel saving, £2,567, lifetime CO<sub>2</sub> saving 11.88 tonnes
- 3.4kW solar PV: cost, £7321, payback years 11.78, lifetime fuel saving, £10,825, lifetime CO<sub>2</sub> saving 29.50 tonnes
- High heat retention storage heaters: cost £5710, payback years 17.02, lifetime fuel saving, £3820, lifetime CO<sub>2</sub> saving 10.40 tonnes A total cost of £13,699, resulting in a lifetime fuel saving of £19,102, and a 51.78 tonne reduction in CO<sub>2</sub> emissions. Residents are able to utilise the easy-to-use smart meters that have been installed to confirm the measurable cashable benefits through a reduction of their bills. The client will benefit from a further tangible income stream from being able to sell excess energy back to the grid, increasing the budget available to reinvest back into the community.

**NIHE** - The impact of retrofit measures in terms of cost and benefit can be calculated in multiple ways of varying complexity. Ideally, over the lifetime of a measure, the cost of installation will be less than the total fuel cost savings, the homeowner benefits from both through reduced bills, increased comfort, health, and well-being. The simplest method to analyse this is to calculate the number of years it takes to pay back the capital cost of the

measure by dividing it by the annual fuel savings. This doesn't account for financial benefit to the landlord necessarily but reduced constraint to the electricity network, which is a benefit as well as a potential green dividend from the reduced energy company and bills for the householder. Below are the agreed final account costs:

- Average Costs of Improved Energy Efficiency per dwelling: £9,300.00
- Average cost heat pump, heating upgrade: £10,914.00
- 2x Thermal batteries: £6,000
- Average cost hybrid system (HVO or Gas) & heating upgrade: £10,633.00 In summary the average cost per dwelling was £22,445 and the average saving in household energy bills per is approx. £521. This ranges from £650 with ASHP/storage to £480 for oil hybrid heating and £390 for gas hybrids. This doesn't factor the annual reduction in carbon of approximately 4t per dwelling. In addition, this whole house retrofit could result in reduced maintenance as heat pumps typically don't require the same maintenance burden as traditional heating systems and have the potential of reducing heating cycle replacements

### **How relevant is this as an example that might be followed by other organisations?**

**LiveWest & IW** – The LiveWest project is an exemplary example of what can be achieved when a holistic approach is taken to utilise part of the £1.4 billion government SHDF grant provided to help improve energy efficiency of homes, and ultimately help the environment. As any registered provider of social housing (including private and local authority providers) are able to apply for the fund, we believe similar projects will be adopted more and more throughout the industry as the importance of energy efficiency continues to grow. An increase in retrofits will be delivered in the coming years, pushing the price down, making them more deliverable/affordable, ultimately increasing the quality of the works, the more they are delivered. IW will continue raise awareness and help the industry grow by:

- Sharing best practice internally: IW will share best practice internally across our UK wide business, utilising our existing carbon managers to help grow
- Recruiting industry experts: as the demand and need for retrofits grow, IW will continue to recruit more qualified experts across the country to advise and help us to support its clients
- Speaking externally at industry related events: IW will continue to help more clients achieve their energy efficiency goals by speaking at relevant events. Example: In March 2023, IW Non-Executive Director, recently spoke at two LHC/SWPA conferences (Exeter/Bristol) on challenges, priorities, and solutions for retrofit and refurbishments.
- Communicating with clients: IW will continue to hold coordination meetings with our long-term clients to discuss the importance of following the industry examples and the relevance of retrofits. Increasing the awareness of as many people as possible can lead to a significant difference being made. This project was phase one of an award-winning sustainability project, and will continue to deliver a social, environmental, and economic benefit into the future.
- Social long-term benefit: as the works have led to further phases/works, there will be more opportunities for employment/upskilling within the local area. Residents can also benefit from an improved health, comfort, and safety
- Environmental long-term benefit: existing buildings will have an improved longevity, resulting in a lesser effect on local ecosystems than newly constructed buildings would have. Improved air quality/reduced carbon emissions.
- Economic long-term benefit: reduced operating costs of buildings/reduced bills for residents/increase in local reinvestment The above examples are just a few of the key benefits that may influence other organisations to follow in the footsteps to help us all create greener futures together.

**NIHE** - The initial learning from RULET has given the Housing Executive confidence and assurance to develop a larger retrofit programme. In October 2023, the Housing Executive commenced a 300-unit Low Carbon Retrofit Programme with the objective to provide options for a new Landlord Decarbonised Heating Policy by 2025 with a low carbon retrofit programme from 2026/27 in line with the Housing Executive's Sustainable Development Strategy and as strategic delivery partner for the current Northern Ireland's 'Affordable Warmth Scheme'. The approximate cost of these two key future whole-house retrofit programmes is potentially £150m pa. The 300-unit Low Carbon Retrofit Programme over the period September 2023 to March 2025 at a capital cost of approximately £9m, has the desired outcome of reducing carbon emissions, reducing householder bills, and providing healthier homes. The following interventions are proposed:

- Improved energy efficiency measures through retrofit, e.g. upgraded wall and loft insulation, replacing windows with double glazed systems fitted to passive house performance standards, basic airtightness measures and autonomous ventilation systems.
- Low carbon heating options, principally air source heat pumps (ASHP), bio methane, if available in the scheme locality, and bio fuels as an alternative to home heating oil.
- Improved 'time of use' electricity tariff options.
- Improved householder education to effect behaviour change.
- Renewable energy to provide power generation and electric storage. Within its role as strategic housing authority the RULET pilot will further reinforce the necessity for adopting the whole house approach and this could be applied by other organisations adapted to other similar net zero or retrofit schemes. Both RULET and the 300 Low Carbon Programme which evolved will provide confidence to the local construction industry with clear market signals on our intention to provide low carbon retrofitting at scale. This can provide some confidence to the current shortage of skills and labour in the construction industry around retrofit measures.