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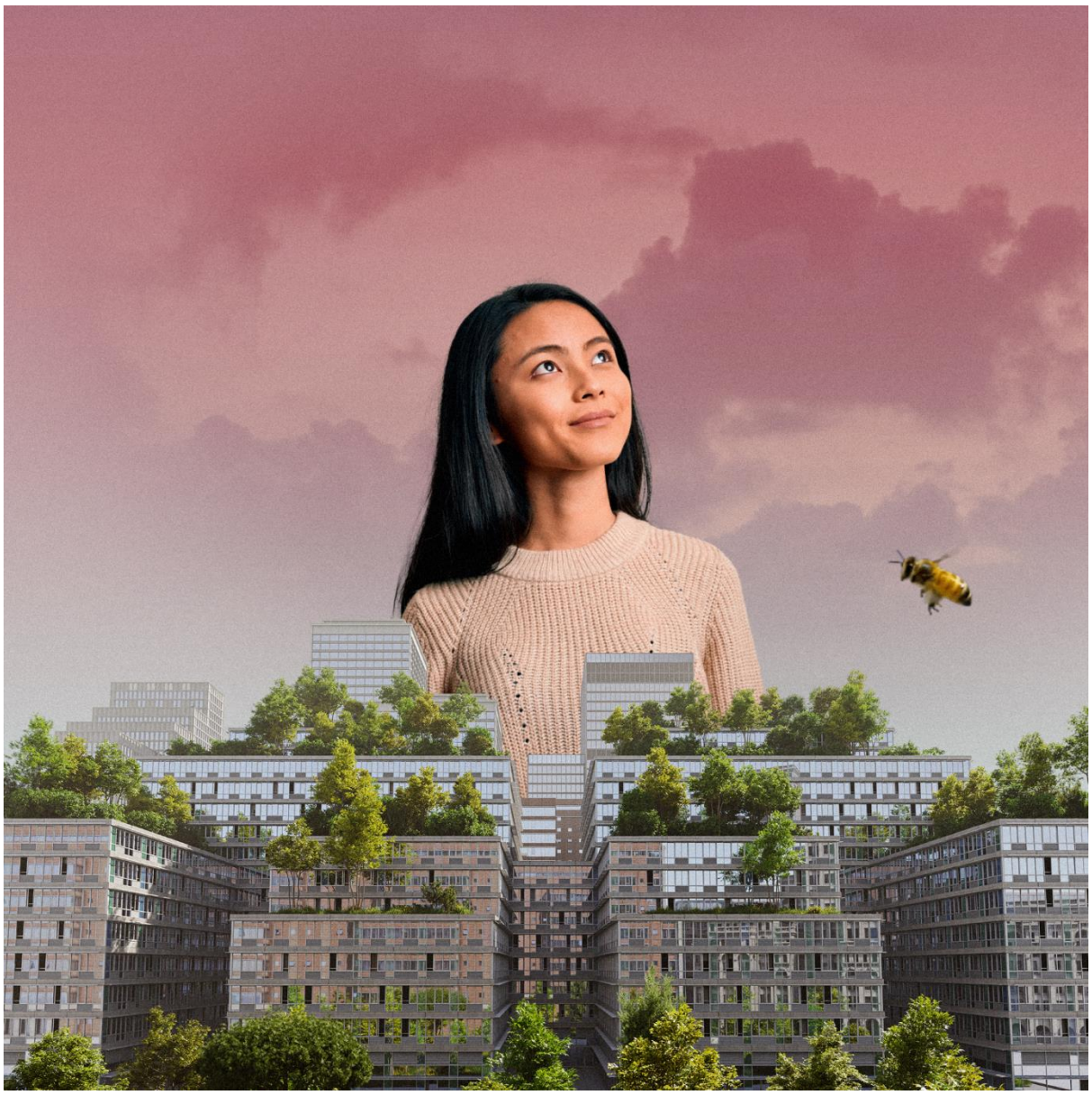

Better Futures Retrofit Accelerator

Summary Report

March 2025

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Contents

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Introduction

For the past 7 years, the Better Futures programme has supported London's drive to achieve Net Zero by 2030. Funded by the UK Shared Prosperity Fund, Better Futures wants London to be a beacon of cleantech, low carbon and resource efficient industry.

Delivered by Undaunted and Enterprise at Imperial College London the Better Futures Retrofit Accelerator (BRFA) was a brand-new initiative supporting climate innovation in the retrofit market in London.

The aim of the BFRA was to support industry transformation; enable the scaling of retrofit delivery in London and nurture London based innovation. By linking key industry decision makers with climate startups focussed on the built environment it sought to advance the development of products and services that could support the decarbonisation of existing buildings and accelerate the transition to net zero.

This document summarises the activities undertaken over the course of the programme, the outcomes from our work and suggestions as to how we could continue to develop and amplify the impact of innovation in the retrofit sector through further support.

Why retrofit?

The built environment is responsible for 25% of the carbon emissions in the UK[1] with 19% being attributable to operational emissions[2], the energy needed to heat, cool and power our buildings.

Historically, most of the focus on energy efficiency and the broader aspects of environmental sustainability has been centred on new buildings. However, there is now increasing acknowledgment of the fact that 80% of the buildings that will be standing in 2050 have already been built[2] and that urgent action needs to be taken to improve their performance to meet local and UK wide net zero commitments.

Retrofitting these buildings is a complex process and presents significant challenges in terms of planning and delivery, but as well as a challenge the retrofit sector presents huge opportunities. The UK's housing retrofit market is projected to be worth over £25 billion annually, with London alone accounting for a significant share of this due to its dense, aging building stock and environmental targets[3]. Estimates place the value of retrofitting non-domestic buildings such as hospitals, schools and commercial buildings at around £500 billion over the next 10 years[4].

Net zero in the built environment cannot be reached by continuing with 'business as usual'. To deliver future fit retrofit, industry will need new products, technologies and working

[1] Net Zero Whole Life Carbon Roadmap, UK Green Building Council, November 2021
[2] UK Green Building Council https://ukgbc.org/our-work/climate-change-mitigation
[3] Construction Leadership Council, Greening Our Existing Homes, May 2021
[4] Retrofit is not the enemy, it's a golden opportunity – so long as our industry can deliver, Building Magazine, 4 September 2023

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practices. This can only be achieved through increased collaboration between innovators, industry and other key players in the built environment.

Bridging the gap – the need to support innovation in the built environment

There is an established ecosystem of innovation support in the UK (venture builders, incubators and accelerators) which is increasingly focussing on climate technology. However, most programmes are targeted at early-stage companies and, whilst they may be focussed on specific technologies or themes (eg Deep Tech or social enterprise), very few are sector focussed. They are also typically quite short in support duration with over 50% lasting less than 3 months and over 80% lasting less than 6 months.

Industry is also taking action towards Net Zero with many individual companies seeking new solutions in their route to decarbonising the buildings they are designing, retrofitting and operating. There are a growing number of UK wide initiatives such as the UK Green Building Council's Advancing Net Zero Campaign and the National Retrofit Hub as well as London centric initiatives such as London Councils' Retrofit London and LETI.

Most of these initiatives are including innovation and new solutions as part of their work but, given the immediacy of need to start retrofitting now, are having to concentrate their focus on products that are already commercially available and 'shovel' ready.

As a result, there is a distinct gap in development support for new products and services that inhabit the space between the established innovation programmes and full commercialisation. Those in industry are often faced with a plethora of unfiltered sales pitches from new products whilst startups struggle to get meaningful engagement with potential industry adopters to refine their customer journey.

The BFRA aimed to fill this gap, acting as a catalyst to support and accelerate the development and adoption of these solutions by providing space to convene conversations between startups and industry. The programme allowed industry to engage with a pre-selected group of new technologies and solutions emerging into the retrofit market which had already been identified as of high impact potential. This process supported startups in refining and 'road testing' products to ensure they truly met market need before then scaling to commercial readiness. These opportunities for collaboration and creative thinking between participants provide a route for effective, impactful new products to get to market faster and support the acceleration of retrofit delivery.

The Programme

Our innovators

The programme supported 24 London based startups and SMEs whose technologies had the potential to scale and make a significant impact in reducing greenhouse gas emissions within the built environment retrofit sector.

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The companies we selected ranged in commercial readiness from prototype to already commercially launched and looking to scale their growth. Their innovations spanned a wide range of product types such as:

- **Systems & planning tools** covering retrofit planning (Building Atlas, Map Mortar, Pario, Riise, Vulcan, Upgreen), energy & carbon management (Ecodriver, Ecofye, Smartshift) and materials specification / circularity (Firstplanit, Material Index)
- **Engineering solutions & energy optimisation** (Cosysense, Light Fi, Verv) covering energy & comfort, refrigerant management & planned maintenance
- **Products** such as heating systems (Anzen); air quality & ventilation products (Airex, Isometric Outcomes, Vox Aeris); insulation systems (Carbon Cell, Q-Bot, Vundahaus) and eco-alternatives to traditional products such as wall studs, board products and finishes (BioTwin, Cresco Biotech, Cyanoskin)

The connection to industry

Industry engagement was a core part of the programme, bringing together key industry influencers and potential adopters of innovation to share their experience and knowledge with our startups and identify how they could work together to accelerate the delivery of new products and solutions to the retrofit, and wider built environment, sector.

Support provided

The selected companies received a range of support over the programme duration.

This covered:

1. **Innovation Support** - Analysing the needs of the companies on the accelerator programme and providing support such as prototyping development through Advanced Hackspace, access to R&D support from Imperial academics to tackle specific technical challenges and paid student interns to bring new skills into their teams.
2. **Tackling Challenges** - Engagement with industry to identify common challenges to adoption of new innovations in retrofit projects with the aim of identifying routes to improvement.
3. **Innovation Delivery** – Identifying needs and opportunities for testing at both small scale (demonstrator) and commercial scale (pilot and first adopter) installations. This also included informal advice to allow innovators to access technical, commercial and industry knowledge on a 'critical friend' basis to test how to best deliver their solutions to market.

The latter two strands of support were heavily focussed on industry engagement with the intent on defining routes to speeding up the delivery of market ready solutions and accelerate the delivery of London's net zero goals.

Identifying the Challenges

Several industry engagement activities were undertaken as part of the programme, the first of which were the Challenge Identification Workshops which were held with each of the recruited cohorts of companies along with a group of industry attendees.

The intent of these sessions was to:

- Identify the common pain points and challenges, for both industry and innovators, in the adoption of new building retrofit technologies.
- Look to identify some potential routes to solving these challenges with a focus on solutions that could be tested within the timeframe of the programme.
- Understand how the accelerator community might be able to work together to make progress on these actions and how the outcomes might be shared.

Through the challenge workshops, we identified four overarching challenge themes which were then refined further through a series of follow-up meetings with the startups.

Decision Making - Understanding the decision-making process for the procurement of new retrofit solutions

Innovators highlighted the challenges associated with identifying the various actors involved in the adoption of new solutions. This includes those that influence the decisions to procure as well as the final decision-makers. Those working in industry were often unaware of the difficulties that innovators faced in getting 'face time' with industry decision-makers in order fully understand how to navigate the procurement processes for their products.

Information - Clarifying the information required by the relevant decision-makers

In communicating with stakeholders, innovators need to understand what information needs to be provided and how it should be tailored to various decision-makers in the procurement process. A key part of this is how to communicate the value of the solution to potential clients and how to acquire this information. This includes gaining a thorough understanding of requirements to comply with relevant regulatory, certification, assurance and insurance standards.

Piloting & Testing - Building a roadmap to support testing and piloting retrofit solutions

Understanding what needs to be demonstrated through test and pilot installations such as validation of installation methods, proof of durability / reliability as well as verification of performance claims. Critical to this is defining the potential benefits to industry partners to provide them with the trust and confidence in new products. Both innovators and industry stakeholders identified the value in creating a standardised template for a piloting and testing agreement covering what the collaborating parties are looking to gain from the testing and how outcomes will be shared.

Ecosystem - Building a collaborative community of innovators & adopters of innovation

Workshop participants were all agreed on the value in developing a holistic approach to coordinating and collaborating within the retrofit supply chain. For innovators this involved the need to understand the wider ecosystem, who they currently have access to and who they still need to engage with.

It should be noted that these themes are all intrinsically linked, with piloting and testing required in order gain the high-quality information needed to support the decision-making process for industry adopters. Additionally, understanding and being able to navigate the

complex retrofit ecosystem is essential to being able to identify suitable pilot partnerships for both industry and innovators.

The outcomes of these workshops allowed us to focus the remainder of our industry engagement activities towards the twin aims of

1) Clarifying the decision-making processes for different product categories and identifying innovation intervention strategies to drive forward actionable solutions

2) Identifying potential partnerships for ongoing product development and testing, to prove the value of new solutions to industry. Both of which are critical in delivering new solutions to market more quickly and supporting the scaled delivery of low carbon retrofit.

Pathways to Change

The Challenge Identification Workshops were followed by a Solutions Round Table event which aimed to identify further strategies and actions around the following topics.

Innovation entry point

This focussed on identifying the key decision makers that influence the procurement of innovative solutions and how this varies by product type. Critical to this was understanding the routes or channels that innovators should explore to gain access to these stakeholders and fully understand their needs.

Sustainability managers and design team members were generally agreed to be the route into projects however, the value proposition needs to be strong enough to convince those who come later in the procurement process eg cost consultants, contractors and the end client. The complexity associated with the range of potential procurement routes was raised as a frustrating factor as this affects the degree of influence the design team has over procurement as opposed to the end contractor (or sub-contractor). For some product types, especially engineering hardware such as sensors and controls, there is significant tension between those controlling capital vs operational expenditure in terms of their motivating factors.

Information for impact

Gaining an understanding of the role that different stakeholders play in the decision-making process (eg who are the ‘influencers’ and who the final decision rests with) is critical to integrating innovative solutions within retrofit design. As is understanding the key information each of the stakeholders are looking for so innovators can better demonstrate the value of their products.

Industry stakeholders raised that they are often presented with information focussing purely on the environmental and carbon benefits of products. However, they have a need to balance a wide range of often conflicting priorities such as regulatory compliance and certification; reliability of supply; ongoing customer service; confidence in installation and ongoing maintenance; payback periods and impact on building value (saleability and lettability). This highlighted the need to emphasise the additional benefits of new products especially where these are additional to ‘business as usual’ options. This could be improved

air quality, thermal comfort, health, speed of installation, durability, circularity, compliance with future regulations, reliability of operation etc.

Building evidence that engages

Test and pilot installations are a critical means to provide proof of value and payback periods for new products. The case studies that can flow from pilot installations are an essential way of providing potential users with the confidence to specify new products. We explored what was required from piloting or testing partnerships from both the stakeholders' and the innovators' perspectives.

The required outcomes from test and pilot installations are quite diverse, covering value related issues such as demonstrating measured savings and payback period as well as practical issues such as proving installation methods, usability testing and ongoing maintenance. But all these outcomes should be focussed on demonstrating the value of new products whilst also mitigating risk exposure for those adopting them. The arguments for entering into pilot partnerships from an adopter perspective vary but could include opportunities to showcase alignment with strategic ESG / net zero goals, reduced exposure to future policy or regulatory changes and improving long term asset value.

The two key elements that emerged from both an innovator and adopter perspective were firstly, the importance of making sure you pick the right partner to work with. It is essential that partners have aligned values and are someone you want to build a long-term relationship with as this can affect the credibility & reputation of both partners. The second is the need for both parties to be clear on what they expect to gain out of the process (including any financial outcomes), who 'owns' the outcomes and how results can be shared.

Partnership Building

Outside the engagement workshops we held further events that were focussed on creating partnerships between industry and innovators to advance their joint aims.

The Challenge Identification workshops exposed the degree to which innovators struggled to engage with those working in industry to refine their customer discovery and access potential development partners. Additionally, those working in industry highlighted the overwhelming effort of sifting through the plethora of new products that they encountered on a daily basis to decide who they wanted to engage with. We hosted a Startup Spotlight, a twist on the more traditional 'investment pitch' event, that brought together an audience from across the built environment and clean tech ecosystem to listen to innovators pitch their products and take questions. This was followed by a networking event where the audience had the chance to speak with the startups to discuss opportunities for fund-raising, co-development, piloting and testing.

The importance of testing and piloting to refine and build trust in new products was apparent from the outset of the project. De-risking new products and building an evidence base to demonstrate their value is essential to them being able to scale. We arranged a number of site visits with a range of building owners, property developers and estate managers which gave them the opportunity for them to engage with innovators on an informal basis giving them access to potential solutions that they could trial. These sessions provided innovators

with valuable insights into the practical challenges faced by property professionals when planning retrofit and exposed them to a wide range of building types including commercial, residential, education, healthcare and listed buildings. In our evaluation of the programme, startups underlined the dynamic structure of the visits, which allowed them to gain access to the end user, opening the door for potential pilots or partnerships. During the site visits, the startups were able to gather information, reflect on the site challenges, and discuss how their innovations could align with market needs. As a result of these visits two pilot installations were agreed during the programme with seven more potential opportunities under discussion for future implementation. The impact of site visits held in the final months of the programme cannot be assessed due to the length of time it takes for these relationships to evolve but are expected to yield further partnership opportunities.

Our final event Beyond the Blueprint: Innovating Retrofit Together focussed on the importance of collaboration and communication in scaling the delivery of low carbon retrofit, as these twin themes emerged in every activity we undertook during the programme. The complexity of the retrofit decision-making process exposed during the workshops highlighted the increased need for us to collaborate and work together to achieve the best low carbon outcomes for our existing buildings. Sharing this information, both what does and doesn't work, is a critical part of this process to support quicker learning within industry and scale delivery of effective retrofit solutions. Alongside this, we need to reframe the way we communicate about retrofit to acknowledge the huge impact the built environment has on people's lives in terms of both physical and mental health and wellbeing. As well as radically reducing carbon emissions, retrofit should be delivering buildings that are fit for their future purpose and provide a healthy environment for their occupants. It is therefore essential that we bring future occupants into the collaboration process to ensure that their needs are fully considered and addressed when planning retrofit projects.

Key Insights & Potential Future Directions

The Better Futures Retrofit Accelerator occupied a unique position at the intersection of the innovation and retrofit ecosystems. The programme brought together innovation expertise from within Imperial College with a level of industry engagement unusual in a startup accelerator.

As the programme had no financial interest in the companies it supported, and was purely impact driven, it was able to act as an impartial party providing industry stakeholders with access to a curated group of high impact innovations that had the potential to support them in the decarbonisation of their buildings. This process supported industry players willing to act as test partners or early adopters of technology to connect with potential innovation partners to run demonstration projects, giving others in industry the confidence to adopt more innovative solutions in the retrofit of their buildings. It also supported the innovators in getting their products developed to a stage where they were ready to enter into these partnerships.

Two consistent messages we heard throughout the programme were the absence of an established structure for innovation to be considered as part of the retrofit design process as well as a lack of opportunities for innovators and industry to engage meaningfully on an informal basis. Participants welcomed the opportunity the programme provided to allow

these conversations to happen so they could learn from each other and advance opportunities for collaboration.

As a result, it is evident that programmes like this have significant potential to become a valuable part of the wider ecosystem, acting as a pipeline for other built environment initiatives around innovation and future solutions such as UK Green Building Council's Solutions Library and the National Retrofit Hub's proposed Supply Chain, Products & Solutions case study library. It can also support mission focussed efforts such as those looking at innovation in regulation such as RetroNetZero RS&IN and BSI's Innovation Lab.

The programme also aligns well with the priorities of the recently launched London Growth Plan which places significant emphasis on London's huge potential to be a frontier 'innovation maker', especially green innovation which can support London's ambitious goal to become a Net Zero City by 2030. London's world leading built environment sector has been identified as an ideal showcase for new low carbon technologies, with potential to use London's public and private sector buildings as demonstrators for the retrofit of the future.

When considering a future evolution of this programme, the learnings of our work so far suggest the following considerations:

- **Timing** – It takes time to build the deep relationships required to form partnerships and procure pilot and testing opportunities to demonstrate the value of innovative products. A longer delivery window allows for a more comprehensive evaluation of their impact.
- **Growing the network** – Expanding the stakeholder and potential pilot partner network would enable a wider range of skill and perspectives to be brought to the table. One means of doing this would be to share events with other initiatives in this space such as those focussed on retrofit or net zero buildings as well as networks of building owners (e.g. anchor institutions) looking to share knowledge on decarbonising their estates.
- **Curating the cohort** - The impact of the support provided to innovators varied depending on the product type and the company's stage of commercial readiness. Early-stage companies benefitted most from the innovation and business support elements whilst later stage companies benefitted more from site visits and piloting opportunities. Tailoring the programme by product type and level of commercialisation would allow better matching with stakeholders looking for solutions for specific building types and improve SME's development potential.
- **Getting more granular** – There is a definite value to segmenting activities to allow deeper work on some of the issues identified in the challenge workshops. This could look at issues that affect specific product types such as navigation of the regulatory certification and assurance process; funding options for products that are more capital intensive to get to commercial readiness (eg those involving complex manufacturing, extensive certification or life cycle assessment) or more detailed mapping of customer journeys, influencers & decision makers.
- **Creating tangible outputs** – A second stage of work could include creating brief guidance documents or case studies for both innovators and industry practitioners. This could include utilising learnings from pilot and test installations to develop a

template for a piloting mandate or the development of guidance on how to navigate the certification process for innovative products.

- **Importance of skills** – It was evident from the work we carried out that many innovators faced challenges around the skills required to install their products and those wishing to adopt new products had concerns about accessing appropriately skilled installers. Linking innovators and industry to Further Education colleges and other technical training providers would be a valuable means to ensuring a pipeline of adequately skilled Installers to ensure new technologies can be delivered at scale.

Further Information

Additional information on the programme, including case studies on some of the innovations we have supported, can be found on the Undaunted website at The Better Futures Retrofit Accelerator

You can also listen to our podcast Accelerating to a Better Future featuring interviews with innovators and stakeholders involved with the programme and learn more about two of our startups in these short videos which were produced during the BFRA programme: meet Cyanoskin; meet Isometric Outcomes.

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About Undaunted

Undaunted is a hub for the UK's climate innovation community, creating new routes into green entrepreneurship and supporting the acceleration of startups and SMEs tackling climate change.

Since 2012, we've developed and refined our model for accelerating applicable, practical and adaptable solutions that make a difference on a global scale.

Undaunted is a partnership between two world-renowned scientific institutions: Imperial College London and the Royal Institution. Grown in Imperial's Grantham Institute – Climate Change and the Environment, we have climate expertise, science and passion for the planet in our DNA.

This academic context is key. It embeds us within world-class facilities, expertise and networks, allowing us to embrace high-quality deep-tech solutions and tackle harder-to-change sectors. It also means we keep climate and public good the core focus of everything we do.

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