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MAKING MARKETS THROUGH THE UK INFRASTUCTURE BANK

THE GREEN HOMES INFRASTRUCTURE OPPORTUNITY

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Delivering net zero will only be possible with a sustained, multi-decade national retrofit drive to decarbonise homes and buildings. The National Infrastructure Commission and Climate Change Committee have identified domestic energy efficiency and low carbon heat as a national infrastructure priority.

To date, mobilising capital has been one of the greatest challenges. The UK Infrastructure Bank (UKIB) could be mission-critical for making progress – supporting local authorities, businesses and financial institutions to unlock healthier homes, lower energy bills, green jobs and significant carbon reductions.

This briefing outlines the market-making role the UKIB could play through supporting transformative, strategic projects. It provides a portfolio of examples from the UK and around the world which the Bank could support in the short- and medium term. Key recommendations include:

> **Recognise and communicate** the decarbonisation of the built environment as a strategic priority, aligned with investment principles and supporting the overall mission.

> **Explore and promote financing options and tools** through which the UKIB can support place-based transitions. Over time, this could include:

- Support for innovative green businesses to invest and scale supply chains, and energy companies to broaden their services
- Provide patient low-cost capital and co-invest alongside new forms of local authority financing to help councils access and crowd-in affordable capital and aggregate demand
- Providing concessional finance or guarantees to retail banks to underpin attractive financial products made available across the sector and to households

- Support the private and social rented sector to decarbonise building stock
- Support local authorities and others to identify project pipelines and aggregate demand to build economies of scale and reduce costs
- Connect transformational deals with private finance actors to deliver blended finance

> **Support digitalisation and smart, data-driven solutions** which could help crowd-in further private finance, monitoring efficient use of capital and long-term benefits.

> **Work with Government departments** to consider future options to channel additional subsidies and incentives through the Bank's operations, as seen in Germany, helping unlock further environmental additionality and private investments.

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1. The investment case: Placing importance on place-based transitions

Through supporting green homes and places, the UK Infrastructure Bank (UKIB) can help close one of the largest investment gaps for net zero, making markets through transformative deals. A strong evidence base underscores the additionality that smart deployment of capital through the UKIB can offer, in a manner highly complementary with its four investment principles.

The Bank's first investment principle is to tackle climate change and drive regional and local economic growth. Emissions from buildings account for 23% of the UK's total.[1] As recognised in the Government's recent Net Zero Strategy and Heat and Buildings Strategy, addressing this is critical for meeting climate targets. Currently heat and buildings represent one of the biggest climate investment gaps – with the Net Zero Strategy identifying a £120bn investment need to 2037.[2] The Energy Efficiency Infrastructure Group (EEIG) has recently highlighted a lack of support for owner occupiers classed as 'able to pay', who represent the largest share of the UK's housing emissions.[3] Many in this category do not have the disposable income or savings to pay for retrofits upfront. As new regulations announced in the Heat and Buildings Strategy come into place, such as the phase out of fossil heating systems, it is vital that further assistance is made available to ensure the transition is fair, affordable and achievable.

A focus on green homes can drive regional and local economic growth. A sustained drive to improve energy efficiency can reduce household energy bills by £7.5bn per year to 2030,[4] support 190,000 jobs across a range of trades to 2030,[5] and avoid pressures on the NHS from cold, unhealthy homes – potentially saving £1.4 to £2bn annually.[6] Home upgrades secure energy cost savings and increase household's disposable income, resulting in a persistent boost to spending and tax revenues, as well as reducing benefit payments. This translates into spending on local goods and services, supporting further 'induced' jobs,[7] marking green homes out from many other forms of investment-led growth.

At the macro-level, a national retrofit drive to lower energy demand and shift to clean electric heat would reduce dependence on gas imports, redirecting spending

[1] https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Buildings.pdf
[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1028157/net-zero-strategy.pdf
[3] https://www.theeeig.co.uk/media/1114/eeig_analysis-of-the-heat-and-buildings-strategy_03.pdf
[4] https://www.theeeig.co.uk/media/1091/eeig_report_rebuilding_for_resilience_pages_01.pdf
[5] https://www.theeeig.co.uk/media/1099/eeig_report_turning_stimulus_into_recovery_pages_web.pdf
[6] BRE (2015) The cost of poor housing to the NHS
[7] EC (2017) The macro-level and sectoral impacts of Energy Efficiency policies; IEA (2014) Capturing the Multiple Benefits of Energy Efficiency

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onto goods and services with a stronger domestic component. Given the UK's gas import dependency, this is a route via which energy efficiency improvements drive GDP, which also increases economic resilience to geopolitical risks, while protecting households from volatile international gas markets. Increasing the energy efficiency of our built environment will also deliver vital energy system-wide benefits by reducing peak demand, reducing the investment need in other areas of network infrastructure. This is a particularly important benefit in the context of increasingly electrified heating and transport systems.

The Bank's second investment principle is to support investment in infrastructure assets, networks, and new technology – prioritising clean energy, transport, digital, water and waste. Again, a focus on place-based transitions is highly complementary with this principle. Domestic energy efficiency and low carbon heat are understood as an infrastructure priority by the National Infrastructure Commission,[8] Climate Change Committee[9] and other bodies. As the examples in Section 3 demonstrate, there are multiple infrastructure assets, networks and technologies the bank can underpin in this area – supporting the Bank's priority areas of clean energy and digitalisation.

The third investment principle is to deliver a positive financial return, in line with the Bank's financial framework. Multiple pilots across the UK and around the world have proven the business case for financial models and services supporting domestic energy efficiency and low carbon heat (see section 3), as well as other Government initiatives such the Heat Networks Investment Project.[10]

The fourth principle is that investments are expected to crowd in significant private capital over time. There are various examples that demonstrate that public investment in retrofits spur additional private investment. For every €1 invested by Germany's infrastructure bank KfW to incentivise renovation through interest rates and subsidies, building owners were motivated to borrow and spend €6 – while the Government has nearly recouped its outlay through increased VAT revenue alone.[11] The UKIB can support the scaling of innovative business models along a timeline complementary to the regulatory pipeline set out in the recent Heat and Buildings Strategy – supporting sustainable growth to pump-prime markets and scale supply chains. In this way, the UKIB can act as an 'enabler of enablers', helping support an ecosystem of products and services that will become self-sustaining over time. For more information on the sequencing to crowd in private capital, see section 4.

[8] https://nic.org.uk/news/ministers-must-seize-the-golden-opportunity-to-switch-to-low-cost-energy/
[9] https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf
[10] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1021146/Heat_Networks_Project_Pipeline_April_to_June_2021.pdf
[11] Calculated from Institut Wohnen und Umwelt & Fraunhofer Institut (2018) Monitoring der KfWProgramme „Energieeffizient Sanieren"und „Energieeffizient Bauen" 2016; BFM (2016) Haushaltsgesetz 2016

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2. Unpacking the problem: How the UKIB can help tackle current market failures

Despite the clear benefits associated with greener homes, a number of barriers to uptake have been identified across different housing tenures. Indeed, home insulation rates have been steadily falling since 2010-12, following the withdrawal of Government support.[12] The finance sector is primed to enter this market; however, support is needed to create the right conditions. The Green Finance Institute (GFI) has profiled different market segments to understand the main barriers (table 1).[13]

Key, cross-cutting hurdles include high upfront costs and a lack of access to affordable finance, combined with low awareness and supply chain challenges – with limited options to aggregate demand to build economies of scale. While there are planned policy changes which may stimulate demand, many households remain without support or incentive for change. The UKIB can help overcome a number of these barriers, including by providing access to attractive sources of capital, facilitating the de-risking of investments and supporting new consumer-focussed business models. Over time, it can also provide advice to local authorities and other stakeholders to build investable proposals and project pipelines.

Table 1: Key financial and non-financial barriers to action and investment in greener homes

	Upfront costs	Lack of financial support	Unclear Government signals	Supply chain	Other
Owner Occupied (first-time buyers, mortgaged homeowners, outright homeowners)	Higher up-front costs of low-carbon heating systems vs traditional gas boilers; costs of whole house retrofit	Lack of financial products and incentives; first-time buyers seek to minimise outgoings, highly leveraged, have limited options for further borrowing	Long-term uncertainty on schemes, nothing on efficiency for 'able to pay'. Regulatory clarity for heat, but lack of clarity on efficiency	Fragmented market and access to trained installers	Lack of access and accessibility of quality, trusted advice and information

[12] https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf

[13] https://www.greenfinanceinstitute.co.uk/wp-content/uploads/2020/12/Financing-zero-carbon-heat-turning-up-the-dial-on-investment_Green-Finance-Institute.pdf

Private Rented (small and large landlords, asset managers)	High upfront costs, particularly for multi-property portfolios; currently unable to aggregate demand	No financial incentives or support Limited capacity to leverage credit, limited awareness for acquiring finance	Lack of long-term certainty Ambiguity on new standards	Fragmented market and access to trained installers	Landlord-tenant split incentive District Heating: size of market, lack of regulatory environment
Social Rented (Including Housing Associations and local councils)	High upfront costs to decarbonise large portfolios	Higher cost of borrowing for Housing Associations than local authorities; many social landlords close to borrowing limits	Lack of long-term policy certainty and capital investment from central government	Supply chain maturity Stock often dispersed	Short-term grant profile difficult to reconcile with long-term objectives District heating: size of market, lack of regulatory environment

The UKIB can help address the risk profile which might stop some lenders from providing finance, and limit take-up from households and other actors. A variety of tools exist which the UKIB can use to de-risk investments,[14] on top of new digital and data-driven solutions (see section 4).

For example, concessional funding and guaranteed financing can help incentivise homeowners and provide lenders confidence to enter the market. Examples of this exist around the world, including the New York State Energy Research and Development Authority's Loan Loss Reserve programme for clean energy.[15] If a borrower defaults, the loan loss reserve will reimburse the lender up to an agreed amount to mitigate their losses.

Long payback periods on retrofitting projects can make traditional types of finance less attractive to homeowners. There is an opportunity for the UKIB to work with actors such as the GFI to establish a 'demonstrator project' of Property Linked Finance (sometimes known as Property Assessed Clean Energy), which helps to overcome the payback challenge by linking the finance to the property rather than

[14] For example, see https://valueandrisk.eefig.eu/ and http://www.eeperformance.org
[15] https://portal.nyserda.ny.gov/CORE_Solicitation_Detail_Page?SolicitationId=a0rt000000x5aidAAA

the property owner, enabling a longer pay-back period. Other innovative business models, such as 'heat as a service', can also help spread the costs for homeowners. Support to scale projects which aggregate demand can also help enable the market (see section 3.1 for examples).

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3. The right tools at the right time: How the UKIB can support greener homes this decade

To support net zero and local economic growth, the UKIB will partner with the private sector financing and local authorities and develop an expert advisory service to help local authorities and other project sponsors develop and finance projects. While the Bank will not provide direct lending to households, capital could be channelled through intermediaries (i.e., retail banks or local authorities) to provide concessional finance to individuals. High-level examples of how these services could be utilised to decarbonise the built environment are indicated in Table 2.

Table 2: Examples of how the UKIB can support place-based transitions

Private sector financing	Local Authority lending	Expert advisory service
• Provide concessional finance or guarantees to retail banks so they can provide attractive offers across all sectors • Support clean economy actors (i.e., heat pump manufacturers, heat network companies, retrofit firms, builders' merchants) to scale supply and invest • Support energy companies broaden their services (i.e., offering 'heat as a service') • Support PRS and housing associations decarbonise their building stock	• Provide patient low-cost capital and co-invest alongside new forms of local authority financing, such as Local Climate Bonds, to help councils access affordable capital and aggregate demand to support multi-vector infrastructure projects (i.e., utility-scale ground-source heat pump installations, heat networks) and services (i.e., whole-street-retrofits, green neighbourhoods as a service – see example below)	• Support local authorities identify project pipelines and aggregate local demand to build economies of scale, with a joint-up approach • Support private and social landlords aggregate demand and access affordable capital • Help 'match make' stakeholders (installers, engineers, manufacturers, etc) for a whole house/ street retrofit approach • Connect transformational deals with suitable private finance actors to deliver blended finance solutions

The Bank has a range of financing tools at its disposal which could be used to support energy efficiency and low carbon heat measures, mapped out in Table 3.

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Table 3: Examples of how the UKIB's financing tools can support place-based transitions

Tool	Example
Senior debt, where there are low levels of liquidity	Providing concessional funding to banks who then on lend the low-cost capital to homeowners for green projects, which is then repaid to the UKIB as customers make their repayments (similar to KfW model – see section 3.2).
Hybrid products such as mezzanine instruments, sitting between senior and equity debt	Potentially relevant for certain heating infrastructure projects, such as heat networks.
Equity to address construction risk or crowd-in additional investors	Similar to the heat networks point above, drawing on lessons and examples from the Heat Networks Investment Project.[16] Opportunities to provide initial capitalisation of a property-linked finance scheme or heat-as-a-service business models.
Guarantees	Providing credit guarantees to bankers lending to social housing providers, reducing the cost of funds for retrofit projects. Wholesale credit guarantees on the wholesale funding that banks use could help reduce the interest rate of green home products (e.g. green mortgages) and stimulate those markets.
Loans to local authorities at the rate of gilts + 60bps for high value and strategic projects	Support and co-invest alongside local authorities in projects to support place-based transitions and spur local leadership.

3.1 Examples from around the UK

By strategically supporting transformative deals and business models, the UKIB can help make new markets – addressing current market failures. A number of 'off the shelf' examples are already being developed across the country, which the UKIB could help scale and mainstream. A sample of these are outlined below, selected based on a high alignment with the Bank's four investment principles. The portfolio contains a mix of examples of projects which could make a difference today, as well as mechanisms and services which the Bank

[16] https://www.gov.uk/government/collections/heat-networks-investment-project-hnip-overview-and-how-to-apply

may seek to support within its longer-term strategy. We note that many of the examples outlined below could be further supported by data and digital solutions outlined in section 4.

Utility scale investment for ground source heat pumps

Kensa Group, who manufacture and install ground source heat pump systems in the UK, have developed a utility-style infrastructure concept to support an area-based approach to clean heat, piloted with Glasgow's Green Street. This model could underpin the mass adoption of ground source heat pump technology through a street-by-street and split ownership approach.[17] The approach resolves issues around distress purchases, network upgrades and synchronisation of homeowner actions and could be scaled through working with the energy industry and suppliers to popularise a networked ground source heat pump solution at scale, similar to gas grid infrastructure projects.

Comfort-as-a-service business models

Comfort-, or heat-, as-a-service models support the construction or refurbishment of homes to high energy performance standards, delivering significant energy bill savings that outweigh the upfront costs of retrofit. These models can be attractive to households, making retrofits easy and hassle-free. Service providers can aggregate demand (including by working with social and private landlords) to reduce upfront costs. Companies are already offering these services across the UK, including Sero.[18] Supported by Energy Systems catapult, Baxi Heating UK and Bristol Energy are also supporting a heat-as-service model.[19] The UKIB could provide upfront finance to service providers (potentially energy companies, retrofit companies and housebuilders) to support the initial upfront costs associated with retrofits, enabling the scaling of this consumer-friendly business model across the country.

Property Linked Finance

Property Linked Finance enables building owners to access 100% upfront funding for retrofits through finance attached to the property. The responsibility for repayments remains with the property and is passed on to subsequent owners who are benefitting from the installed measures. This model is based on the success of Property Assessed Clean Energy (PACE) financing in the USA. Property Linked Finance overcomes several market barriers, including allowing longer payback periods and therefore smaller repayments for consumers. There are various mechanisms for repayments that the GFI are exploring with the intention

[17] https://welcometogreenstreet.com/
[18] https://www.seroprojects.com/our-solution/
[19] https://es.catapult.org.uk/news/baxi-and-bristol-energy-heat-services/

of establishing a pilot scheme in 2022. UKIB funds could be used to finance the administrator providing the upfront cost of the scheme, or to crowd in wider investment or incentivise uptake by supporting concessional lending.

Green-neighbourhoods-as-service (GNaaS)

Bankers without Boundaries have proposed a mechanism to address the challenge of scaling energy efficiency measures in the urban built environment.[20] GNaaS envisages the establishment of a central entity in a city or region which designs, commissions, manages and funds deep energy retrofit on a street-by-street scale with incremental community investments. To fund the work, a mechanism attaches the long-term energy and maintenance savings to the centralised funding source. This takes the form of a long term (30 year+) comfort and maintenance contract with the resident or property. The concept has been met with positive reception from multiple local authorities and financial institutions, who would be interested in providing upfront costs, pending 'proof of concept', and the mechanism being promoted through the UK Cities Climate Investment Commission. [21] The UKIB could help support pilot trials across the UK, which could then be scaled up, leveraging additional private finance.

Energy Services Company (ESCO) in a box

ESCOs provide energy solutions and financing support to organisations that want to lower their carbon output. However, it is difficult for small and medium businesses to tap into this level of expert guidance. In Oxfordshire, the ESCO-In-A-Box initiative is changing this story. EP Group – an energy efficiency finance consultancy – partnered with Low Carbon Hub and Oxford Brookes University to launch a scheme that would help local businesses adopt energy-saving measures. Many local authorities have made promises to reach net-zero in the coming decades and initiatives like ESCO-in-a-box can help them to meet ambitious targets. The scheme can be tailored to suit different regional and industry-specific challenges across the country and around the world. [22]

Cardiff Capital Region data driven decarbonisation

Cardiff Capital Region is targeting a 51% decrease in domestic heat and power emissions. In doing so, a digital- and fabric-first approach is being adopted, supported by the implementation of Building Retrofit Plans to accelerate long-term decarbonisation, supported by UCL's 3D Stock Model (see section 4 for more information).[23] The implementation of Building Retrofit Plans across the

[20] https://www.bwbuk.org/post/green-neighbourhoods-as-a-service
[21] https://cp.catapult.org.uk/project/uk-cities-climate-investment-commission/
[22] https://carboncopy.eco/initiatives/esco-in-a-box
[23] Active Building Centre Research Programme: abc-rp.com

region will mean almost half of the population of Wales will benefit from becoming "green finance ready". With further funding, this model could be rolled out in additional regions.

Wholesale Guarantee

Wholesale guarantee schemes in the UK have previously been successful at helping grow markets and crowd in private finance. A National Loan Guarantee Scheme was launched March 2012 to help businesses access cheaper finance by reducing the cost of bank loans under the scheme by 1 percentage point.[24] Participating banks were expected to pass on the entire benefit that they received from the guarantees across the UK through cheaper loans. The package of interventions was worth £21bn. £5bn was available initially (with a minimum allocation of £100m per bank) with the remaining available over the two following years. Over 28,000 loans with a value of over £5.2bn were offered by the participating banks.

National District Heat Fund

Low-carbon district heating networks will be critical to achieving decarbonisation, but district heat networks currently serve only 2% of the UK's heat demand. This could grow to up to 20% of homes by 2050[25] and may require up to £22bn of private investment to achieve.[26] A National District Heat Fund would help leverage private capital to meet this investment need. The potential of such a model under the UKIB is exemplified by the Green Investment Bank Offshore Wind Fund, which was a wholly-owned subsidiary and managed third-party capital. The fund targeted unlevered, operating assets, and provided a route into the market for new investors who wished to access green UK infrastructure assets. It attracted five UK local authority pension funds and several international investors, leading to the fund exceeding its target capitalisation of £1bn.[27]

Urban Sensing, analytics and scalable thermal Imaging

Heat loss from buildings is invisible, varies significantly from one building to another and it has not been possible, historically, to detect, measure and

[24] http://www.transcapital.co.uk/the-national-loan-guarantee-scheme-a-cure-for-funding-problems/#:~:text=The%20National%20Loan%20Guarantee%20Scheme%20(NLGS)%20was%20launched%20on%2020,up%20to%201%20percentage%20point.&text=The%20NLGS%20allows%20banks%20to,issuing%20Government%20guaranteed%20unsecured%20debt.

[25] https://www.theccc.org.uk/wp-content/uploads/2016/10/Next-steps-for-UK-heat-policy-Committee-on-Climate-Change-October-2016.pdf

[26] https://www.ippr.org/publications/piping-hot

[27] https://www.greeninvestmentgroup.com/en/news/2017/worlds-first-offshore-wind-fund-manager-powers-through-p1bn-target.html

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catalogue heat-loss variance within building typologies and between typologies at scale. Advances in orthothermography, photogrammetry, LiDAR and high-accuracy geo-location surveying from ground-based vehicles and unmanned aerial vehicles has been combined by the team at Swansea University[28] and The University of Sheffield[29] to enable heat-loss detection and measurement along with digital 3D reconstruction of tens of thousands of homes within a few hours. The technology being developed is end-to-end in terms of data architecture linking robotics manufacturing to the urban sensing platforms so that manufactured solutions can accelerate cost reduction of fabric-first measures. These scalable techniques have the potential to provide real-world validation of digital tools like Building Renovation Plans, which can underpin a smart approach to green finance solutions (see section 4).

Innovation partnership for deep retrofit in Nottingham

Nottingham City Council owns 25,000 homes. An average investment of just £20,000 per unit would generate a total investment of £540m. Nottingham is therefore well placed to develop innovative programme approaches to cost effective domestic retrofit. It has partnered with The Mayor of London's retrofit accelerator programme, through links with Energiesprong UK, to develop a partnership for deep retrofit. It is developing an offsite manufacturing approach to whole house low carbon retrofit with performance guarantees. The partnership is aimed at establishing the 'sweet spot' where cost effective deep, whole house retrofit can be delivered at scale. There is currently a funding gap of c.£25,000 between the cost of offsite manufacture of external fabric measures. The investment can be justified based on long term maintenance savings, property value increases and other revenues. A lower borrowing rate for infrastructure investment would make borrowing more affordable to support a capital spend of £30m per year.[30]

3.2 Examples from around the world

KfW – support for energy efficiency in buildings and SMEs in Germany

KfW references energy efficiency as a cornerstone of its support to tackle climate change. Domestically, KfW offers energy efficiency programmes for properties, SMEs and municipalities. Within 10 years, KfW has supported measures in more than 4 million homes in Germany. Overall, KfW's promotional

[28] ABC-RP.com

[29] Resources, Infrastructure Systems and built Environments Discipline | Department of Civil and Structural Engineering | The University of Sheffield

[30] This case study was provided by UK100 and featured in the report An Opportunity for the UK Infrastructure Bank to Accelerate the Pace of Net Zero Investment in our Cities: https://www.uk100.org/sites/default/files/publications/UKIB%20case%20studies_Bristol_Nottingham_Leeds.pdf

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funding has triggered investments of over EUR 260 billion in building measures and secured an average of 320,000 jobs per year in the building industry and regional trades, while helping to reduce carbon emissions by almost 9 million tonnes per year.[31] Money is provided to households via intermediary financial partners. For households, subsidies (offered as a grant or partial loan relief) are available offered for achieving deep retrofits through whole-house improvements. For individual retrofit measures, the grant contribution is quite modest. This helps spur environmental additionality and economic activity, helping leverage additional private finance.

Dutch Securitisation Association – Nationale Hypotheek Garantie (NHG) in the Netherlands

The NHG is a public mortgage loan insurance scheme. It protects borrowers from any residual debt after a foreclosure following a default on their mortgage loan. The NHG Guarantee covers the outstanding principal, accrued unpaid interest and disposal costs. The mortgage is guaranteed by the Dutch Homeownership Guarantee Fund, lowering the risk and interest rates by up to 0.50%. The terms and conditions and standards for the Dutch NHG state that lenders are eligible to take out a mortgage with this guarantee as long as the home does not cost more than €325,000. However, if energy efficiency measures are included in the mortgage, the limit increases to €344,500 – therefore encouraging environmental additionality.

New York Green Bank supports innovative whole-house upgrade business models

NY Green Bank (NYGB), New York State's $1bn clean-energy fund, and a new efficiency company named Sealed signed a $5m loan-financing agreement to broaden the market for energy efficiency upgrades.[32] Sealed pays for the bulk of a household's efficiency upgrades and often takes over as the billing agent for the homeowner's utility bills. The homeowner pays Sealed a monthly bill that covers the efficiency investment and—in cases when it acts as the billing agent—the customer's energy use. Before NYGB was involved, Sealed offered upgrades that homeowners financed with either upfront payments or extended loans. NYGB's financing allowed Sealed to start the new programme, "HomeAdvance," as a billing intermediary. NYGB's investment establishes a loan-performance history for residential energy efficiency by demonstrating to larger capital providers that efficiency upgrades can generate steady and predictable cash flows. The deal is large enough to finance upgrades for approximately 400

[31] https://www.kfw.de/About-KfW/Newsroom/Latest-News/Pressemitteilungen-Details_403200.html
[32] https://cbey.yale.edu/sites/default/files/2019-08/NYGB.pdf

households — an adequate volume to be pooled together and securitized or sold to a long-term investor if the projected cash flows meet expectations.

European Bank for Reconstruction and Development (EBRD)

The EBRD has set up facilities in several countries where it provides finance and technical assistance through a facility to local financial institutions – the Green Economy Financing Facilities.[33] This model could be adopted by the UKIB to provide technical and financial assistance to local authorities on low carbon-built environment technologies. The EBRD has committed over EUR1.5 bn to the Green Cities Programme to help cities identify, prioritise and connect urban environment challenges with sustainable investments and policies. The Green Cities Policy Tool aims to inform effective policy instruments to improve urban sustainability, focusing on case studies and presented around five sector-specific areas energy and buildings.[34] Meanwhile, the Technology Selector tool is an online platform that lists the 'best-in-class' green technologies that improve energy efficiency for businesses and households for 24 countries. The UKIB could develop a similar tool for the UK and only provide financing for technologies that meets its 'best in class criteria'.[35]

[33] https://ebrdgeff.com/about-seff/
[34] https://www.ebrdgreencities.com/policy-tool/about/#background
[35] https://ebrdgeff.com/armenia/launch-technology-selector-tool-to-accelerate-delivery-green-finance/

4. The conditions for change: Policy, digitalisation and innovation

A review of the current landscape of policy plans, market innovation and data standards can help the UKIB identify where and when it can add value and support successful and high-impact delivery. The UKIB can act to smooth the runway for planned policy changes, accelerate the roll-out of smart approaches and help mainstream pilot projects.

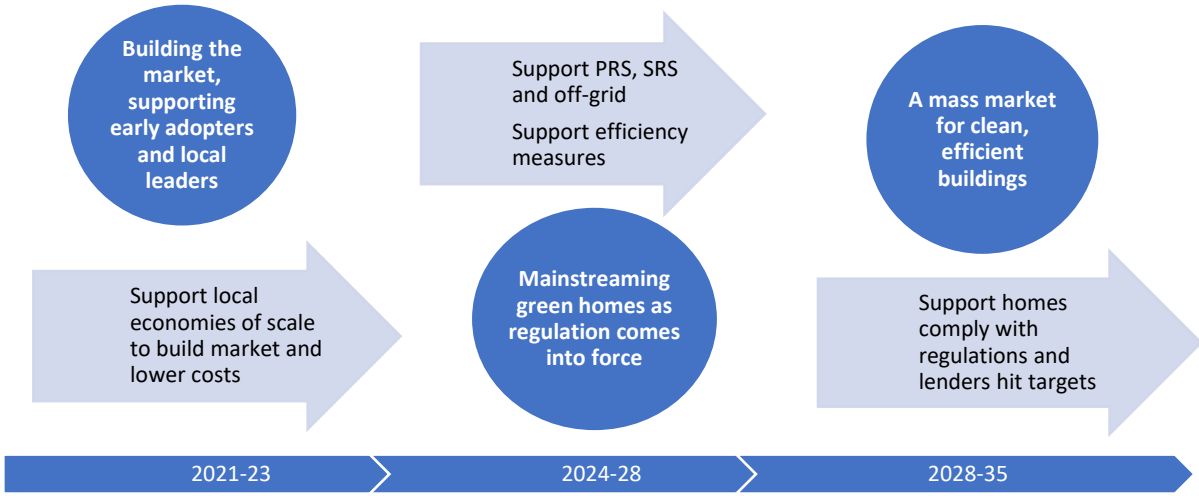
Providing a clear landing strip for current and proposed regulatory changes

The recent Heat and Buildings Strategy (HABS) has set a direction of travel for clean heat, looking to end installations of new fossil gas boilers by 2035 and new fossil fuel heating systems for off-grid homes from 2026. The Government has committed to work with industry to target a 25-50% reduction in the costs of heat pumps by 2025, targeting to grow UK manufacturing to over 300,000 units a year by 2028. Building economies of scale, spurred through local leadership and early adopters, can support this target. There is a parallel need to support the market for energy efficiency measures, as these are often complementary to and help optimise retrofit outcomes and avoid unintended consequences. Action is needed now to build up the market from its current low baseline.

Tightening minimum energy efficiency regulations are planned for the private rented sector from 2028. The HABS indicated a near-term introduction of minimum standards for the social rented sector and may also introduce standards to the owner occupier tenure this decade in England. In addition, BEIS has consulted on setting requirements for lenders to help householders improve the energy performance of their homes, with lenders reporting on the energy performance of their mortgage portfolio, and voluntary improvement targets to meet an average of EPC Band C by 2030.[36]

The flow chart below indicates different stages of the transition (in blue circles) and complementary steps the UKIB can take to support the Government's policies (grey arrows). We note that these processes are best understood in continuum, steadily building momentum towards a mass-market across all housing tenures. For instance, near term action to support owner occupiers will be essential, as the supply chain is unlikely to scale without indications of future demand.

[36] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936276/improving-home-energy-performance-through-lenders-consultation.pdf



Moving forward towards a mass-market, there may be additional tools through which the UKIB can unlock greater action and investment from homeowners. Working with BEIS and Treasury, the Bank could explore future options to channel additional subsidies and incentives through the Bank's operations, as seen in Germany, helping spur further environmental additionality and private investments, and ensuring all households have access to attractive financial offers.

As local authorities have been identified as key delivery partners in the Government's Net Zero Strategy, it is fundamentally important to understand their role in place-based approaches. There is a clear opportunity for local authorities to be central to decarbonising the housing stock both in relation to new build and retrofitting existing buildings,[37] which in turn produces opportunities for levelling-up through investment in local authority retrofit programmes. Over time, UKIB can develop financing approaches that enable local authorities to have the technical and commercial resources they need to turn their conceptual investment opportunities into investable projects.

Digitalisation and innovation: Supporting the consistent scaling of data infrastructure

An ecosystem of enabling measures is steadily evolving to support the financing of green homes, including through fintech and PropTech solutions. The UKIB could support the consistent roll-out of tools to collect data to enhance the quality of retrofits, while monitoring the energy cost savings associated with projects. This could be supported through requesting standardised data collection as a condition of support, to allow lessons about outcomes to be learned and provide the data that private investors will need to help them decide which schemes to invest in.

Pioneering firms and financial institutions are already offering these tools. For example, Principality Building Society has partnered with energy tech company Sero

[37] https://www.uk100.org/sites/default/files/publications/Power_Shift.pdf

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to develop a green customer proposition with a Building Passport app to provide a better understanding of the home's energy performance and carbon impact, and how it can be improved.[38] The GFI's Coalition for the Energy Efficiency of Buildings (CEEB) is helping establish consistent market conditions for the roll-out of Building Renovation Plans through providing a standardised framework.[39] The CEEB is also developing an open-source protocol for capturing 'metered' energy savings. The protocol seeks to provide actionable data and real-time performance monitoring to catalyse the development of new financial products, services and business models.[40]

Other digitalisation initiatives can support the effective financing of the decarbonisation of the built environment by the Bank. The UCL London Building Stock Model is providing data-rich insights into the characteristics of local built environments. The scaling up of these approaches is progressing at pace with the Active Building Centre Research Programme, working with the UCL 3DStock Lab to stock model all properties and tenures in Wales, as a pre-cursor to the implementation of Building Retrofit Plans at scale. Digital reconstruction of the built environment enables machine learning technology to better characterise the current condition and potential retrofit pathways of properties whilst capturing dimensional information to support the scale-up of manufacturing processes. Combining this with scalable infrared surveying and machine learning enables better understanding of the diversity of heat loss within typological architypes. This data could be utilised by UKIB and others to gain deeper insights into the most efficient options for decarbonisation at a household and community level, providing information which could help aggregate demand.

[38] https://www.mortgagesolutions.co.uk/news/2021/10/11/principality-partners-with-sero-to-accelerate-green-mortgage-development/

[39] The CEEB has recently published a framework for introducing a consistent approach to building renovation plans in the UK: https://www.greenfinanceinstitute.co.uk/news-and-insights/delivering-renovation-plans-with-property-logbooks/

[40] https://www.greenfinanceinstitute.co.uk/programmes/ceeb/metered-energy-savings/

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5. Structural considerations

The success of the UKIB is not just dependent on the financing it can offer, but also the capacity, knowledge and skill building services it can provide. Over time, the UKIB can play a deeper role than just delivering finance, helping tackle some of the structural challenges associated with financing place-based transitions.[41] Local authorities, as the recipients of £4bn in financing from the Bank over its initial capitalisation period, will need to proactively identify projects and deliver finance to transition their local communities. However, UK100 has identified 9 barriers to local authority investment:

- Resource constraints to originate and develop projects
- Competing demands of council revenue and capital budgets
- Lack of patient capital/de-risking finance products
- Local energy projects are often small scale
- Risk aversion
- Stop/start government policy
- Constraints of government funding
- Supply chain capacity
- The inflexible nature of Public Works Loan Board (PWLB) funding[42]

The CCIC has also identified gaps in available headcount within local authorities to deliver innovative financing structures and investment such as those proposed in this briefing, as well as a number of gaps in capabilities and skills across a number of specialist and complex areas such as low carbon technology and financing. This is where the Expert Advisory Function must play its role. The UKIB can act as a central knowledge hub for project development and technical assistance know-how.

Delivering the financing proposals in this briefing will also require collaboration between local authorities and private sector investors, local businesses, local public bodies, and local residents. This will require relationship building and development of the necessary structures and services to enable such collaboration. This is an area in which the bank should provide support to local authorities and private investors – acting as a central hub for stakeholders working on net zero delivery. In order to fulfil the investment principle of partnership, the Bank should collaborate with Innovate UK, the Strategic Innovation Fund and the Shared prosperity fund to develop the expert advisory, technical assistance and project development functions that Local Authorities require to actively participate in delivering a net zero built environment.

[41] UK Cities Climate Investment Commission, City Investment Analysis Report, Executive Summary, October 2021

[42] https://www.uk100.org/sites/default/files/publications/UKIB%20case%20studies_Bristol_Nottingham_Leeds.pdf

6. Conclusion

The UKIB can play a transformative role in decarbonising the built environment – helping enable the business models which will build the economies of scale necessary to drive local economic growth and support net zero. The benefits of strategically prioritising this sector are clear, and there are multiple shovel-ready projects and mechanisms the bank could support. Industry, investors, local authorities, academics and civil society are positioned to support the bank to identify high-impact ways to unlock investment across a range of different housing tenures, and work to support the roll-out of digital infrastructure to enable smart, efficient deployment of capital.

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