



MARKET ANALYSIS

ASSESSING THE OPPORTUNITIES FOR GREEN TECHNOLOGIES AND SERVICES WITHIN HOUSING

GREATER MANCHESTER HOUSING PROVIDERS
APRIL 2020



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In partnership with:



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1 | Executive Summary

1.1. About the Review

1.1.1. Green Economy understands that the social housing sector in Greater Manchester plays a significant role in the use of domestic green technologies, and that this role will expand in future. To learn more, the Hub appointed Altair to undertake research to better understand the scale and scope of the market opportunities likely to be realised in the next five years for green technologies and services by Greater Manchester Housing Providers (GMHPs).

1.1.2. From October 2019 to February 2020, Altair undertook qualitative and quantitative research to understand the barriers and opportunities for the use of green technologies by GMHPs, and to identify demand for specific technologies likely to be used in future for retrofitting of existing properties, and for new development.

1.2. Findings and Recommendations

1.2.1. Altair found that there are wide variations in the progress made to date by GMHPs in their use of green technologies and in their future plans. While GMHPs recognise the need to replace traditional products with those with a lower carbon footprint, there are significant barriers to this and a need for meaningful investment.

1.2.2. Table 1 below presents the key findings from the review and draft recommendations for stakeholder groups to consider.

Table 1: Key Findings and Draft Recommendations

Key Findings	Recommendation
Recommendations for GMHPs	
<p>Collaborative efforts within Greater Manchester, such as partnerships with the Greater Manchester Combined Authority (GMCA) and housing and sustainability sub-groups such as the Low Carbon Asset Management Group, have successfully helped to promote sustainability measures in social housing. GMHPs have benefitted from shared learning of these groups.</p> <p>One barrier for GMHPs is that greener homes don't currently attract a higher valuation than traditional properties, and</p>	<ol style="list-style-type: none"> 1. GMHPs should collectively set retrofit targets, aligning the objectives of the GMCA and the GMHPs. Altair understands that the development of a collaborative strategy is underway, as is the development of shared KPIs. 2. GMHPs and the wider housing sector should lobby the RICS on how to better consider energy efficiency in property valuations. 3. GMHPs and the wider housing sector, should consider lobbying for reform in rent and service charge legislation, so

Key Findings	Recommendation
<p>therefore social housing providers are not able to increase borrowing to meet the increased cost resulting from fitting green technologies.</p> <p>In addition, the return on investment for landlords is limited; the financial benefit of lower fuel bills in residential properties goes to the occupiers of those properties.</p> <p>The Welsh social housing rents model allows social landlords to increase the amount of rent proportionate to the energy efficiency of residents' homes.</p>	<p>that they might share in the benefit of reduced energy costs and recoup a greater proportion of their capital investment.</p> <p>4. GMHPs may wish to repeat this research in one year's time and / or on an ongoing basis to ensure alignment of key trends and demand.</p>
<p>Recommendations for Supply Chains</p>	
<p>Partnerships, from joint procurement frameworks and from collaborations with supply chains and energy providers, have been successful in GMHPs' use of green technologies.</p> <p>Many of the GMHPs with experience of retrofitting or developing homes with green heating or energy systems, had done so through such partnerships or similar programmes.</p> <p>GMHPs also indicated that Procure Plus, a major procurement consortium in the North West, had served as an essential source of information and access to technologies when specialist skills were not retained in-house (nor in their traditional contractor supply chain).</p> <p>However, GMHPs also noted that there was a general lack of availability of trusted, independent advice to conduct due diligence and options appraisals on technologies being considered.</p>	<p>5. Procurement bodies should identify a number of GMHPs willing to commit to, and assemble an order book of, green technologies. This would provide certainty to the supply chain, enable greater investment, and reduce costs through economies of scale. While procurement bodies operate on this business model to harness the benefit of combined volumes, it is vital to ensure commitment which many GMHPs are currently unable to provide.</p> <p>6. Private sector supply chains should continue developing innovative business models to support GMHPs, and the wider housing sector, in overcoming funding and operational challenges. There is also a need for product and service providers to develop their understanding of the social housing sector's customer base, regulatory requirements and funding environment.</p> <p>7. The private sector should consider scaling up to accommodate demand for independent consultancy advice on green technologies.</p>

Key Findings	Recommendation
Recommendations for Government	
<p>Domestic Renewable Heat Incentive (RHI) funding has historically been instrumental in providing funding to GMHPs, and others, to invest in green heating technologies. Other funding initiatives have been helpful in setting up trials and pilots.</p> <p>Many GMHPs noted that a lack of assurance over the future of renewable funding after RHI was a barrier to developing future delivery plans.</p> <p>Lack of clear funding is compounded by the fact that the return on investment into green technologies for social housing providers is limited, since the social housing rent settlement prevents the recoup of savings by landlords.</p>	<p>8. The government should provide certainty and offer funding programmes which allow housing providers to invest in long-term, stock-wide green technology programmes.</p> <p>9. The government should consider how to provide assurance to private firms over their return on investment in green technologies and services.</p>
Recommendations for Social Housing Trade Bodies	
<p>Historically, community and global responsibility objectives have not been significant motivators for the strategic use of green technologies. Pressure from staff, current affairs, and a wider call for government action have increasingly brought sustainability and low-carbon action to the fore at board level.</p> <p>However, an inability to determine the 'technology of the future' by establishing a firm evidence base for its use and confirmation of long-term cost savings is a significant barrier among GMHPs for use of green heating technologies.</p>	<p>10. The National Housing Federation (NHF), National Federation of ALMOs (NFA) and Local Government Association (LGA) should provide guidance to boards on the strategic importance of carbon reduction as it relates to the Climate Change Emergency, tenant empowerment and the sustainability of social housing assets.</p> <p>11. The NHF, NFA and LGA should co-ordinate sector-wide thought leadership and guidance on the use of green technologies in social housing, accessing suppliers, partners and funding models.</p>
Recommendations for the Regulator of Social Housing	
<p>GMHPs are interested in the potential for green technologies to help their customers</p>	<p>12. The Regulator of Social Housing should consider new consumer standards that</p>

Key Findings	Recommendation
<p>overcome fuel poverty and future-proofing for higher efficiency standards, along with compliance with building standards. However, there are currently no regulatory consumer standards within social housing for ongoing environmental performance in homes.</p>	<p>set targets for sustainability and environmental performance among social housing stock.</p> <p>13. The Regulator of Social Housing should recommend to housing providers that they consider local and national policy on carbon reduction when deciding on their asset investment strategy.</p>

1.2.3. In light of the above recommendations, the Hub may wish to consider the following areas for progression:

- How trends on green technologies and services outlined in this report may be used to initiate engagement with housing providers on potential future demand and to support local supply chains to identify priority areas of focus (e.g. skills investments)
- How findings may be used to engage with procurement bodies on how they may leverage local supply chains for provision of green technologies and services
- If further work to investigate innovative commercial and partnership models and best practice should be undertaken to inform housing providers about their options for utilising green technologies and services

2 | Introduction

2.1. Overview

2.1.1. In October 2019, Green Economy (part of GC Business Growth Hub) appointed Altair to undertake research to better understand the scale and scope of the market opportunities likely to be realised in the next five years for green technologies and services across Greater Manchester Housing Providers (GMHPs).

2.1.2. From October 2019 to February 2020, Altair undertook qualitative and quantitative research to understand the barriers and opportunities for the use of green technologies among GMHPs, and to identify demand for specific technologies likely to be used in the future for both asset management/retrofit and new development.

2.2. About Altair

2.2.1. Altair is a multidisciplinary consultancy which works with clients in the affordable housing and regeneration sectors. Altair's work is predominantly in the UK, but Altair also works internationally through Altair International. Services provided include strategy and change, governance, treasury and finance, HR and people and property.

2.2.2. Altair is a subsidiary of the Aquila Services Group, whose purpose is 'making a better, more sustainable, socially responsible world'. As part of this, Altair is committed to promoting thought leadership in the sector and has previously undertaken several research and analysis projects across a range of topics, including using evidence-based research methods to support housing providers and governments in setting future strategies and policies.

2.3. About GC Business Growth Hub and Green Economy

2.3.1. GC Business Growth Hub's service helps ambitious businesspeople to realise their growth potential by offering access to a range of practical services, from assessing growth options to unlocking finance or accessing experienced business mentors. The Hub's service is offered by GM Business Support Limited, which is part of The Growth Company. The group employs over 1,000 staff and provides more than £60m of business support services annually.

2.3.2. Green Economy delivers the Hub's Green Technologies and Services programme, and provides specialist support and advice to businesses operating in or diversifying into the Green Technologies and Services sector. The offer includes one-to-one support and advice, access to an online Marketplace providing tailored sales opportunities and connections to other members, as well as a frequent events and workshop programme.

2.4. Research Goals

- 2.4.1. Green Economy understands that a move to carbon neutrality by GMHPs will help generate significant investments in low carbon and energy-efficient technologies, which will require the engagement of local suppliers, installers, maintenance contractors and consultants. However, the information relating to the scale and scope of this opportunity remains largely undocumented.
- 2.4.2. The aim of this research is to deepen Green Economy and GMHPs' knowledge of:
- The political, social, environmental and financial drivers and barriers influencing a shift towards green products and services across GMHPs
 - The types of green technology and services that GMHPs plan to procure over the next five years
 - The value of the green technologies and services that GMHPs expect to procure over the next five years
 - How GMHPs' asset-management plans' impact on demand for green technologies and services within a future five-year period.
- 2.4.3. In gathering information about GMHPs' use of green technologies, and the opportunities and barriers they face, the Hub hopes to:
- Collate and present information gathered from GMHPs into a single report, which may be owned by GMHPs as a tool for collaboration and strategy setting
 - Use information gathered from the review to inform the local supply chain of the opportunities and barriers faced by GMHPs for procuring green technologies and services.

2.5. Research Methodology

- 2.5.1. The approach to this research covered:
- The development of a data collection pro-forma and quantitative data gathering from GMHPs on the use of green technologies for retrofit and new development
 - Qualitative data collection and testimonials through interviews with GMHPs
 - Desktop review and analysis of wider sector use of green technologies and services
 - Presentation of findings and recommendations in this report.
- 2.5.2. All activities were underpinned by engagement with the GMHPs. In total, Altair worked with 15 GMHPs, whose social housing stock within Greater Manchester represents about 55% of Greater Manchester's total social housing stock.¹ Altair thanks all organisations who contributed to the research.

¹ Data collected from 2019 Statistical Data Return of Private Registered Providers and 2019 local authority housing statistics

2.6. This Report

- 2.6.1. This report includes findings from the research and key recommendations for GMHPs and other stakeholders. It is intended to be used by the Hub, Green Economy and GMHPs to promote further work to align demand for green technologies from GMHPs with activities by Green Economy, supply chains, government and other social housing stakeholders.

3 | Context: Low Carbon Activity in Social Housing

3.1. Overview

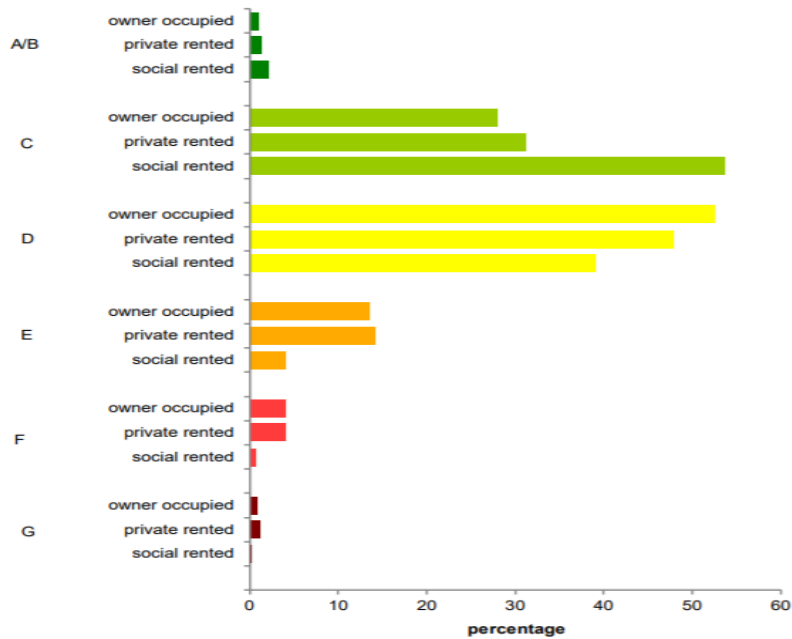
3.1.1. Part of Altair’s review has been to undertake a desktop analysis of the social housing sector’s use and uptake of green technologies and services. While the rest of the analysis focuses on Greater Manchester, this section provides context for the sector across the UK, and an understanding of the alignment of GMHPs’ plans to others.

3.2. Current landscape

3.2.1. Housing is the second largest emitter of CO² after transport², with the sector contributing 18% of total UK emissions. With the social housing sector accounting for 17% of all homes, the sector has a significant role in the overall UK carbon picture.

3.2.2. The figure below shows the EPC ratings of homes based on tenure and demonstrates that social rented properties are significantly more energy-efficient compared to private rented and owner-occupied properties. In the social housing sector, 56% of dwellings are in Energy Efficiency Ratio Bands A to C, compared with only 33% of private rented sector dwellings and 29% of owner-occupied dwellings.

Figure 1: EPC Ratings in Owner Occupied, Private Rented and Social Rented sectors



² 2018 Office for National Statistics

3.2.3. Research conducted by the National House Building Council in 2015³ surveyed over 200 housing associations to understand their experiences of a variety of energy-efficiency technologies. Their analysis showed that while the Code for Sustainable Homes (replaced in 2015 by the national technical standards) had a significant influence on sustainable technology use; available funding and the cost of technology also heavily influenced investment decisions. In addition:

- Between 2006 and 2015, two thirds of housing associations had invested in some form of sustainable technology, with photovoltaics (solar panels) being by far the most common technology
- 43% of those surveyed said that benefitting tenants and reducing their fuel poverty was one of the main reasons for installing sustainable technologies into their new homes.

3.2.4. Research⁴ conducted by SHIFT Housing shows how improving energy efficiency in homes ultimately provides long-term financial benefits to both landlords and residents. Findings include:

- Offsite manufacturing can result in cost savings and improved new build standards.
- The emergence of 'pay-as-you-save' schemes which allow social landlords to charge an 'energy plan' in retrofitted homes. The charge is far less than the residents' energy savings, so both the landlord and resident financially benefit.
- Homes with Mechanical Ventilation with Heat Recovery (MVHR) systems typically have lower damp and condensation leading to lower disrepair claims and hence lower cost to landlords through reduced levels of compensation
- Free installation of photovoltaic (PV) panels, then supplying residents with the electricity generated at a low rate.

3.2.5. The research also references the Welsh social housing rents model which allows social landlords to increase the amount of rent proportionate to the energy efficiency of residents' homes. As discussed later in this report, the ability to recover the costs of green technologies has been cited as a key barrier among GMHPs.

3.3. Social Housing Examples

3.3.1. GMHPs have introduced a range of sustainability initiatives, as described later in this report. Several examples of social housing providers operating outside Greater Manchester with sustainability features in their programmes are provided below.

3.3.2. A national social housing provider has been given the pan-European 'Certified Sustainable Housing Label' created to measure the sustainability of housing

³ NHBC Sustainable technologies, the experience of housing associations (2015)

⁴ Via SHIFT Housing 2050: How UK social housing can meet the challenge of climate change (2018)

providers based on 30 social and green indicators. Some notable features from their strategy include:

- Creating an improved housing stock with SAP ratings of 'D' and above by 2025
- Refreshing their vehicle fleet with a significant proportion of hybrid/electric vehicles
- Enabling employees to be active participants in 'green' living inside and outside the office, with a focus on training and rewarding appropriate action
- Reducing fuel poverty and supporting residents through a work programme
- Ensuring new-build homes conform to a new set of sustainability standards stressing both quality and performance
- Substantially reduced direct carbon emissions and non-recyclable waste from operations.

3.3.3. In addition to the introduction of "clean air zones" across the country, the UK Government has moved forward its ban on the sale of new diesel, petrol or hybrid vehicles from 2035 alongside. It is likely the above and other social housing providers will primarily focus on introducing electric-only fleets going forward. The Local Government Association, representing council housing providers, has actively promoted electric fleets among local authorities. The National Housing Federation, the trade body for housing associations in England, is progressing work on climate change and sustainability, however engagement with other activity (e.g. consultation with government on new electric vehicle policies) is currently unknown.

3.3.4. A medium-sized housing association in Sussex runs an award-winning programme that puts residents at the centre of achieving sustainability. The programme was launched in 2009, and aims both to retrofit homes to become more energy-efficient, and provide an education programme of practical measures residents can take to minimise their carbon footprint and energy costs. The programme also makes use of a product called Smartwire which is a 'master switch' for all-non-essential devices, with estimated annual cost savings for a family home of £138.14.

3.3.5. In September 2019, a large housing association in the north of England launched a £2m programme to test solar-plus-storage systems in social housing developments, with funding support from the EU Structural and Investment Fund. A strong impetus for the programme was the significant reduction in feed-in tariff rates, so the housing association wished to explore alternative commercial models for long-term PV deployment. The combination of rooftop PV panels and battery storage allowed the sale of power on site or via peer-to-peer networks, and some other form of export, as well as interaction with other energy markets for demand-side response.

3.4. Funding and government support

3.4.1. The sector called for extra government funding to deliver 'green' homes and retrofit existing properties. However, the March 2020 Spring Budget had very little to offer.

Analysts have stated that it is likely the chancellor will wait until November 2020, when the Treasury will review the net zero emissions policy, to tackle this issue.

- 3.4.2. The budget did however include a pledge to move towards equalising levy rates on electricity and gas and, from April 2022, government will freeze the levy on electricity and raise it on gas. This will improve the financial viability of green technologies over traditional gas heating and may also result in increased consumer pressure on landlords to change technologies as fuel costs rise.
- 3.4.3. The Budget also pledged to invest an extra £500m in new rapid-charging hubs for electric vehicles, which may increase the use of electric fleet within GMHPs and the wider sector.
- 3.4.4. Many housing associations rely on private-sector finance to fund their activities. Recently some providers have started to use sustainable or social loans. Several social landlords have loans with financial institutions where the interest on the loan is directly linked to outcomes and targets; the rationale is that the more sustainable targets are met, the more favourable the loan terms are to the housing association.
- 3.4.5. One recent example is a housing association in the south west agreeing a £50m revolving credit facility with a leading UK bank. The agreement is that if the provider meets targets for the energy efficiency of its existing homes, the margin on the loan decreases.

3.5. About Greater Manchester Housing Providers

- 3.5.1. Greater Manchester Housing Providers comprise 24 housing associations, arm's-length management organisations (ALMOs) and a local authority housing provider with significant operations within Greater Manchester. Collectively, these housing providers (GMHPs) manage about 225,000 homes, approximately 22% of Greater Manchester's total housing stock. Housing associations are not-for-profit private providers of social housing and are regulated by the Regulator of Social Housing. ALMOs manage stock owned by local authorities. There are 20 housing associations, 3 ALMOs and 1 local authority housing provider within the group.
- 3.5.2. Regulated social housing providers are responsible for ensuring that their organisations run efficiently and that they protect their customers. All providers must comply with consumer standards, including standards which mandate that housing providers maintain homes in line with health and safety requirements and those which promote tenant involvement and empowerment. Private not-for-profit providers (such as housing associations) must also comply with economic standards, including meeting value for money targets and maintaining good governance and viability within their organisations.
- 3.5.3. The Grenfell Tower fire in 2017, one of the UK's worst modern disasters, caused a significant change to the status quo of housing providers. The ensuing implications of

the Hackitt Review, an independent review of building regulations and fire safety, and cross-sector tenant pressure, have meant social housing providers (including GMHPs) have developed strategies for, and invested significantly over the past three years into, remedial works to ensure that their homes are fire safe.

3.6. GMHPs and Green Technologies

3.6.1. Research suggests that around a third of the Greater Manchester's carbon emissions come from homes, so the social housing sector is uniquely placed to contribute to the ambition of reducing energy usage by existing and future housing stock. In addition, Greater Manchester's Five-year Environment Plan sets a clear target for the city-region to become carbon-neutral by 2038. As partners with the Greater Manchester Combined Authority (GMCA), GMHPs' housing associations and ALMOs are tasked to ensure that their asset management and development programmes are in line with the GMCA's wider ambitions.

3.6.2. As part of the GMCA Five-year Environment Plan, GMHPs have formally made commitments to:

- plan for a post-gas economy for new and replacement heating systems
- raise the minimum SAP standard to C for all existing homes by 2025
- build all new homes to zero-carbon status in advance of the city-region's 2038 target

3.6.3. In addition to contributing to GMCA's climate change ambitions, GMHPs are also interested in the potential for green technologies to help their customers overcome fuel poverty, and future-proofing for higher efficiency standards, along with compliance with building standards. These are discussed in more detail in the following section.

4 | Drivers for GMHPs' use of Green Technologies

4.1. Overview

4.1.1. There are several important motivations for GMHPs use of green technologies:

Fuel poverty initiatives	High-efficiency green technologies promote energy affordability for residents.
Partnerships	Including in-sector partnerships, promoting shared visions and learning, and out of sector, including Joint Ventures with private energy and technology companies.
Funding	A number of larger funding programmes, such as the Domestic Renewable Heat Incentive (RHI), and smaller, one-off funding opportunities have been instrumental in the use of renewables among GMHPs.
Regulations, targets and future-proofing	Statutory rules (such as building standards) and adopted targets (such as Greater Manchester 2038 zero-carbon targets) have contributed to GMHPs' efforts to install appropriate technologies into new and existing stock.
Leadership and resource for sustainability efforts	Success of GMHPs' programmes, driven in part by commitment at leadership level. Knowledge, capacity and passion for change from within the organisation.

4.2. Fuel Poverty Initiatives

4.2.1. A household is said to be in fuel poverty when its members cannot afford to keep a home adequately warm at a reasonable cost, given their income levels. According to latest statistics, over 12% of Greater Manchester householders are in fuel poverty (c. 130,000 households). The North West is ranked the second worst region for fuel poor households in England at 12.5%.⁵ In 2014 the government put in place a new statutory fuel poverty target for England: to alleviate fuel poverty by achieving a minimum energy efficiency rating of Band C by 2030.

⁵ Using the Low Income High Costs (LIHC) definition of fuel poverty and figures produced by DECC 2012, via Community Action on Fuel Poverty

4.2.2. Fuel poverty is of particular concern to social housing providers because it affects the most vulnerable residents in communities and can cause ill-health.⁶ It also has a significant impact on the overall affordability of housing. For this reason, social housing providers across the country have acted to retrofit and build new stock with energy-efficient heating systems.

4.2.3. Clearly, fuel poverty is a particular driver for the use of green technologies among GMHPs engaged in the research. Of the 15 GMHPs who returned a questionnaire, all of them indicated that “reducing fuel costs to residents” was a primary reason to adopt green technologies.

4.3. Partnerships

4.3.1. Throughout the social housing sector, there are a number of inter-sector partnerships which enable change through collaboration. In particular it is a way that organisations with limited internal resources benefit from shared learning. Such partnerships include formal groups, such as the Placeshapers group of 100 community-based social housing providers who collectivise on shared values as a voice for change.

4.3.2. GMHPs are clearly empowered, through partnerships and collaborative efforts within Greater Manchester, to promote sustainability measures in social housing. For example:

- GMHP (the collective group of GMHPs) is a partner with GMCA and has committed to some of the combined authority’s targets for housing and sustainability. GMHP has a direct relationship with the GMCA through a Memorandum of Understanding, which enables its members to influence GMCA policy on housing, health and social care.
- Sub-groups, such as the Low Carbon Asset Management Group, bring together representatives from GMHPs to share learning and help support each other in drawing up strategies to meet internal and external targets.

4.3.3. GMHPs agreed that the groups and sub-groups operating within Greater Manchester have implemented initiatives within their organisations.

4.3.4. *Recommendation: GMHPs should collectively set retrofit targets, aligning objectives of the GMCA with objectives of GMHPs. Altair understands that the development of a collaborative strategy is underway, as is the development of shared KPIs.*

⁶ Tackling fuel poverty through local leadership, Local Government Association

- 4.3.5. Another source of partnership working includes joint procurement frameworks and support. Of the 15 GMHPs who returned a questionnaire, 86% named a joint framework or procurement consortium that they currently use. The most commonly cited frameworks or procurement consortia (used by two or more GMHPs) were:
- Procure Plus used by 60% of GMHPs
 - Fusion 21 used by 40% of GMHPs
 - Procurement for Housing used by 20% of GMHPs
 - Northern Housing Consortium used by 20% of GMHPs.
- 4.3.6. Other frameworks or procurement consortia used (by one GMHP) include London Housing Consortium, Procurement For All Procurement Hub, JV North, Crown Commercial Service and ESPO.
- 4.3.7. Many GMHPs had benefitted directly from these frameworks and had been able to engage green technology and support services supply chains through these. It was also understood among GMHPs that the knowledge and support offered through these collective frameworks could be relied on without the need to develop specialist skills for the procurement of green technologies in-house. GMHPs indicated that Procure Plus had served as a source of information for accessing technologies when specialist skills were not held in-house (or in their traditional contractor supply chain).
- 4.3.8. GMHPs had not, however, developed long-term procurement strategies, and instead engaged with these frameworks for green technologies on an *ad hoc* or project-by-project basis.
- 4.3.9. *Recommendation: Procurement bodies should identify a number of GMHPs willing to commit to, and assemble an order book of, green technologies. This would provide certainty to the supply chain, enable greater investment, and reduce costs through economies of scale. While procurement bodies operate on this business model to harness the benefit of combined volumes, it is vital to ensure commitment which many GMHPs are currently unable to provide.*
- 4.3.10. The social housing sector also has strong experience of partnering with out-of-sector partners to provide homes and other services. These include partnerships with health authorities, police, local charities and the private sector. As part of this, social housing providers across the country effectively combine resources to deliver more and better services for their customers and wider communities.
- 4.3.11. Many GMHPs have successfully used green technologies through partnerships with the private sector. Of the 15 GMHPs who returned a questionnaire, 53% indicated that they currently procure green technologies for new development through JVs and partnerships; 6% currently procure green technologies for planned maintenance through JVs and partnerships. Qualitative evidence suggests that more organisations had used JVs or partnerships for planned maintenance and new development in the past but were not doing so currently, which may reflect a trend observed across the

sector to insource programmes in response to the collapse of a number of large contractors. Many of the GMHPs had experience of retrofitting or developing homes with green heating or energy systems through partnerships or similar programmes.

- 4.3.12. The forms of these arrangements vary, and may include project-based joint ventures and programmes where the private partner provides a service at risk, with some contribution from the GMHP. Some examples of these arrangements include:
- A £10m offer from a utility company to upgrade a historic gas-fired district heating system to biomass
 - Private-sector led “rent a roof” solar PV programmes, which provide a lower-cost energy option to residents at no capital cost, but which model their programme on returns on energy generated.

- 4.3.13. GMHPs generally have an appetite for these arrangements. One GMHP said that their organisation would welcome innovative funding models that work within the constraints of their businesses (e.g. social rents and service charges) and which promote affordability among residents. However, it has also been mentioned among GMHPs that some of the measures installed through some partnership opportunities have not resulted in the most appropriate solutions (they are currently unused or have not achieved efficiencies intended). In future, there may need to be greater focus on independent advice about the suitability of opportunity-based programmes.

4.3.14. *Recommendation: Private sector supply chains should continue developing innovative business models to support GMHPs, and the wider housing sector, in overcoming funding and operational challenges. There is also a need for product and service providers to develop their understanding of the social housing sector’s customer base, regulatory requirements and funding environment.*

4.3.15. *Recommendation: The government should consider how to provide assurance to private firms over their return on investment in green technologies and services.*

4.4. Funding

- 4.4.1. There have been a number of historic funding arrangements for green technologies in addition to smaller, one-off funding opportunities for housing providers. GMHPs have generally agreed that opportunistic funding has traditionally been a source of incorporating green technologies into their stock (usually through communal or site-specific projects) in the past.
- 4.4.2. Where organisations were successful in obtaining funding, the most significant source is the Domestic Renewable Heat Incentive (RHI). For example, one GMHP commented that RHI funding enabled them to pilot air source heating in ten properties and another GMHP mentioned that RHI funding bridged the financing gap between installing gas boilers and air source heat pumps.

- 4.4.3. The Domestic RHI is a government financial incentive introduced by the Department for Business, Energy & Industrial Strategy to encourage the use of renewable heat. Its aim is to cut carbon emissions and help the UK meet its renewable energy targets.
- 4.4.4. RHI is a programme open to private homeowners and social landlords to install renewable heating alternatives into homes. Applicants who join the scheme and keep to its rules (including annual reporting) receive payments every three months for seven years. The RHI is due to end on 31 March 2021. The government has not announced how it will encourage low carbon heating after this date, but the latest budget has indicated that a programme for renewable technologies among social landlords will be employed. A number of GMHPs noted that lack of assurance over the future of renewable funding after RHI was a barrier to future plans.
- 4.4.5. A historic programme that some GMHPs referred to as being successful in their own use of low-carbon technologies was the Community Energy Saving Programme, which was a three-year obligation on major energy suppliers and generators to offer free or low cost energy efficiency measures to communities in certain low income areas that ran from 2009 to 2012.
- 4.4.6. In addition, one GMHP is applying for International Development Fund (IDF) funding, which will see renewables installed across an estate of some 400 homes. This funding is offered on a matched basis.
- 4.4.7. Where possible, GMHPs have used in-house resource to apply for funding. Some GMHPs, however, acknowledged that they lacked knowledge about what funding was available and how to access it. There were also some barriers such as short timescales to apply for funding. As a result, one GMHP commented that they procured consultancy support to apply for European Regional Development Funding.
- 4.4.8. Other funding initiatives GMHPs have successfully used include trials and pilots intended to test and gather data on a particular green technology. However, the long-term efficacy of these programmes is not completely understood, and in some cases the maintenance and longevity of the technologies originally tested have proved difficult for GMHPs to manage. However, these pilots have resulted in successful renewable installation in small schemes within the GMHPs' wider portfolio.
- 4.4.9. One GMHP is successfully using the Homes as Energy Systems fund, a European Regional Development funded project in Greater Manchester that seeks to demonstrate how all homes could be transformed to meet environmental objectives. It contains a 50% subsidy for retrofit programmes.
- 4.4.10. Some GMHPs also suggested that, while they were well placed to seek funding from the European Investment Bank, Britain's departure from the European Union has complicated this process and cast doubt over their qualification for future related programmes.

4.5. Regulations, Targets and Future-proofing

- 4.5.1. Building and other regulations strongly influence the way all developers, including social housing developers, specify and build housing. Historically, grant for new social housing schemes came with conditions on specification exceeding building regulations. Today however, building regulations are the main compliance mechanism by which GMHPs specify their new-build programmes.
- 4.5.2. Regulatory and other standards are of vital importance to GMHPs' adoption of green technologies. Of the 15 GMHPs who returned a questionnaire, 86% indicated that a primary incentive for a shift to using green technologies was "Regulatory and building standards", and 93% indicated that "Future-proofing for higher energy efficiency and building standards" was similarly vital.
- 4.5.3. GMHPs also commented that they have already begun planning for the financial and operational implications of transitioning completely away from gas boilers in all new builds from 2025, in line with the government's new sustainability measures announced during the 2019 Spring Statement. Regarding planned maintenance programmes, GMHPs noted that they will replace gas boilers with electric boilers in line with stock condition assumptions well ahead of the Greater Manchester 2038 zero-carbon deadline (at least ten years before, according to current gas boiler life-cycle assumptions). This is to ensure GMHPs do not replace boilers before their life cycle ends in order to meet the target.
- 4.5.4. Other sources of compliance pressure include planning obligations. While GMHPs did not widely indicate that planning criteria influenced their use of green technologies, some suggested that this may be the case in the future.
- 4.5.5. Homes England plays a major role in new housing development, with the grant funding regime aligned to its strategic priorities. Homes England's current Strategic Plan (2018/19 to 2022/23) does not explicitly include increased energy efficiency in homes.

4.5.6. *Recommendation: The Regulator of Social Housing should consider new consumer standards that set targets for sustainability and environmental performance among social housing stock.*

4.5.7. *Recommendation: The Regulator of Social Housing should recommend to housing providers that they consider local and national policy on carbon reduction when deciding on their asset investment strategy.*

4.6. Leadership and Resource for Sustainability Efforts

- 4.6.1. There appears to be a correlation between GMHPs who have more developed strategies and made more progress in delivering low-carbon programmes and those

who have dedicated staff to carry out these programmes. The success of the programmes is somewhat dependent on commitment at a leadership level, and knowledge, capacity and passion for change from within the organisation.

- 4.6.2. In addition, GMHPs who have more developed low-carbon programmes, and who have used green technologies and services over time, tend to have internal resources and staff committed to the programmes, resulting in more successful past programmes and a clearer understanding of how to use these technologies in future.
- 4.6.3. Anecdotal evidence suggests that dedicated, experienced staff working with supportive executive teams and boards have helped create environments for more innovative green processes to be used. This may be the case because some of these organisations view green initiatives (and the work of their sustainability officers or teams) as part of the 'status quo', or an integral element of their organisation's approach to areas such as planned maintenance.

4.7. Strategic Objectives

- 4.7.1. Of the 15 GMHPs who returned a questionnaire, 13 indicated that a primary driver for a shift to using green technologies was "Global responsibility to low carbon initiatives", and 14 gave a similar rating to "Community and social responsibility".
- 4.7.2. GMHPs indicated that, while historic pressure for the use of green technologies and services stemmed from asset management and sustainability teams (if available) in-house, boards were now becoming increasingly interested in how their organisations were responding to calls to support sustainability and climate change initiatives. In the past, community and global responsibility objectives have not been significant motivators for the strategic use of green technologies. Pressure from staff, current affairs, and a wider call for government action have increasingly brought sustainability and low-carbon action to the fore at board level.
- 4.7.3. Formerly GMHPs have not observed much customer pressure for green technologies, some are now seeing elements of this from resident groups, motivated in part by global decarbonisation concerns.
- 4.7.4. *Recommendation: The National Housing Federation, National Federation of ALMOs and Local Government Association should provide guidance to boards on the strategic importance of carbon reduction as it relates to the Climate Change Emergency, tenant empowerment and the sustainability of social housing assets.*

5 | Barriers for GMHPs' use of Green Technologies

5.1. Overview

5.1.1. There are several serious barriers for GMHPs use of green technologies:

Education and use	Some customers require support to use green technologies effectively, particularly those who are vulnerable.
Competing priorities	GMHPs and the wider social housing sector are under a great deal of pressure to ensure their homes are fire safe, with resulting lack of focus on other areas, such as decarbonisation of homes.
Financing and viability	Funding the additional costs of green technologies in both retrofit and new build programmes can be a challenge, given current modelling and valuation methodology.
Risk aversion and disruption to customers	Boards are generally cautious about green technologies if past programmes have been ineffective, if technologies are disruptive to residents, or if their use has worsened performance in other areas of the business (e.g. void turnover).
Suitability of stock	Age and access to stock has considerable impact on the ways GMHPs could and should utilise green technologies.
Uncertainty about technologies	GMHPs feel that there is uncertainty about the long-term impacts of certain alternative heating technologies, and a lack of trusted, independent advice available to conduct due diligence on the technologies considered.
Skills and support	GMHPs have experienced a lack of skills in-house and among contractors and maintenance providers in accessing projects and funding, surveying for and procuring green technologies, installation and maintenance.

5.2. Education and Use

5.2.1. One barrier common among GMHPs relates to the education of customers on the use of green technologies, particularly green heating. There is a need to support and train customers in the use of ambient heating systems, which is significantly different from the ways in which they may have used traditional boiler and direct heat systems. It was also noted that these cultural changes were most challenging for vulnerable residents, such as older people, whose needs and expectations from a heating

system may not immediately align with newer technologies and the way these operate.

- 5.2.2. For example, it was commonly cited among GMHPs that when transitioning from traditional gas boilers to air source heating technologies, when customers felt chilled, they were more likely to turn up heating significantly, as they may have done before. However, customers were unable to feel a significant temperature change in a short amount of time, as they may have done with traditional gas. As a result, the technology tended not to achieve cost benefits.
- 5.2.3. Due to circumstances like these, organisations have noted the additional resources required (both in terms of staff time, and any direct costs of hiring externally) to train residents to use their new heating systems most effectively.
- 5.2.4. Finally, it was mentioned by some GMHPs that cultural change also needed to happen within organisations to improve the use of green technologies. While on the whole their colleagues are open to green technology and its uses, not everyone was properly trained on the low-carbon agenda and its opportunities. This was being achieved among some GMHPs through low-carbon literacy training, but some felt there was still room to improve.

5.3. Competing Priorities

- 5.3.1. The Grenfell tragedy in 2017, and resultant pressure from the RSH and tenants on health and safety, as well as recommendations from the Hackitt Review, have meant that GMHPs and the wider social housing sector are under an increased obligation to ensure their homes are fire safe. As a result, many organisations have invested significantly in analysis of cladding and other features to ensure there is full compliance with fire safety regulations.
- 5.3.2. Ongoing remedial works, and overall commitments to fire safety through retrofit programmes, have had a strategic and funding impact on social housing providers since 2017. Boards, for example, have focused on and set targets for asset management teams to meet fire safety standards and replace unsafe cladding from high-rise blocks. This has shifted priorities away from other strategic areas, such as the de-carbonisation of homes.
- 5.3.3. Many social housing providers had not budgeted for such extensive fire safety works; they have had to redirect funding, and resources such as staff, from elsewhere in their business plans for this purpose. This has made it difficult for organisations to invest in other non-core areas within planned maintenance programmes, such as green technology.

5.4. Financing and Viability

- 5.4.1. The large majority of GMHPs indicated that financing the additional costs of green technologies is a significant barrier to their widespread use. This is the case in both retrofit and new build programmes.
- 5.4.2. For retrofit, this is due to asset management planning processes and budgeting. Long-term (typically 30 years) financial planning for asset management is underpinned by stock condition survey data and the replacement cost of current components. These plans ultimately dictate budgets. The often substantial additional capital cost of green technologies is a significant barrier to GMHPs using them widely.
- 5.4.3. Some organisations have indicated that, within these assumptions, there is the potential to gap fund the upgrade of energy inefficient systems (such as storage heaters) to gas or electrical systems. This is, however, calculated on a case-by-case basis: no GMHPs reported that their asset management plans considered green technology upgrades across their stock.
- 5.4.4. In new build, it was mentioned by GMHPs that two barriers currently exist to using green technologies more widely:
- Many organisations have limited control over the specification of components in new technologies, either because they procure new homes through Section 106 agreements or joint venture agreements, which are private developer led.
 - Social housing providers compete for land with private developers. This often means that private developers, who are not required to specify higher-cost renewables and other green technologies (consequently with lower building costs), are able to bid more for land.
- 5.4.5. These barriers are further exacerbated by a lack of evidence that new homes with green additions or lower running costs are more valued in the open market. This means that greener homes do not currently attract a higher valuation than traditional properties; therefore, social housing providers are not able to increase borrowing to meet the increased cost of having fitted green technologies.
- 5.4.6. *Recommendation: GMHPs and the wider housing sector should lobby the RICS on how to better consider energy efficiency in property valuations.*
- 5.4.7. Of the 15 GMHPs who returned a questionnaire, while all of them indicated that 'reducing fuel costs to residents' was a primary driver for a shift to using green technologies, only 53% gave the same priority to 'savings to the landlord'. This is because efficient technologies may reduce heating costs paid by residents, but do not result in direct savings to landlords.
- 5.4.8. Similarly, return on green technology investment for social housing providers is limited. Savings to residents often cannot be easily recovered by landlords, due to the social housing rent settlement, which sees rent levels set in line with local income

calculations with annual increases percentage linked to inflation. Generally, there is also limited opportunity to increase service charges or administer any other fees to residents.

5.4.9. *Recommendation: GMHPs and the wider housing sector, should consider lobbying for reform in rent and service charge legislation so that they might share in the benefit of reduced energy costs and recoup a greater proportion of their capital investment.*

5.4.10. *Recommendation: The government should provide certainty and offer funding programmes which allow housing providers to invest in long-term, stock-wide green technology programmes.*

5.4.11. Social housing providers have many priorities. They tend to avoid risks that may adversely affect their customers or their business plans. Risk management underpins the way social housing providers are regulated, governed and managed. In addition to the RSH Consumer and Economic standards, tenant satisfaction is also a KPI for all social housing providers. These factors are considered in strategic decision-making by boards and may weigh against the adoption of green technology programmes.

5.4.12. Some GMHPs who have used pilots and trials to test emerging green technologies have had negative experiences, such as lack of performance against expectations or inefficient customer use. As a result, many of these organisations may be less willing to use innovative green technology in the future or may be unable to obtain the support of their boards.

5.4.13. One related barrier to the use of green technologies, particularly in employing a 'fabric first' approach to retrofit programmes, concerns traditional programming and performance measures among GMHPs. These measures, which focus on short void turnaround times and minimising the resulting rent loss from empty properties, may sometimes conflict with the benefits of more extensive green technology upgrades. The measures do not necessarily reflect that, for some GMHPs, the best time to install significant green technology is during void periods. As a result, some organisations depend on traditional equipment which may be installed quickly, even if alternative green interventions may contribute to better sustainability overall and reduced running costs in the long term.

5.4.14. Retrofit of extensive green upgrades may be disruptive to residents, particularly if interventions include internal insulation or other internal work. This has meant GMHPs may undertake work which involves minimal disruption, such as external upgrading. They forgo more extensive and time-consuming initiatives, despite some of these realising better outcomes.

5.5. Suitability of Stock

5.5.1. Some GMHPs discussed the practical barriers to using green technologies in retrofit stock which relate to the specific makeup and geographical spread of their stock. Of the 15 GMHPs who returned a questionnaire, their stock comprised 57% houses and maisonettes, and 43% flats. Some organisations have dense, geographically tight estate-based stock and others have widespread, rural low-density stock. These factors, as well as age and access to stock, had considerable impact on the ways these organisations could and will use green technologies in the future.

5.5.2. Some GMHPs mentioned that older, Victorian stock did not have fabric appropriate to get best value from green heating systems, and that the cost of retrofitting this stock was not viable without additional financial support.

5.6. Uncertainty about Technologies

5.6.1. There is a general lack of certainty about the long-term impacts of certain alternative heating technologies among many GMHPs. The inability to determine the 'technology of the future' by establishing a firm evidence base for its use and confirmation of its long-term cost savings is a significant barrier for GMHPs in adopting green heating technologies.

5.6.2. It was noted by some GMHPs that the procurement of certain technologies (such as air source heat pumps) and the maintenance regimes for some of the technologies proved to be more costly than originally estimated. This cost under-estimation has diminished trust among boards.

5.6.3. Related to this, GMHPs also noted that there was a general lack of availability for trusted, independent advice to conduct due diligence on the technologies being considered. Some GMHPs mentioned that the options appraisals they had commissioned previously were biased towards the merits of a certain technology. This, in some instances, may have resulted in underestimating ongoing costs. Circumstances like these have left some GMHPs wary about engaging further reviews and accepting their recommendations with confidence.

5.6.4. *Recommendation: The private sector should consider scaling up to accommodate demand for independent consultancy advice on green technologies.*

5.6.5. GMHPs also noted the difficulty in undergoing feasibility assessments for green technologies against high-efficiency gas boilers, especially given the decreasing cost of gas. Anecdotal evidence indicated that the cost of ground source heating was comparable, if not more expensive, than gas alternatives due to this price reduction. Because of this, for certain GMHPs it has been hard to prove that some renewable programmes meet core objectives, such as lower running costs to residents.

5.6.6. In addition, some GMHPs mentioned the current lack of availability of reliable consultancy advice for particularly innovative solutions, such as hydrogen plant technology. This means that the full spectrum of options is not being considered at

present. This may reduce boards' confidence in currently available technologies, and if better options might become available in future.

5.6.7. Recommendation: The National Housing Federation, National Federation of ALMOs and Local Government Association should co-ordinate sector-wide thought leadership and guidance on the use of green technologies in social housing, accessing suppliers, partners and funding models.

5.7. Skills and Support

5.7.1. One barrier mentioned by a number of GMHPs was the lack of skills, in-house and among contractors and maintenance providers, in a number of areas related to green technologies, including:

- accessing projects and funding
- surveying for green technologies
- procuring green technologies
- installation
- maintenance.

5.7.2. This lack of skills has meant that organisations have sought initial and ongoing support from specialist contractors to fit and maintain green technologies projects. Even organisations with a Direct Labour Organisation tend not to have specialist skills in-house to install or maintain innovative green heating technologies. Many GMHPs said that they had been able to access these services locally for smaller programmes, but it was harder to find local suppliers capable of carrying out larger schemes.

5.7.3. Generally, GMHPs were satisfied with the services they had received for sustainability and low-carbon-related evaluation. These included whole-business evaluations (including stock, fleets and office spaces) to help organisations identify areas where improvements could be made.

6 | Estimating Demand for Green Technologies

6.1. Overview

6.1.1. Appendix 1 contains a detailed breakdown of the questionnaire responses relating to the projected intention to use, the demand for and estimated spend (where available) on green technologies in retrofit/existing stock, and the likelihood of use for green technologies in new development housing. This section contains an overview of the findings. As many of the figures provided by GMHPs are indicative estimates, and subject to funding availability and overall business planning, it should be used as an indicator of preference for certain technologies over others and should not be used to signal likely demand to the supply chain.

6.1.2. Technologies in the questionnaire include:

- **Renewable energy** (e.g. solar PV)
- **Heating** (e.g. flue gas heat recovery units, combined heat and power, grade A efficiency boilers, air source heat pumps, ground source heat pumps, biomass and mechanical ventilation and heating)
- **Energy efficient building technologies** (e.g. insulation – loft and cavity, insulation – external or internal wall, windows, doors, energy-efficient lighting, monitoring – wireless heating zone controls, water efficient technologies flow taps, dual flush systems).

6.2. Technologies for Retrofit

6.2.1. Of the thirteen GMHPs who provided details about their retrofit expenditure, combined planned capital expenditure for green technologies over the next five years for retrofit is valued at about £500m. This figure is planned spend, and many GMHPs noted it depends on budgets and funding made available by local and national government (e.g. local authority HRA).

6.2.2. To indicate likely demand for green technologies in retrofit/existing stock, GMHPs were asked to complete a form to establish the following for each technology listed in 6.1.2:

- Intention to use the technologies over the next five years by indicating “Yes” or “No”
- For technologies answered “Yes”, the quantities of that technology (where available) over the next five years
- For technologies answered “Yes”, the total budget spend for that technology (where available) over the next five years.

6.2.3. Appendix 1 contains a breakdown of how GMHPs estimated total demand for⁷ and spend on green technologies for existing stock. Findings from the analysis include:

- **Renewable energy:** About half of GMHPs will use solar PV for retrofit. Demand for solar PV units ranges from 11 units to 150 units, with spend ranging from £38k (£3.5k per unit) to £600k (£4k per unit)
- **Heating:** GMHPs indicate they will use the following two technologies more than other heating technologies over the next five years:
 - Grade A efficiency boilers (c. 80% of GMHPs will use), with demand for units ranging from 100-500 units per GMHP for some GMHPs with relatively low demand, and 2,000 - 5,000 units in GMHPs with higher demand (total of c. 16k units among nine GMHPs). Spend ranges from £200k for some GMHPs with lower demand levels and up to £7m in GMHPs with high demand (c. £1,500 - £2,500 per unit)
 - Air source heat pumps (c. 64% of GMHPs will use), with demand for units ranging from 100 units in GMHPs with lower demand levels and up to 3,000 units in organisations with high demand levels (total of c. 3.6k units among five GMHPs). Spend ranges from £300k for some GMHPs with lower demand levels and up to £12m in GMHPs with high demand (c. £1,500 - £4,000 per unit)

Note: The least demanded heating technologies among GMHPs were flue gas heat recovery units and biomass. No GMHPs indicated they would use these technologies in the next five years.

- **Energy-efficient building technologies:** GMHPs indicate they will use the following four technologies more than other heating technologies over the next five years:
 - Insulation – loft and cavity (c. 93% of GMHPs will use), with demand for units (homes) ranging from c. 500 units for some GMHPs with relatively low demand and up to c. 1,500 units in GMHPs with higher demand (total of c. 5k units among six GMHPs). Spend ranges from £45k for some GMHPs with lower demand levels and up to £1.125m in GMHPs with high demand (c. £300 - £1,000 per home)
 - Insulation – external or internal wall (c. 86% of GMHPs will use), with demand for units (homes) ranging from c. 10-300 units for some GMHPs with relatively low demand and up to c. 1,000 units in GMHPs with higher demand (total of c. 2k units among four GMHPs). Spend ranges from £45k for some GMHPs with lower demand levels and up to £1.125m in GMHPs with high demand (c. £6k - £12k per home)
 - Windows (c. 87% of GMHPs will use), with demand for units (homes) ranging from c. 10-150 units for some GMHPs with relatively low demand and up to c. 1.25k units in GMHPs with higher demand (total of c. 4.2k units among seven GMHPs). Spend ranges from £45k for some GMHPs with

⁷ Please note total demand for green technologies includes demand across all stock. Because some GMHPs have stock in other parts of the country, these demand figures may be higher than total demand related to GMHP housing.

lower demand levels and up to £3.5m in GMHPs with high demand (c. £3k - £8k per home)

- Doors (c. 93% of GMHPs will use), with demand for units (homes) ranging from c. 100-500 units for some GMHPs with relatively low demand and up to c. 2k – 4k units in GMHPs with higher demand (total of c. 13.1k units among eight GMHPs). Spend ranges from c. £125k for some GMHPs with lower demand levels and up to £4m– 8m in GMHPs with high demand (c. £650-900 per home)

Note: The relatively lower demanded energy-efficient building technologies among GMHPs were energy-efficient lighting, monitoring – wireless heating zone controls, and water efficient technologies flow taps, dual flush systems with c. 50% - 70% of GMHPs indicating they would use these technologies over the next five years.

6.2.4. In addition, one GMHP provided “other” green technologies they plan to use for retrofit. These include battery storage and Demand Side Response (DSR), and retrofitting heat meters to communal heating.

6.3. Technologies for New Development

6.3.1. Of the thirteen GMHPs who provided details about their new development expenditure, combined planned capital expenditure for new development over the next five years is valued at c. £1.9bn, with numbers to be developed of up to c. 24k new homes. This figure is planned spend; GMHPs noted it is dependent on business planning and viability.

6.3.2. To indicate likely demand for green technologies in new developments, GMHPs were asked to complete a form to establish the following for each technology listed in 7.1.2:

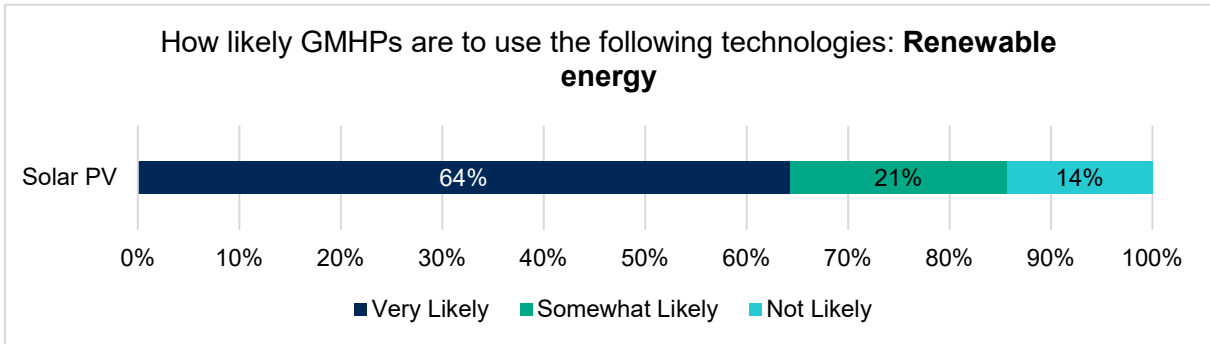
- Likelihood to use the technologies over the next five years by indicating “Very Likely”, “Somewhat Likely” or “Not Likely”
- Due to inability to determine the types of units to emerge in the future (as part of evolving development programmes), Altair did not ask GMHPs to specify the quantity and budgets for each of these technologies for new build developments.

6.3.3. Appendix 1 contains a breakdown of how GMHPs estimated total demand for⁸ and spend on green technologies for existing stock. Key findings from the analysis are provided below.

6.3.4. The figure below shows that about 85% of GMHPs are very or somewhat likely to use solar PV renewable energy.

⁸ Please note total demand for green technologies includes demand across all stock. Because some GMHPs may build homes in other parts of the country, these demand figures may be higher than total demand related to new GMHP housing.

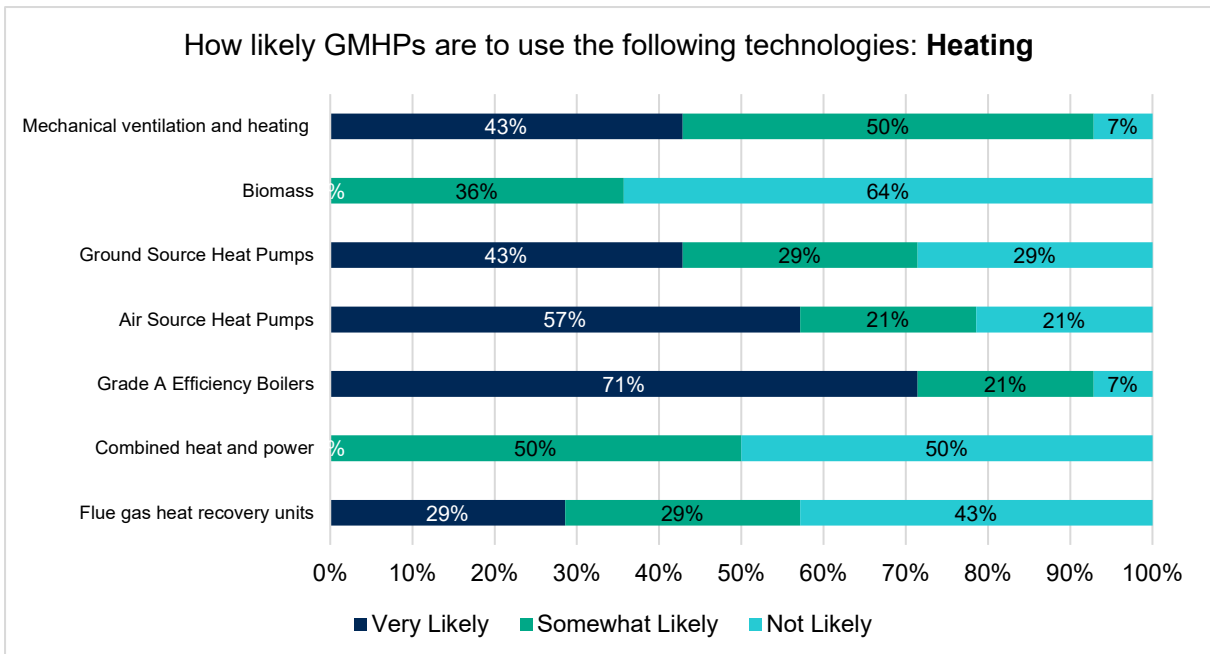
Figure 2: GMHP Likelihood to Use Renewable Energy in New Development



6.3.5. The figure below shows demand for heating technologies:

- GMHPs are most likely to use mechanical ventilation and heating, air source heat pumps, and grade A efficiency boilers over the next five years in new developments
- GMHPs are least likely to use biomass, combined heat and power and flue gas heat recovery units over the next five years in new development.

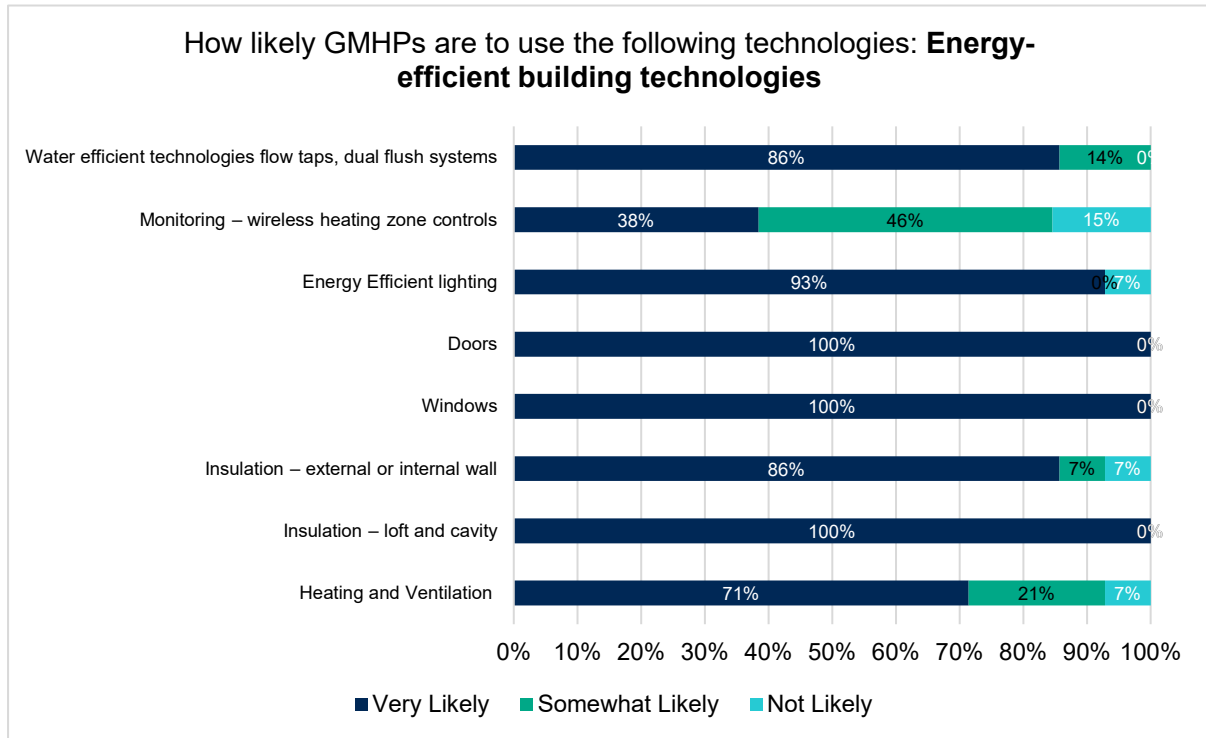
Figure 3: GMHP Likelihood to Use Heating Technologies in New Development



6.3.6. The figure below shows demand for energy-efficient building technologies:

- GMHPs are most likely to use insulation – loft and cavity and energy-efficient doors and windows over the next five years in new development.
- GMHPs are least likely to use monitoring – wireless heating zone controls over the next five years in new development.

Figure 4: GMHP Likelihood to Use Heating Technologies in New Development



6.3.7. In addition, two GMHPs provided “other” green technologies they plan to use for new development. These include:

- Electric vehicle charging points – *Somewhat likely*
- Enhanced air leakage standards – *Very likely*
- Rainwater harvesting – *Somewhat likely*
- Off site/modular for energy performance – *Very likely*
- Battery storage – *Somewhat likely*
- District heating/heat grid – *Somewhat likely*

Appendix 1 | Green Technologies - Demand Analysis

Type of technologies likely to be used in retrofit work

The table below contains estimates of the proportion of GMHPs who plan to use each of the specified technologies over the next five years in existing stock.

Technology	% of GMHPs who plan to use technology in the next five years for existing stock
Renewable energy	
Solar PV	46%
Heating	
Flue gas heat recovery units	-
Combined heat and power	8%
Grade A efficiency boilers	87%
Air source heat pumps	79%
Ground source heat pumps	64%
Biomass	-
Mechanical ventilation and heating	29%
Energy-efficient building technologies	
Insulation – loft and cavity	93%
Insulation – external or internal wall	86%
Windows	87%
Doors	93%
Energy-efficient lighting	71%
Monitoring – wireless heating zone controls	64%
Water efficient technologies flow taps, dual flush systems	69%
Other (please list):	<ul style="list-style-type: none"> ▪ Battery storage ▪ DSR ▪ Retrofitting of heat meters for communal heating

Key: Green = >75%, orange = 25 – 74%, red = <25%

Quantity Demand for Retrofit

The table below illustrates the ranges of quantities demanded by GMHPs for technologies for retrofit. Note: These figures are for illustrative purposes only and are estimates depending on budgets, funding availability and business planning.

Technology	Units projected by GMHPs to procure over next five years			Number of GMHPs to provide estimates
	Min Demand	Max Demand	Total Units	
Renewable energy				
Solar PV	11	150	196	4
Heating				
Flue gas heat recovery units	-	-	-	0
Combined heat and power	-	-	-	0
Grade A efficiency boilers	129	5,000	15,881	9
Air source heat pumps	100	3,000	3,632	5
Ground source heat pumps	100	700	1,167	5
Biomass	-	-	-	0
Mechanical ventilation and heating	-	-	-	0
Energy-efficient building technologies				
Insulation – loft and cavity	500	1,500	5,000	6
Insulation – external or internal wall	10	1,000	1,986	4
Windows	14	1,250	4,264	7
Doors	89	4,484	13,141	8
Energy-efficient lighting	1,000	1,000	1,000	1
Monitoring – wireless heating zone controls	400	2,000	2,400	2
Water efficient technologies flow taps, dual flush systems	421	6,000	11,321	5

Budget for Retrofit technologies

The table below illustrates the ranges of budgets indicated by GMHPs for technologies for retrofit. Note: These figures are for illustrative purposes only and are estimates depending on budgets, funding availability and business planning.

Technology	Projected spend by GMHPs to procure over next five years			Number of GMHPs to provide estimates
	Min Budget	Max Budget	Total	
Renewable energy				
Solar PV	£38,500	£600,000	£638,500	2
Heating				
Flue gas heat recovery units	-	-	-	0
Combined heat and power	-	-	-	0
Grade A efficiency boilers	£219,300	£7,000,000	£21,510,436	8
Air source heat pumps	£200,000	£21,000,000	£22,000,000	4
Ground source heat pumps	£300,000	£12,000,000	£14,100,000	4
Biomass	-	-	-	0
Mechanical ventilation and heating	-	-	-	0
Energy-efficient building technologies				
Insulation – loft and cavity	£45,000	£1,125,000	£2,520,000	7
Insulation – external or internal wall	£60,000	£4,000,000	£6,430,000	5
Windows	£45,500	£4,168,500	£21,012,333	7
Doors	£126,900	£8,483,464	£15,082,564	8
Energy-efficient lighting	£150,000	£480,000	£830,000	3
Monitoring – wireless heating zone controls	£150,000	£200,000	£350,000	2
Water efficient technologies flow taps, dual flush systems	£100,000	£1,503,819	£1,603,819	2

Likelihood of green technologies to be used in new development

The table below summarises the likelihood that GMHPs will use each of the specified technologies over the next five years in new development. *Please note: Figures have been rounded to the nearest whole percentage, and so may not add up to 100%.*

Technology	Likelihood of use in new development in next five years		
	Very	Somewhat	Not at all
Renewable energy			
Solar PV	64%	21%	14%
Heating			
Flue gas heat recovery units	29%	29%	43%
Combined heat and power	-	50%	50%
Grade A efficiency boilers	71%	21%	7%
Air source heat pumps	57%	21%	21%
Ground source heat pumps	43%	29%	29%
Biomass	-	36%	64%
Mechanical ventilation and heating	43%	50%	7%
Energy-efficient building technologies			
Heating and ventilation	71%	21%	7%
Insulation – loft and cavity	100%	-	-
Insulation – external or internal wall	86%	7%	7%
Windows	100%	-	-
Doors	100%	-	-
Energy-efficient lighting	93%	-	7%
Monitoring – wireless heating zone controls	38%	46%	14%
Water efficient technologies flow taps, dual flush systems	86%	14%	-

Planned development programmes for GMHPs likely to procure green technologies

The table below illustrates total planned development programmes over the next five years for all GMHPs who have indicated that they would be 'Very Likely' or 'Somewhat Likely' to incorporate each of the technology types specified. Please note that not all units built would necessarily include all the technologies stated.

Technology	Total size of development programme over next five years (Stock Units)	
	Very Likely	Somewhat Likely
Renewable energy		
Solar PV	10,305	8,600
Heating		
Flue gas heat recovery units	7,500	6,700
Combined heat and power	-	9,069
Grade A efficiency boilers	21,364	2,000
Air source heat pumps	9,569	4,500
Ground source heat pumps	7,269	6,300
Biomass	-	6,905
Mechanical ventilation and heating	9,400	10,169
Energy-efficient building technologies		
Heating and ventilation	17,205	2,364
Insulation – loft and cavity	23,569	-
Insulation – external or internal wall	22,169	500
Windows	23,569	-
Doors	23,569	-
Energy-efficient lighting	19,569	-
Monitoring – wireless heating zone controls	3,105	12,364
Water efficient technologies flow taps, dual flush systems	21,705	1,864

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