Appendix A - Housing and Landlord Services – Energy Efficiency Strategy

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1 – Strategic Context

Set against the backdrop of the climate and ecological emergency, Bristol's buildings must be ready for a future containing more extreme temperatures *and* more volatile energy prices. As the largest domestic landlord in the city, Bristol City Council (BCC) has a huge role to play in ensuring our homes can meet the challenges ahead.

The One City Climate Strategy sets out a number of priority areas which, taken together, will ensure our homes and buildings are ready for a net zero future:

- 1 Improving the performance of existing buildings in the city to minimise heat demand.
- 2 Maximising electricity generation within the city, including at least 350MW of solar PV.
- 3 Phasing out natural gas by 2030 including the replacement of 160000 gas boilers across the city.

The impacts of the cost-of-living crisis are felt particularly keenly by BCC tenants, many of whom are in lower income groups. The One City Bristol Fuel Poverty Action Plan published in 2020 sets a target that "by 2030, nobody in Bristol will suffer from a cold home due to fuel poverty".

In response to the commitments made in the One City strategies, the BCC Housing and Landlord Services Team has set a target to improve the energy performance of our homes so that every property achieves an EPC rating of C or better by 2030. Around 7400 BCC homes are currently below EPC C, a number which could rise to around 10400 when proposed changes to the EPC framework are introduced at a national level in 2024. The purpose of this document is to set out how we will achieve that goal – taking action to ensure our tenants are healthier and warmer, and that their energy bills are lower.

As well as being impactful in their own right, the steps needed to improve energy efficiency standards form the first part of the journey towards a fully decarbonised housing stock. In this

document we will set out the risks, challenges and opportunities of transitioning away from gas heating and hot water, helping to pave the way for a separate heat decarbonisation plan which we will publish in due course.

2 - Introduction – measuring energy performance

2.1 – Current EPC Performance

As outlined above, BCC has set an ambitious target that all our domestic properties will reach a high standard of energy efficiency by 2030. In order to show progress, we need a consistent way to measure the performance of our homes; Energy Performance Certificates (EPCs), are a cost-based metric used to assess and compare the energy performance of domestic and non-domestic buildings. To generate an EPC for existing buildings, an assessment is carried out using the 'Reduced Data Standard Assessment Procedure' (rdSAP) methodology, which gives the building a score from 1-100 (a score of 100 indicates a building with zero energy costs). The 'SAP score' is then used to generate an EPC rating from A-G (with A being the highest rating available).

BCC is not required to carry out a physical EPC survey on all our homes. Instead, we use our extensive stock condition data to calculate an assumed EPC rating for each individual property, giving us a clear picture of how our housing stock is performing. Annex One gives in-depth data on the energy performance of BCC homes. Table one (below) provides a high-level overview of BCC homes broken down across different EPC bands.

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EPC Band	Total number of properties	
A (92 – 100)	0	
B (81 - 91)	194	19373 (72.4%)
C (69 – 80)	19179	
D (55 – 68)	7038	
E (39 – 54)	323	7380 (27.6%)
F (21 – 38)	19	
G (1 – 20)	0	
Total	26753	

The data in Table One shows us that almost three quarters of BCC homes are already at EPC C or better, with the significant majority achieving a C rating and a median SAP score of 71. This compares favourably with the Office for National Statistics (ONS) 2021 data for England, whereby the median SAP score across all tenure types was 66.

2.2 EPCs – a change in methodology

In early 2024 the national framework which underpins EPCs is set to change. In practical terms this means the performance of BCC's housing stock will appear worse than it does at present (with more homes moving to EPC D and below). Despite no physical changes to the properties themselves, the assumed performance of our housing stock will reduce due to changes in the way energy performance is calculated. Table two gives an indicative overview of how our homes will perform under the new methodology:

Table Two

EPC Band	Total number of properties	
A (92 – 100)	0	
B (81 – 91)	45	16,313 (60.9%)
C (69 – 80)	16268	
D (55 – 68)	8928	
E (39 – 54)	1144	10,440 (39.1%)
F (21 – 38)	336	
G (1 – 20)	32	
Total	26753	

The data in Table Two shows a significant increase in the number of homes with poor energy performance. A variety of factors are responsible for this predicted drop in performance, the main one being a change to the assumed cost of electricity, which causes homes with electric heating and hot water systems to drop more than 10 SAP points on average.

The data in tables one and two shows that approximately 28% of BCC homes are currently below EPC C, potentially rising to around 40% from early 2024 under the new SAP methodology. These properties will require improvements if the 2030 target is to be met. We will achieve this through:

- Implementing a major programme of fabric improvements over the remainder of this
 decade. Targeting uninsulated and poorly insulated homes, improving thermal performance
 by installing measures such as solid wall insulation and cavity wall insulation, as well as
 topping up loft insulation and replacing windows and roofs where necessary.
- Increasing the deployment of Solar PV panels on our rooftops. It is our ambition that one day all BCC homes will benefit from rooftop solar where technically feasible we will start by prioritising homes at the greatest risk of fuel poverty.
- Taking an increasingly data-driven approach to our rolling programme of cyclical maintenance, ensuring that whenever we visit a poor performing property to carry out cyclical maintenance, we also identify and carry out any low-cost energy efficiency works needed to improve the EPC rating.
- Reviewing heating systems in blocks of flats, in particular those with direct electric heating.
 Many of our flats in blocks have expensive night storage heaters or other, more modern
 forms of direct electric heating. These heating systems score poorly under SAP framework
 and often result in lower EPC scores, even when installed in well insulated homes. Over the
 course of 2024/25 we will review the heating and hot water systems in electrically heated
 properties, to identify a long-term solution which addresses both our decarbonisation and
 our fuel poverty goals.
- Introducing a 'Bristol Standard' for our new build properties to increase their energy
 performance beyond current levels. By adopting aspects of the emerging Local Plan
 sustainability requirement (due to take force from 2025) a year early, we will ensure low
 carbon heating is standard in all new homes, and will aim to invest more money to improve
 the thermal performance and air-tightness of new properties, as well as ensuring the

deployment of solar PV on new rooftops, where appropriate, and the use of other sustainable technologies are utilised to better the energy performance of all new affordable homes delivered by the HRA.

3 - Fabric first

3.1 - Targeting the right properties

Improving energy efficiency of existing buildings through a 'fabric first' approach is widely viewed as a no-regrets first step to decarbonisation and, to that end, government grant funding schemes such as the Social Housing Decarbonisation Fund encourage this approach. In practice, meeting our EPC C 2030 target will mean combining BCC funding with external grant funding to deliver a series of projects across the next seven financial years, where possible completing energy efficiency upgrades alongside existing planned improvements such as roof and window replacements to reduce costs and minimise disruption for tenants.

In recent years BCC has invested significantly in installing measures such as cavity wall insulation, loft insulation and double glazing. Most of the remaining uninsulated and poorly insulated properties are 'harder-to-treat' homes where these more straightforward, lower-cost measures are not sufficient to achieve the required standard. These homes tend to have solid walls or narrow cavity walls consistent with non-standard methods of construction commonly used in the middle part of the 20th Century. Work to improve these properties is already underway, with a programme of major upgrades scheduled for 2023/24 and 2024/25 (see Annex Two) delivered via the strategic partnership with Bristol City Leap.

The 2030 target encourages a focus on our poorest performing homes, but there will be instances where we need to go further. Preparing our housing stock for the transition to low-carbon heating means minimising heat demand wherever possible, so we will need to improve some homes which — on paper — are already at EPC C, but based on analysis of our data we know perform poorly and would be unable to transition to low carbon, low temperature heating systems without fabric improvements.

Through analysis of our stock condition data, we have identified around 4000 properties which are in need of significant fabric improvements. This cohort, which is made up of flats in blocks with solid walls, non-traditional 'easiform' homes and older 'acquired' properties, contains a number of homes at EPC D or below, as well as a homes which, despite being at EPC C, are likely to need fabric improvements to minimise heat demand and pave the way for the installation of low carbon heating in the future.

Annex Three gives an overview of how this large programme of work could be delivered and includes indicative costings. BCC will continue to work with our delivery partners at Bristol City Leap (BCL) to finalise the programme of works and submit grant funding bids where applicable. The high cost of addressing these 'hard to treat' homes r may mean that the funding currently identified in the Housing Investment Plan is not sufficient to complete a full programme of solid wall installation by 2030.

Recommendation one – continue with our fabric first approach, prioritising the remaining uninsulated and poorly insulated homes detailed in Annex Three.

3.2 - PAS 2035 - a 'whole house' approach to retrofit

PAS 2035 is an industry standard that aims to drive high quality retrofit in the energy efficiency sector. At the centre of PAS 2035, a 'whole house' approach means that all energy efficiency measures must be considered together to mitigate the risks of a piecemeal approach to retrofit. Historically there have been issues where retrofit measures such as cavity wall insulation or solid wall insulation have been installed in isolation of other measures. This can lead to issues such as:

- Increased damp and mould
- Cold bridging
- Poor air tightness

Use of the PAS 2035 framework is mandatory in all grant-funded retrofit projects such as some of those outlined in Annex Two, whereas for projects solely funded by the HRA, PAS 2035 is currently optional. Working to PAS 2035 across all relevant projects would bring a number of benefits:

- Clarity for delivery teams with all retrofit projects designed and specified in line with a national standard.
- Fairness for residents, with all deep retrofit projects delivered to the same standard.
- Improved outcomes for damp and mould brining associated health benefits for residents, with insulation and ventilation measures considered together as standard under the PAS 2035 framework.
- Consideration of overheating in line with the Keep Bristol Cool Framework, ensuring that the need to keep our homes cool is included in the retrofit design process.

Adopting PAS 2035 as standard is estimated to increase the cost of retrofit projects by 15-20%. However, improved retrofit design is likely to drive longer-term savings to repairs and maintenance budgets, helping to offset these additional up-front costs.

Recommendation two – adopt PAS 2035 as standard in all deep retrofit projects which involve the installation of multiple, high-cost measures.

4 – Lower cost measures – an increased focus on energy efficiency

Many of the homes currently below EPC C do not require a major intervention such as external wall insulation or solar PV to reach the required standard. Around 4000 BCC homes currently at EPC D or below are traditional flats and houses with cavity wall insulation, double glazing and loft insulation – Annex Four gives a breakdown of these properties. Despite these homes being below the required standard, they perform well relative to the types of property outlined in section three (above), with a median SAP score of 67 (just two points below the threshold for reaching EPC C).

For this type of home, a major intervention is unlikely to be needed. Rather than high-cost measures such as external wall insulation, many of these properties are capable of reaching EPC through lower-cost 'shallow retrofit' measures such as:

- Draught proofing
- Energy efficient lighting
- Additional loft insulation
- Floor insulation

By taking an increasingly data-led approach to energy efficiency, we can work alongside colleagues at Bristol City Leap to develop a targeted programme, improving energy efficiency standards for our

residents and ensuring these homes receive the improvements they need to reach at least EPC C. Annex four contains more data on properties in this category.

Recommendation three – Use data to inform our energy efficiency programme, targeting low cost measures at homes which are marginally below the EPC C standard.

<u>5 – Solar PV – maximising deployment for retrofit</u>

Maximising electricity generation from solar PV is a key aspect of the One City Strategy, but is an area where BCC homes perform poorly - Currently <1% of BCC homes benefit from rooftop solar panels. Whilst this figure is set to increase somewhat as more new build homes are completed over the course of this decade, there remain around 15000 existing roofs currently without solar panels, of which around half are thought to be technically suitable.

Under the new EPC framework due to take effect from early 2024, approximately 3000 additional homes will move to EPC D or below due to the change in methodology. Many of these properties are fully insulated so, rather than a lack of insulation, the major contributing factor is expensive direct electric heating and hot water. These households are likely to experience the highest heating and hot water bills of all BCC tenants and, adopting the 'Low Income Low Energy Efficiency' (LILEE) definition, are at significant risk of fuel poverty.

By prioritising homes with direct electric heating and hot water, we can maximise near-term deployment of solar PV in a way that is consistent with BCC's wider strategic objectives on energy performance and fuel poverty. This approach also creates opportunities to maximise grant funding by targeting properties with the lowest SAP scores first. The installation of solar PV alongside other related technologies such as battery storage and Solshare units will help reduce energy bills for tenants and improve the EPC rating of these poor performing properties.

Recommendation four - prioritise fuel poor households for solar PV, in particular blocks of flats with expensive direct electric heating and hot water, aligning HRA investment to our duel strategic aims of maximising energy efficiency and minimising fuel poverty.

Beyond the immediate need to prioritise the poorest performing properties, there is a longer term need to continue to maximise solar generation on our rooftops. Maximising deployment of rooftop solar over time will help pave the way for the transition to low carbon heating by minimising tenants' energy bills and reducing the overall demand placed on the electricity grid through the electrification of heat and transport.

On average our Repairs and Maintenance Service replace around 200 roofs per year on houses and house-type flats, of which around 50% are likely to be suitable for rooftop solar. By increasing our roofing budget to include feasibility studies on all roof replacements, and installing solar PV wherever technically feasible, we will ensure that deployment of solar panels increases in the long term and is not limited only to those higher priority homes outlined above.

This approach minimises disruption for our tenants by ensuring roof replacements and solar PV installations are carried out at the same time wherever possible. By aligning these works with our rolling programme of repairs and maintenance, we will also realise cost savings associated with scaffolding and other preparatory work. Annex Five gives an indicative cost for this programme over a 30-year timeline.

Recommendation five – carry out solar PV feasibility assessments alongside all roof replacements and install solar panels wherever technically feasible to do so.

6 - Direct electric heating and homes off the gas grid

As outlined in section five, BCC owns around 2500 homes with older night storage heaters or their more modern 'high heat retention' equivalents, in addition to a further 500 homes with electric heat pumps. The majority of these homes use immersion heaters for hot water, and some are fitted with electric showers. In many cases these properties are prevented from being connected to the gas grid by building safety regulations.

Under the current SAP framework around 42% of these properties are EPC D or below, compared to around 26% of all other homes. This means that BCC tenants with electric heating and hot water are over 60% more likely than those with gas heating to live in a home which performs below the required standard. Under the revised SAP framework, we estimate the number of electrically heated homes at EPC D or below will rise to 86%, compared to 34% of all other homes. This means that under the new EPC methodology, BCC tenants with electric heating and hot water will potentially be around over 150% more likely to live in a home which performs below the required standard.

In many cases the energy performance of electrically heated homes can be improved through the use of solar PV and other associated technologies as outlined in section five (above), however in other cases this will not be possible. The structure of high-rise blocks – with limited roof space compared to the large number of dwellings – makes them relatively unsuitable for solar installations. Further work is needed to appraise the options for heating these buildings in the long term.

Recommendation six – work with Bristol City Leap review of the various options for heating and hot water in blocks of flats with direct electric heating. Produce a cost benefit analysis to include the following options:

- Continuation of the existing programme upgrading older storage heaters to more modern 'high heat retention' equivalents. Maximise deployment of solar PV where possible
- Alternative individual electric heating units such as air-to-air heat pumps
- Retrofit to a wet central heating system and install a site-specific energy source such as a ground-source heat pump
- Retrofit to a wet central heating system and connect to district heating

The results of this review will help identify the best solution for low-cost low-carbon heating in these homes, and will inform further recommendations in our Heat Decarbonisation Plan.

7 - New build homes - driving quality by introducing a 'Bristol Standard'

We're committed to ensuring all new BCC homes are net zero ready, capable of generating zero emissions from the point at which the electricity grid becomes fully decarbonised.

The proposed changes to our Local Plan will help ensure that from 2025 onwards, all new developments in Bristol are built to the highest energy efficiency standards. As the City's largest residential landlord, we're adopting these standards early. From 2024 onwards all new BCC homes will be fitted with a low carbon heating solution as standard and the use of solar PV will always be deployed where technically feasible to do so.

8 – Heat decarbonisation

For our existing homes, decarbonisation of heat is by far the biggest challenge we face on the journey to net zero. Currently around 90% of BCC properties have gas heating and hot water systems

(80% individual gas boilers and 10% communal heating systems). Annex Six gives a breakdown of existing heating systems across different property archetypes and areas of the city.

Due to a range of factors including wider market conditions, the commitment to fully decarbonise Bristol by 2030 appears extremely challenging in the context of heat decarbonisation, with several significant barriers to near term deployment of low carbon heating systems:

- Capital costs of air source heat pumps (ASHPs). The majority of our homes have individual gas boilers which provide heat and hot water. The most obvious low carbon solution for these homes are ASHPs, but based on current costs, the estimated total cost of replacing these heating systems would be £290 million £330 million. It is unlikely that this level of investment will be achievable over the remainder of this decade. With additional investment needed to decarbonise communal gas heating systems in blocks of flats, the estimated overall cost of decarbonising our housing stock is in excess of £400 million. Heat pumps are likely to reduce in cost over time, as the low carbon heating market matures in line with the country's wider decarbonisation agenda.
- Running costs of low carbon heating systems. While it is possible for low carbon heating systems to achieve lower running costs than fossil fuel alternatives, much of this depends on the way the system is installed and used in practice. The unit cost of electricity is around 3-4 times that of gas so despite the higher efficiencies they can achieve there remains a high risk that those switching to heat pumps and low carbon heat networks will experience higher heating bills in the near term, increasing the risk of fuel poverty for some households.
- Technical suitability of our homes. Detailed work is needed to understand the most suitable low carbon heating solution for each of our homes. Many BCC tenants do not have smart meters in their homes and use prepayment cards to pay for electricity these residents are thought to be at significant risk of increased running costs due to the likelihood of voluntary disconnection and an inability to make use of cheaper 'time of use' electricity tariffs. Furthermore, ASHPs differ from gas boilers in that they require a hot water cylinder to be installed; in many of our smaller homes this is likely to result in a loss of space to one of the existing rooms.
- Resident engagement. ASHPs are low temperature heating systems which work best when set to run constantly and maintain a stable room temperature. This is in contrast to gas boilers which run at higher temperatures and are often used intermittently to warm up a room in a short space of time. Among the 70,000 people living in BCC homes are a large number of people with long term health problems and other complex needs. A separate resident engagement strategy needs to be in place before we can begin deploying low temperature heating systems at scale.
- **Skills and supply chain.** Replacing around 21,000 gas boilers over a six-year period would require us to install around 70 heat pumps each week. Our work to date has demonstrated that heat pump installations take time, sometimes requiring planning permission as well as intensive work with our residents to ensure they understand their new heating system. Irrespective of the wider economic conditions, we will be unable to deploy heat pumps at a sufficient rate to meet a 2030 decarbonisation goal.

The barriers outlined above do not mean that BCC homes cannot decarbonise over time. It is our ambition that in the future all BCC homes will be fully decarbonised, but to achieve this we will need to overcome the challenges set out above, including a review of the level of capital funding allocated to our heating replacement programme. The multiple barriers to heat decarbonisation are

illustrative of the need for a separate Heat Decarbonisation Plan which is both affordable *and* grounded in real world delivery.

Recommendation seven – develop a Heat Decarbonisation Plan over the course of the next 12 months which sets out the most suitable low carbon hating solution for all BCC homes. The plan should identify opportunities for potential early no-regrets actions, for example early opportunities for district heating connections.

Recommendation eight — Develop a Resident Engagement Strategy in conjunction with colleague at Bristol City Leap, to ensure we minimise instances of tenants missing out on energy efficiency and renewable heat measures through a failure to engage. The strategy should set out how we will increase awareness across all residents, as well as how we plan to engage at a project-specific level.

While we develop a longer-term plan for heating, we have to ensure that our tenants with existing gas boilers have continuous access to heating and hot water. In practice this means we will have to continue our policy of replacing gas boilers where existing systems have broken and are beyond economic repair.

Accelerating delivery and maximising grant funding

The targets set out in the One City strategies are challenging both in the scale and pace of delivery required, and the associated capital costs. By continuing to maximise grant income from sources such as the Social Housing Decarbonisation Fund, we can ensure the HRA budget goes further, helping to meet the cost of expensive measures such as solid wall insulation.

Recommendation nine – maximise all grant funding opportunities including further waves of the SHDF.

Grant funding can bring in significant levels of additional income, but the delivery windows are short and meeting the conditions of grant agreements is resource intensive. By charging the way we work to complete design and development work in advance of delivery windows, we can reduce the burden on delivery teams and ensure we complete grant-funded projects on time.

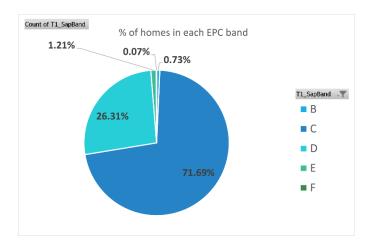
Recommendation ten – separate project budgets into 'development' and 'delivery', with development budgets running one year ahead of delivery budgets in the Housing Investment Plan.

10 - Summary of recommendations

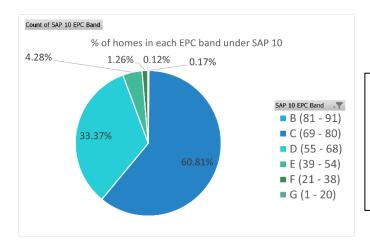
- 1 Continue with our major programme of solid wall insulation for uninsulated and poorly-insulated homes
- 2 Adopt PAS 2035 as standard for all deep retrofit projects
- 3 Initiate a 'shallow retrofit' programme targeting lower-cost measures at homes marginally below the required standard
- 4 Introduce Solar PV programme targeted at those most at risk of fuel poverty, in particular flats in blocks with expensive direct electric heating and hot water
- 5 Install Solar PV on all new roofs where technically feasible to do so.
- 6 Review of use of electric storage heaters in high rise blocks of flats to identify an affordable long term heating solution.

- 7 Develop a heat decarbonisation plan which sets out the risks and opportunities of transitioning away from gas over time
- 8 Develop a Resident Engagement Strategy together with Bristol City Leap to maximise take up of retrofit measures
- 9 Continue to maximise grant funding by bidding for future rounds of SHDF funding, actively seeking to identify other grant funding opportunities, and being open to other innovative funding models where the financial interests of the HRA and our residents are safeguarded.
- 10 Introduce development budgets for energy efficiency works to generate a steady pipeline of work and ensure deliverability within grant funding windows.

Annex One – Analytical overview of EE data



This chart shows an overview of the current energy performance of BCC homes. Around 28% of our residential properties are currently below EPC C



This chart shows an indicative overview of the energy performance of BCC homes under the new SAP 10 methodology. Around 39% of our residential properties are likely to be below EPC C

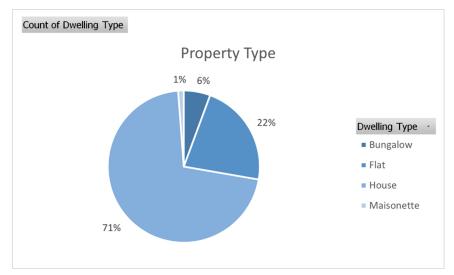
Annex Two – current energy efficiency projects

	Total cost	Grant funding	No. of homes (EPC D and below)	No of homes (EPC C and above)
Francome, Waring and Underdown	£14,500,000	£0	43	117
Littlecross House	£8,000,000	£2,000,000	112	13
Ledbury Road	£7,018,776	£1,000,000	34	46
London Road	£420,560	£48,000	1	3
St Judes blocks (Charleton, Langton, Tyndall, Haviland, JCH)	£17,000,000	£4,000,000	101	63
112 easiform flats	£3,861,215	£1,344,000	16	96
Easiform pilot	£323,000	£500k	4	21
Total	£51,123,551	8,892,000	311	<u>359</u>

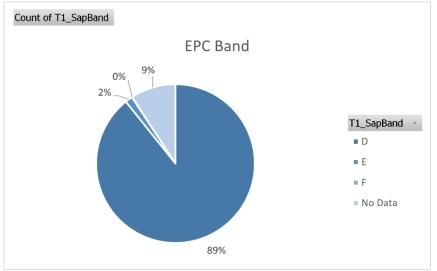
Annex Three – estimated total cost of fabric improvements (solid wall and hard to treat properties)

	Total cost April 2025 - March 2031	Maximum income from grant funding	No. of homes (EPC D and below)	No of homes (EPC C and above)	Total number of homes
Deep retrofit – acquired properties	£38m	£7m	602	226	828
Deep retrofit – high rise blocks	£12m	£2m - £4m	176	231	407
Deep retrofit – low rise blocks	£23m	£4.5m - £7.5m	215	390	605
Deep retrofit – house type flats	£30m	£7m	300	761	1061
Deep retrofit – houses	£56m	£14m	430	942	1372
	£159m	£39.5m	1723	2550	4273

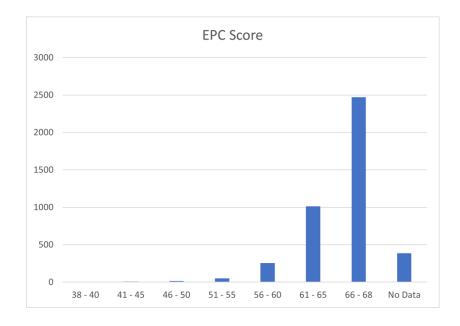
<u>Annex Four – overview of homes requiring lower-cost interventions</u>



Of the 4000 homes requiring low cost measures, nearly three quarters are houses



Almost 90% of these homes are currently EPC D – just below the required standard

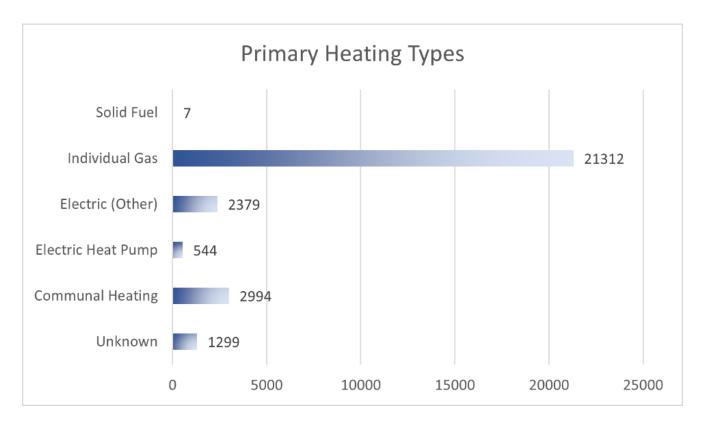


2500 of these homes (62%) are within 3 SAP points of achieving an EPC C rating

Annex five – indicative costings for rooftop solar programme

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Notes
Solar PV programme – block roofs	£16000 (development costs only)	£220,000	£330,000	£550k	£550k	£550k	Targeting PV and associated storage and power sharing tech at low rise blocks with electric heating
Solar PV programme – house roof replacement	£600,000	£600,000	£1.2m	£1.4m	£500,000	£1.6m	All roof replacements to include PV where feasible. Programme to run beyond 2030 at a cost of ~£28m over 30 years

Annex Six – overview of heating by type



The majority of BCC homes (85% in total) have gas heating, made up of individual gas boilers (75%) and communal gas heating (11%). These homes tend to perform relatively well in EPC terms with around 73% at EPC C or above.

Around 3000 of our homes have electric heating, a combination of storage heaters and air source heat pumps. These properties tend to do less well in EPC terms, with around 50% at EPC C or above.