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STEP-IN

Interim Report on V1 Urban Living Lab

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Abstract: This deliverable describes the context, working methods and results of the urban living lab within the STEP IN project. It centres on the Greater Manchester metropolitan area in the United Kingdom.

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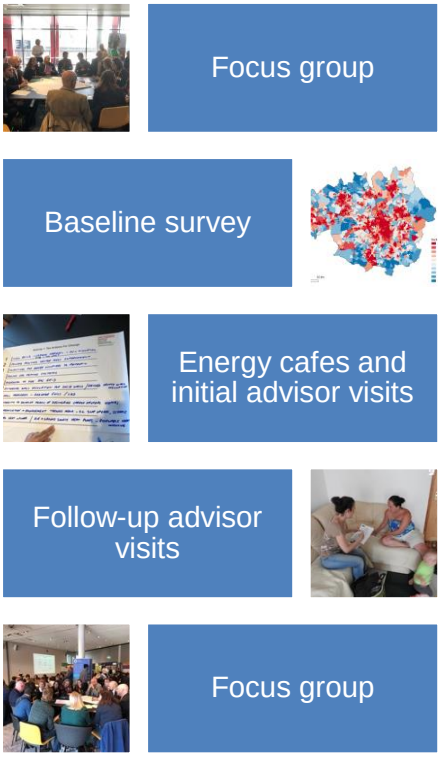
Glossary

Abbreviation / acronym	Description
EPOV	European Union Energy Poverty Observatory
GM	Greater Manchester
GMCA	Greater Manchester Combined Authority
KYP	Kashmiri Youth Project
LEAP	Local Energy Advice Partnership
LSOAs	Lower Super Output Areas
PRS	Private Rented Sector

1. Executive Summary

The STEP IN Manchester living lab is unique in terms of its spatial extent and socio-economic character. It centres on, and operates within, the entirety of the Greater Manchester *(GM)* metropolitan area – one of the largest urban conurbations of its kind in the United Kingdom, and Europe more broadly. In Manchester, living lab participants were primarily recruited via the Local Energy Advice Partnership – LEAP – programme; currently the principal policy to address the fuel poverty mitigation policy operating in GM.

Public engagement and knowledge exchange activities within the living lab included focus group meetings, energy cafes and energy advisor visits targeting 154 households. The energy advisor visits were integrated with the LEAP programme, and included an initial and follow up consultation, accompanied by customized research questionnaires for the STEP IN project. Both the advisor visits and the questionnaires proved invaluable information for the lab, as they identified numerous highly specific energy, health and housing issues faced by local residents, while helping reduce energy consumption through the provision of energy advice, 'small' energy efficiency measures and onward referrals to relevant agencies.



Qualitative and quantitative data from the lab were analysed in September and October 2019, and were compared to the results of a baseline assessment undertaken in February 2019. The results demonstrated the extensive presence of fuel poverty and energy vulnerability in Greater Manchester, and the significant benefits brought about by energy efficiency improvements. They also showed significant differences among levels of vulnerability and consumer engagement among different groups of residents in the city. A common thread running through all the findings is that within the energy domain, behaviour change in itself cannot yield significant benefits without wider and systemic improvements in broader economic, housing and social policies; and the structures of inequality and recognition that render some households more vulnerable and precarious than others.

Still, there is strong evidence to suggest that the assistance provided within the energy advice visits had a positive impact on how residents heated and powered their homes. **A direct energy bill saving of 8.6 per cent per year** for the next 10 years was estimated to have been achieved across all households participating in the project.

2. Introduction

This report describes the context, working methods and results achieved within the Manchester Living Lab of the STEP IN project. The living lab is unique in terms of its spatial extent and socio-economic character. It centres on, and operates within, the entirety of the Greater Manchester *(GM)* metropolitan area – one of the largest urban conurbations of its kind in the United Kingdom, and Europe more broadly. Despite being a thriving economic hub, GM has some of the greatest levels of urban poverty in the UK. Its housing stock is highly varied, with a significant portion of residential dwellings being of poor quality and lacking energy efficient wall and roof insulation, appliances and heating systems.

For nearly a decade, GM has been subject to the UK's austerity programme, marked by significant cuts in social welfare support and local government spending. This has further worsened the living standard of socially excluded and low-income households, including those who are struggling to pay for their energy bills. Adding to the difficulties faced by such groups have been further reductions in the types of support available to them, owing to a significant reduction in targeted state support for improving the residential energy efficiency of low-income households *(Middlemiss 2016)*.

The Manchester Living Lab is the first of its kind to address the joint challenges of improving energy efficiency and targeting low income households at the same time. Living Lab approaches are increasingly used in urban settings to address environmental sustainability challenges. Based on prior accumulated experience in this domain, the University of Manchester is currently implementing a comprehensive and iterative living lab in an inner-city district adjacent to the city centre, focusing on improvements in air quality, traffic safety, community spaces and greening. However, the unique organizational and methodological mechanics of Living Lab approaches – with their focus on engagement, iteration and self-reflective learning – have yet to be applied to the residential energy efficiency and equity challenge in the UK; even rarer are instances of introducing multiple forms of information technology into the equation, as is being done by the STEP IN project.

The UK has an extensive history of public debate and policy to address 'fuel poverty' – in England, a household is considered fuel poor if their required fuel costs are above the national median, and 'were they to spend that amount, they would be left with a residual income below the official poverty line' *(Government Digital Service 2019)*. In recent years, 'energy vulnerability' has entered the scientific agenda – it is commonly understood as a household's propensity to become unable of securing a socially- and materially-necessitated level of energy services in the home *(Bouzarovski and Thomson 2018)*. In this report, the two terms are often used interchangeably, even though fuel poverty is referred to as 'energy poverty' in the European and global context.

The implementation of the lab started in January 2019, involving a variety of research and engagement methods: documentary evidence analysis, statistical data collection, focus groups, 'energy cafes' and advisor visits. Accompanying the 'core' work of the lab were a series of public engagement, knowledge exchange and dissemination activities that took place both within the lab, and across the UK and Europe more broadly. An estimated **2700 people** were reached via the different activities undertaken in the first iteration of the lab, which concluded in September 2019.

The core organizations involved in running the lab included two universities – the University of Manchester and Liverpool John Moores University; a municipal body – Greater Manchester Combined Authority; a private company – AgilityEco; and a practitioner-led charitable organization – Groundwork. As such, the lab operated within a diverse and comprehensive institutional ecosystem of actors representing different organizational cultures, policy perspectives and knowledge-generation methods – one of the key ingredients for the successful functioning of a living lab in a dense urban setting.

Description of the Living Lab

2.1 Location

The Manchester living lab covers the entirety of the Greater Manchester Combined Authority *(GMCA)*, a major city region of England, UK. Extending across a substantial geographical area, GMCA encompasses the two cities of Manchester and Salford, and the eight metropolitan boroughs of Bolton, Bury, Oldham, Rochdale, Stockport, Trafford, Tameside and Wigan. GMCA has a total population of 2.78 million people *(Greater Manchester Combined Authority 2017)* – an estimated increase of 7.7 per cent, or 199,900 people, between 2006 and 2016. The 2011 UK Census found that there are 1.9 million households in Greater Manchester, and it has the largest travel-to-work area of any conurbation in the UK outside of London. GMCA has the largest economy of all UK combined authorities outside London, contributing 3.6 per cent of UK gross value added – GVA – in 2018 *(Office for National Statistics 2017)*. However, these headline figures conceal considerable inequalities – in terms of income, qualification levels and educational attainment – among and within the different local authorities that constitute Greater Manchester.

2.1.1 Baseline Assessment

A 'Baseline Assessment' was conducted at the start of the first iteration of the Living Lab, with the aim of understanding the socio-economic extent and spatial patterning of energy poverty and deprivation within the GMCA area. The assessment also provided benchmarks for energy poverty and energy-related behaviour analyses. The document utilized several sources of data. We drew heavily on statistics from the UK Census, disaggregated across Lower-Layer Super Output Areas *(LSOAs)*. We also undertook a review of secondary literature, including publicly-available academic studies, think tank reports and other relevant documents focused on energy efficiency and energy poverty. Due to the availability of customized, comprehensive and high-resolution data for the whole of GM, it was judged that a statistical survey for the baseline assessment would not be required.

The assessment commenced with an overview of the general context of the housing stock and energy efficiency in GM. It then provided a discussion of deprivation and poverty issues in GM, and a more specific emphasis on energy poverty. At the core of the assessment was a review of consumer and stakeholder perspectives on energy poverty and energy efficiency in Manchester and the UK. We also examined the legal and organizational underpinnings of energy poverty policy in the UK, while providing conclusions and recommendations relevant for further work.

The analysis found that energy poverty is likely to be a widespread problem in GMCA due to a combination of factors – the presence of an ageing housing stock with limited insulation, reliance on electric heating in some neighbourhoods, high-levels of income, and health deprivation; see Figure 1 These challenges were found to be most prevalent within inner city areas, although demographic factors, such as an ageing population, also result in risks that can drive energy poverty in sub-urban neighbourhoods. The findings suggested that focussing the operations of the Living Lab on inner city areas may yield the greatest benefits.

The report also found identified key structural issues that will continue to energy poverty in the future – these include of affordable and clean energy service provision in some areas, and the relatively poor energy efficiency of the housing stock in others. We identified the presence and importance of a broader socio-economic around increasing levels of income inequality and urban poverty, cuts to public services, and pressures on energy prices.

One of the headline findings of the baseline assessment was that energy behaviour changes and small-scale energy efficiency measures are unlikely, on their own, to lead to significant energy poverty decreases across the city. Still, we did emphasize that they can provide direct improvements in the lives of highly vulnerable residents. Their methodological contribution to identifying vulnerabilities 'at the doorstep' is also important here – especially as said forms of deprivation and precariousness may be subsequently be addressed through referrals to relevant forms of social or energy efficiency support. We also emphasized the need for focusing on inner-city areas, with households living in inefficient properties, or containing pensioners, single parents and disabled persons.

Figure 1: Fuel poverty patterns in the GMCA area according to the UK Government's Low Income High Cost indicator

2.1.2 Market Segmentation

The baseline survey explored patterns of energy vulnerability and energy use across several axes. This was based on evidence from the relevant literature and secondary data. The resulting 'segmentation' found that a sizeable minority of GM residents are reliant on electric central heating, which is often inefficient and expensive to run and thus can increase the likelihood of a household experiencing energy poverty. We also established that low energy efficiency plays a key role in driving energy vulnerability. Energy inefficient properties are primarily located in the private rented sector, which also houses, in many instances, disproportionately high numbers of low-income households. It also emerged that properties in the lowest energy efficiency band tend to be located at the outskirts of the city, as well as inner-city areas. Urban cores had the lowest ratio of such housing, perhaps due to the predominance of apartments. Socio-demographic factors of vulnerability included low income, as indicated e.g. by living on benefits; gender – particularly low-income households; disability; old age; and the presence of young children in the household.

2.1.3 Stakeholders

The primary stakeholders in the project were residents of GMCA experiencing, or at risk of experiencing, energy poverty. These were engaged via the energy cafes, through information campaigns, and personalized home visits from trained energy advisors.

We also worked closely with a number of relevant NGOs in the GMCA area, including Groundwork, the Kashmir Youth Project, and Carbon Coop. Through its Five Year Environment plan and the report on 'Decarbonizing Greater Manchester's Existing Buildings', GMCA also engaged with, and presented some of the outcomes of the project to, other institutional stakeholders via such as the Energy Systems Catapult, the Southway Housing Trust, and Homely Energy. Nationally, the project also engaged with the Energy helpline, in its work on 'hard to reach' energy consumers.

2.2 Unique Challenges Identified

Challenges encountered in the Manchester Living Lab related to its socio-spatial context and functioning in a diverse and large city with major structural socio-economic issues beyond the remit of the Lab. Even though the Lab ecosystem included a variety of actors, and the Lab itself is deeply networked in relevant institutional and policy frameworks within the city and beyond, the Lab's specific focus on energy vulnerability and energy efficiency meant that many processes and developments relevant to the target households remained outside its remit.

Diversity. As GMCA has a highly diverse population, including people of multiple ethnicities and cultural backgrounds, the Lab was expected to encounter challenges related to inter-cultural communication. We sought to minimize such challenges by engaging closely with locally-embedded community groups whenever possible. For example, two energy cafes were held in central Rochdale, an area with many residents for whom English is not a first language. We therefore collaborated with the Kashmir Youth Project *(KYP),* a local community organisation, who provided interpreters to ensure all energy advice was clearly communicated to attendees.

Measuring energy efficiency gains. In the focus groups, and from anecdotal evidence, it became apparent that small energy efficiency measures – efficient light bulbs, draught excluders, letterbox covers, radiator foil – are among the easiest to introduce. Such measures were expected to have a bigger impact on health and wellbeing than they do on cost and consumption reduction *per se*. However, their impacts were difficult to quantify. Qualitative evidence to this effect was collected in the first iteration of the Lab, and subsequent iterations will attempt – via the energy advisor visits and insights from the relevant literature – to quantify the benefits of direct energy efficiency measures.

Housing precarity and transiency. In the focus group discussion, and from a review of the relevant literature *(Bouzarovski and Cauvain 2016; Petrova 2017)* it emerged that Private Rented Sector – PRS - tenants are among the most vulnerable and complex households to address. For such groups, many energy efficiency measures can be put in only if they are permitted by the landlord, or are removable. PRS households may also not be living in the same residential property for a sufficient amount of time to allow them to change particular behaviours or access the support that they need. We also detected a number of specific challenges in the social housing sector, mainly connected with its particular forms of governance, knowledge and regulation.

Limits to the advisor visits. In the baseline assessment, it transpired that many energy-related household challenges are connected with income poverty and other forms of vulnerability and deprivation, beyond the remit of the Lab. However, their visibility becomes apparent 'at the doorstep', during an energy advisor consultation. The energy advisor visits, for example, often identify households with mental health and hoarding problems, which the lab itself is not specifically designed to handle.

Within the Lab itself, paperwork related to referrals, energy switching, or access to specific forms of technology are obstacles for many people in energy poverty.

Technological challenges. This was the first iteration of the Lab, using previously unused and untested information technology and engagement tools. As such, a number of technical challenges arose in relation to the implementation of centralized information technology platforms developed by the project, and the technical devices related to energy consumption measurement. With respect to the former, these included issues around the transferability of new software for data collection onto the existing technical devices and information collection processes implemented by the energy advisors, while with regard to the latter, a number of challenges arose around the safety and ease of use of temperature and humidity monitors in particular.

3. Living Lab Implementation

3.1 Overview of Living Lab Timeline

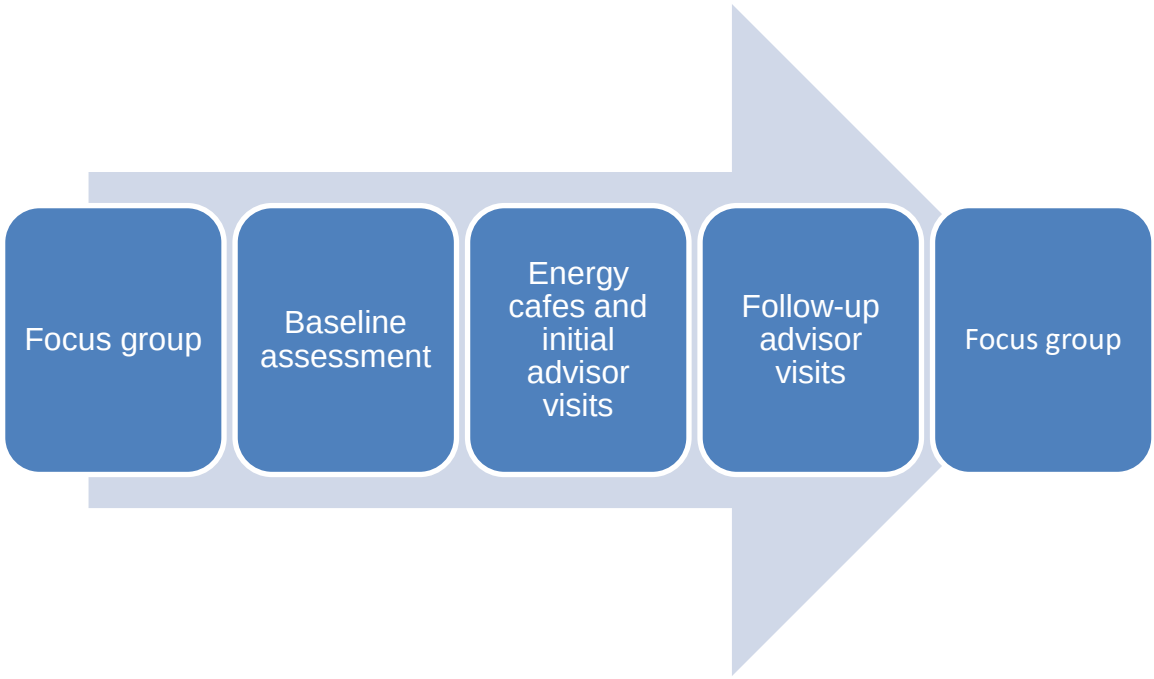


Figure 2: Key stages in the living lab

This report describes the first iteration of the Manchester Living Lab – a further two are planned from November 2019 until the end of the STEP IN project. The iteration, as such, included five interlocking and complementary steps – see Figure 2.

1. At the start of the Living Lab in January 2019, a focus group with 12 participants from key relevant stakeholders in the Living Lab – University academic experts, local authority officials, practitioners and private company representatives – was held at the University of Manchester, so as to chart out the architecture of the Lab, define its operational aspects, in addition to identifying key expected outputs and challenges ahead.

2. The baseline assessment involved undertaking an analysis of secondary data, in order to assess the socio-economic extent and spatial patterning of energy poverty in the GMCA area. This informed the subsequent activities of the Living Lab, particularly the targeting of activities within locations identified as at high risk of energy poverty. The baseline assessment also highlighted some of the key systemic challenges faced by the Lab.

3. The second stage of the Lab involved two principal methods: 'energy cafes' held in several local neighbourhoods within GMCA; and home visits to individual households by trained energy advisors. The energy advisor visits, targeting a total of 154 households, were part of the Local Energy Advice Partnership – LEAP – programme but included an additional STEP-IN component. During this stage of the Lab, temperature, humidity and electricity consumption monitors were installed on the residential premises of 20 households.

4. The final stage was a second, follow-up energy advisor visit. This was used to assess the effectiveness of the initial visit in improving comfort levels and reducing energy poverty.

5. A focus group with a similar set of constituencies as the first one – and 5 participants – was held in September 2019. This helped evaluate the outcomes of the Lab and produce recommendations for the next stage of the process.

3.2 Methodology Employed

3.2.1 Recruitment of Living Lab Participants

Living Lab participants were primarily recruited via LEAP programme – currently the principal policy to address fuel poverty mitigation policy operating in Greater Manchester. LEAP is widely known and highly publicized across GM. It focuses on providing expert, one-to-one advice to vulnerable households on how they might reduce their energy costs and keep their home warmer and more comfortable. Households are referred to the programme and, provided they meet programme-specific eligibility criteria around health, income and vulnerability, are subsequently visited in their home by a trained home energy advisor Income criteria primarily centre on the provision of social welfare or the lack of sufficient earnings; health criteria involve a wide range of medical conditions; while 'vulnerability' criteria involve being a victim of domestic violence, suffering a recent bereavement, moving in and out of homelessness, being a recent immigrant or asylum seeker, and having a physical or sensory disability. It should be noted that households can also refer themselves to the programme.

Further participants in the LEAP programme itself were also recruited via sign-up sheets at the energy cafes. These were particularly valuable for engaging with 'hard-to-reach' communities that may not sign-up to the LEAP programme, and for whom trust is a major issue.

Focus group participants were recruited from the consortium participants and their partners within Manchester.

3.2.2 Benchmarking

The benchmarking in the first stage involved establishing the rate of fuel poverty, average consumption levels and average electricity bills.

3.2.3 Market Segmentation

Two segmentation methods have been undertaken in the project to date:

- A preliminary segmentation of vulnerable citizens and consumers more likely to undertake energy efficiency measures was implemented within the baseline assessment;
- In the advisor visits, questionnaires included a number of variables – informed by the baseline assessment – that offered a basis for more detailed quantitative and qualitative examinations of the socio-demographic and spatial characteristics of citizens who were affected by energy vulnerability, and the willingness and ability to undertake energy efficiency interventions within any given group or site.

3.2.4 Focus Groups

As noted above, focus groups were held at the start and end of the first iteration of the Lab. They principally included experts and institutional representatives of the various stakeholders involved in the running of the Lab. Minutes from the focus groups, which were fully anonymized, were used to

both set and evaluate the operation of the Lab. Conclusions were made during each of the focus groups, resulting in specific action points to be followed.

In order to calibrate advisor visits, a focus group with 12 participants was held at the University of Manchester, on the 28th of January 2019. Discussion points at the focus group included methodological complexities in terms of when it would be best for the second advisor visit to take place – issues around the time needed to put some measures in place was discussed, as well as problems of memory recall, or people naturally feeling better or worse due to weather changes. The need to be careful in terms of questions we are asking and what we are measuring was also discussed, as were sampling strategies.

The second focus group – with 5 participants – was used to evaluate the functioning of the Living Lab. The discussions mainly centred on the methods employed, obstacles encountered, lessons learned, and steps to be taken in the future.

3.2.5 Home Energy Advisor Visits

Home energy advisor visits were the central component of the Living Lab in its first iteration. As noted above, they were part of the LEAP home visit, where advice is provided on a range of issues: both 'behaviour change' and approaches to energy saving via energy efficiency investment or housing and appliance stock improvements. In the main, visits focused on the targeted households' everyday energy consumption and saving strategies. They provide advice on issues such as the switching away from expensive energy tariffs or suppliers, and whether there are any further opportunities for a household to make their energy costs more affordable – e.g. by consolidating its heating patterns. During each LEAP visit, and to the highest extent possible, energy advisors also install a number of 'small', low-cost energy efficiency measures, such as draft-proofing, radiator reflector panels, and low-energy lightbulbs.

Based on the findings of the home visit, there are a range of onward services that can be offered. The advisor checks the household's eligibility for 'income maximization' benefits, while identifying serious hazards in the home – around fire risk in particular – as well as providing referrals to funding for large-scale energy efficiency measures such as insulation. Each energy advisor also leaves behind a Home Visit Pack which includes details of the help and advice given to each household, as well as contact details of other organizations offering further support.

A brief follow up visit is subsequently arranged – its purpose is to check the well-being of the household and to evaluate if they have taken up any of the advice offered, and that households understand how to use the measures that have been installed.

In the first iteration of the Manchester Living Lab, the STEP-IN project added a number of supplementary questions and checks during both the initial and final home assessor visit. This included temperature measurements, examinations of energy and spending cutbacks beyond heating, and self-reported information on household health circumstances. The demographic profile of the household – age profile, number of people, gender, occupation – was also surveyed. For 20 of the households, detailed temperature, humidity and electricity use measurements were taken between the first and second visit. Data collected in this manner was examined with the aid of statistical methods – frequency analyses, cross-tabulations, and linear regressions – as well as interpretive qualitative methods.

The first advisor-led questionnaire survey was answered by 154 households in GM – containing approximately 300 people – between 26th April 2019 and 30th June 2019. Due to non-responses on some questions, this generated 149 complete household profiles that could be analysed across all questions asked – these households included 290 people. The same 154 households were contacted once again for the second advisor-led visit and questionnaire, which took place between the 25th of

July 2019 and the 20th of September 2019. A total of 84 households agreed to be interviewed once again in the follow-up questionnaires – resulting in a response rate of 55 per cent.

3.2.6 Energy Cafes

Three energy cafes were held in the first iteration of the Living Lab: a central Manchester café in March 2019, and two in inner-city Rochdale in June 2019.

The events followed a 'world café' style format, with relevant experts positioned at tables or stalls. Attendees visited the stalls and were able to receive advice and had the opportunity to discuss and ask questions relating to energy issues.

The first energy café – see Figure 3 – took place in the form of a fuel poverty roundtable within the public sector space of the Manchester Green Summit. Approximately 120 people attended the public sector space. They included local residents, NGOs and business representatives. Energy café participants highlighted the need to address energy poverty in Manchester via inclusive and comprehensive measures such as gas heating system replacement, carbon neutral new build, and retrofit incentives. Policy measures were then ranked along an impact-effort matrix.

Figure 3: The first Manchester energy café – photo by Neil Simcock.

The purpose of the second and third cafés was the provision of advice to consumers vulnerable to energy poverty; see Figure 4. The cafés in Rochdale engaged particularly with the local Muslim community – a demographic that has generally remained outside the remit of energy vulnerability debates and policy in the UK. The cafés focused on providing awareness raising around issues relating to switching energy suppliers; advice on available support services that may help with the management of energy costs, including participation in the STEP-IN project via a home energy advisor visit; and

identifying household measures that can be taken to reduce energy costs and improve comfort, e.g. through more informed purchase decisions, behavioural change, as well as physical measures such as energy efficient appliances and refurbishment schemes. They gave a voice to citizens that have rarely been heard when it comes to issues of energy efficiency, energy savings and behaviour within the city. The second café was attended by 28 people, while the third attracted 7 participants.

Figure 4: The first Manchester energy café – photo by Suzanne Barningham

3.2.7 Information Campaigns

The LEAP programme is widely advertised and promoted to local people and relevant stakeholders, using a variety of channels. In terms of raising awareness of potential households to the service, this is carried out in a range of ways, including:

- Online – through a dedicated website and through websites and social media channels of a variety of partners – including Agility Eco, Groundwork, GMCA and local authorities. The campaign has a national Twitter account – @LEAPService – and Facebook page: https://www.facebook.com/LEAPService/;
- Front line services – front line staff across local authorities and within social housing providers are provided with materials and periodic training to ensure that they are aware of the LEAP service and can signpost people they come into contact with on to the scheme for assistance;
- Community events – Groundwork attend a variety of community outreach events in order to promote the service;
- Other schemes – LEAP is also the first port of call for access to other energy efficiency schemes in operation across Greater Manchester. Advertising of these schemes or households seeking support in these areas will also be directed through the LEAP programme to assess eligibility for and arrange these services. This includes:

- The Warm Homes Fund Scheme – which delivered 500 first time central heating systems to households across Greater Manchester between summer 2018 and autumn 2020, and which is planned to be extended until 2021.
- ECHO – which provides emergency assistance to qualifying households to repair or replace broken or condemned boilers.
- HEART – which supports households in the replacement of inefficient home appliances.

Given that LEAP is national, there is a launch event when starting in a new area to which local authority staff, charities and housing associations are invited. Over the winter there is a weekly referrers newsletter that go out with news, improvements to the scheme, case studies, and a referrer league table.

3.2.8 Information Centres

Fixed information centres were not provided within STEP-IN specifically. However, the project operated a joint stand with the University of Manchester Green Energy Summit in March 2019.

3.2.9 ICT Tools

Energy advisors working for the Lab relied on a customized proprietary app. In the second focus group, it was felt that centrally-issued ICT tools developed by STEP-IN need to be made more responsive to the needs identified by Living Lab participants. If energy advisors are to use these IT tools in the future, there will need to be extensive consultation with the project's IT co-ordinators.

3.2.10 Impacts Monitoring

For the advisor visits, impacts monitoring was undertaken during the second home visit – a number of questions were asked regarding the uptake of energy efficiency measures, changes in household behaviours as well as a self-reported improvement or decline in household well-being and health.

For the energy cafés, evaluation questionnaires were distributed at the second and third energy cafés. These gathered data on attendees' perceptions of the café, and changes in their knowledge and awareness. This information will feed into the design of future energy cafés in iterations 2 and 3 of the living lab. The questionnaire was administered by approaching attendees after they had visited the energy advice stall. Questions were asked verbally, with a paper sheet filled in by the researcher. When necessary an interpreter from KYP was used. In total 28 people responded to these questionnaires.

3.3 Stakeholder Involvement

As was pointed out above, the STEP-IN project indirectly fed into GMCA's Five Year Environment Plan, which was launched at the Mayor's Green Summit in March 2019. The plan sets out the action required across all sectors – public, private, third – and individuals in order to meet the city region's environmental ambitions.

A key part of the plan is the need to tackle energy used in the city region's buildings – both in people's homes and commercial and public properties. Scientific modelling, underpinning the 5 Year Plan, sets out the need to significantly increase – in terms of extent and depth – the retrofit of buildings in Greater Manchester to improve their energy efficiency.

In September 2019, the GMCA published a more detailed report, underpinning the Five-Year Environment Plan – Decarbonising Greater Manchester's Existing Buildings. The report's contents and recommendations were tested with a wide number of key partners, through a series of working groups and consultation workshops. The report sets out the wider benefits of investing in reducing energy use in Greater Manchester's buildings. One of the two priorities for domestic properties in the report

is to tackle energy vulnerability and fuel poverty by supporting households to reduce energy demand. This includes commitments to:

- Maximize current funding and programmes being delivered in the city region – including the Local Energy Advice Programme.
- Develop proposals for and push for changes to national funding programmes for fuel poverty, including greater local control and direction.

In order to implement the actions and recommendations in the Five Year Environment Plan, the GMCA, working with partners, has adopted a mission-based approach. This means that organizations from across sectors are coming together to deliver the city region's mission to be a carbon neutral city region by 2038. The GMCA has established a set of challenge groups to deliver each of the priorities in the Five Year Plan – including one for decarbonising the city region's buildings. This group brings together representation from the private, public and third sectors and academia to drive forward actions to deliver on the plans that are now in place. Inputs received from the STEP IN project are a central part of the inclusive decarbonization effort.

STEP-IN also contributed to relevant activities at the national scale in the UK, in a workshop organized by EnergyHelpline, and titled '*How to drive engagement in the energy market for the most disengaged consumers'*. Chaired by Yvonne Fovargue MP, Chair of the All-Party Parliamentary Group on Consumer Protection, the roundtable discussion brought together representatives from parliament, industry and other experts in energy, consumers and markets to explore next steps and opportunities for driving consumer engagement – including how to engage the most vulnerable customers. Among other points, the group explored the potential benefits of a door-to-door or drop-in switching advice service which could compliment the supplier-branded letters used in the consumer engagement trials to build trust, especially amongst vulnerable consumers. There was discussion of the possibility of partnerships between price comparison websites and organisations with local organisational capacity.

STEP-IN's WP2 leader also chairs the European Union Energy Poverty Observatory – EPOV – and the COST ENGAGER network. The University of Manchester is the lead partner in EPOV. There was a continuous exchange of insights and information between EPOV and STEP-IN thanks to this institutional link.

3.4 Ethical Issues

All project documents and procedures were strictly in line with all data processing in the project will be in compliance with GDPR and the UK Data Protection Act 2018. This included consent procedures, as well as data collection, sharing and storage provisions. The avoidance of stigmatization and the maintenance and promotion of participant well being featured prominently throughout all project processes and activities.

All participants in the project for whom personal data was requested by Groundwork – the data controller and processor – were given detailed participant information sheets and consent forms to sign, as well as a STEP-IN project leaflet. The participant information sheets highlighted, inter alia, the project's purpose, sampling mechanisms, participation provisions, disadvantages and advantages of participation, as well as confidentiality provisions. In the consent forms, participants agreed for their data to be anonymised and shared with the University of Manchester and the GMCA. Anonymized STEP-IN relevant data was subsequently shared with the University of Manchester, which stored and analysed in a GDPR-compliant manner and in line with a clearly defined Data Management Plan deposited at http://dmponline.dcc.ac.uk. All ethical aspects were supervised by the STEP-IN Ethics Advisor.

3.5 Conclusions

In its first iteration, the STEP-IN Living Lab in Manchester collected a variety of quantitative and qualitative data, and undertook multiple forms of public engagement, consultation and dissemination. This was undertaken under the auspices of a self-reflective, cyclical and multi-stakeholder framework, building upon the three principles of sustainability experiments described by Bouzarovski and Haarstad *(2018)*: dissensual politicization, multi-scalar enrolment, and the hybridization of human and material agencies. All methodological approaches were predicated upon the inclusion of the widest possible range of constituencies, as well as the analysis and promotion of comprehensive and effective energy efficiency measures.

Figure 5: The first Manchester energy café – photo by Neil Simcock.

4. Lessons Learned and Results

4.1 Results

4.1.1 Energy advisor home visits

Quantitative aspects

From the surveys, it became obvious that a large majority of households were struggling with the symptoms of energy vulnerability. A total of 74 households *(nearly half of all those who were interviewed)* felt that they were inadequately warm in their homes, while 84 *(55 per cent)* reported being unable to pay for their energy bills on time). This is well beyond the average rate of energy poor households established by the initial STEP-IN assessment, indicating that the LEAP programme is good at targeting vulnerable households, even though a significant number of those who did not self-identify as fuel poor or energy vulnerable – according to two of the main indicators for this condition *(Bouzarovski and Thomson 2018)* – are also being included.

The disproportionately high presence of domestic energy deprivation in the sample comes as little surprise given the eligibility criteria of the programme. Indeed, the overwhelming majority of households in the programme were deemed eligible on the basis of low income *(86 per cent)*, experiencing health issues *(84 per cent)*, receiving benefits *(81 per cent)*, or evidence of other forms of vulnerability *(14 per cent)*. Importantly, many households *(61, or 41 per cent of the total)* had been referred to the programme by an external entity – primarily a relevant organization – while the majority *(88, or 59 per cent)* had referred themselves.

In terms of the socio-demographic and housing features of the interviewed households, it is worth noting that the average number of bedrooms was 2.47, while the average household size was 1.96. The majority lived in owner-occupied homes, although a significant proportion – nearly a third – inhabited social rented housing. Most of the housing was semi-detached *(48, or 32 per cent)* or terraced *(33, or 22 per cent)*, while there were also a significant number of flats *(33, or 22 per cent of the total)* – see Figure 6. The majority of households relied on gas-fired condensing boilers – 89 homes, or 60 per cent – but there were a significant number of residential properties with non-condensing boilers – 24 homes, or 16 per cent of the total. Other types of heating systems, principally electricity, were present in 36 homes – or 24 per cent of the total.

Housing tenure	Owner-occupied	Private rented	Social rented
Number	84	19	45
Share	56%	13%	30%

Table 1: Tenure distribution among the surveyed households

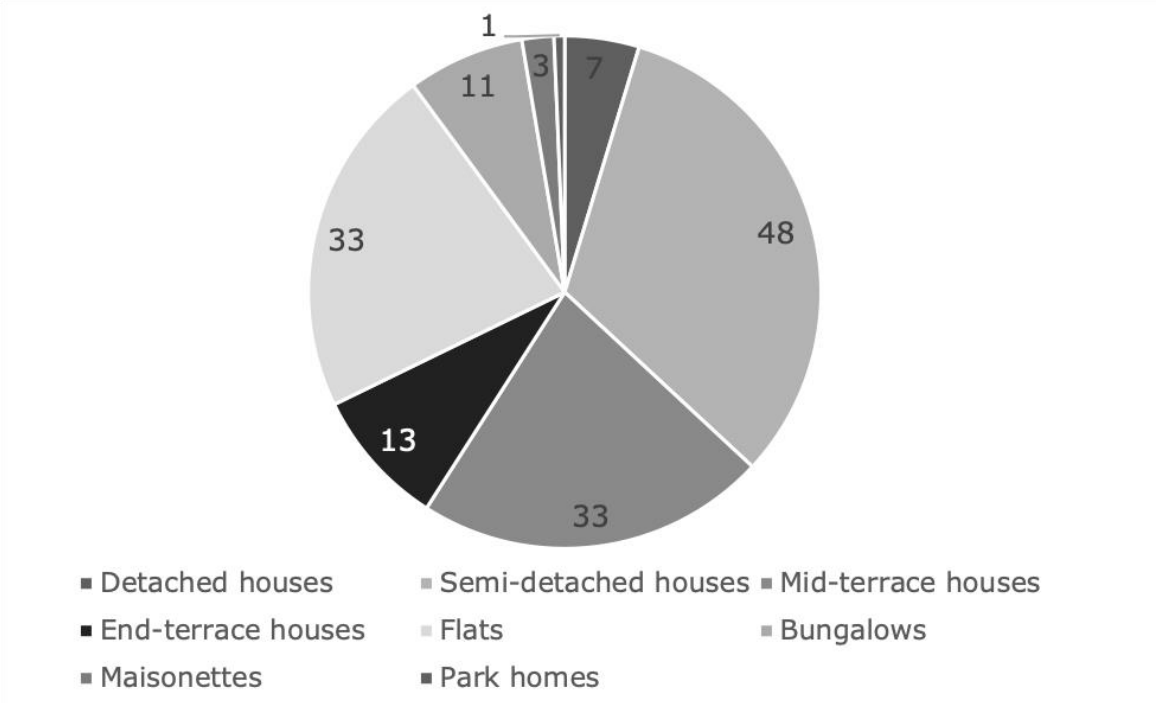


Figure 6: Types of housing among the surveyed households

In addition to the income challenges highlighted above, energy efficiency was a key driver of energy vulnerability in the survey sample, with 62 households *(41 per cent)* estimating that their disproportionately high energy bills were due to the poor quality of their building fabric; see Table 2. Within this group, a very large share of households *(66 per cent)* attributed their problems to draughty windows and doors, 30 per cent complained about the thermal efficiency and walls and foundations, and a further 24 per cent felt that energy-inefficient appliances had a role to play. The temperature and humidity monitors also showed that poor quality building fabric had a profound effect on the ability of a house to keep hold of heat and moisture. Even though LEAP is able to help with draughts, the stock that is provided by the programme can only able be fitted to wooden doors and windows. However, many residents were found to have damaged or broken uPVC windows and doors that were not amenable to such interventions. At times, the energy advisors reported that it was possible to refer the households through to a housing association for further repairs.

Housing issue	Draughty windows and doors	Poorly insulated walls and foundations	Energy inefficient appliances	Rot in windows or doors	Leaking roof	Other
Number	41	19	15	6	2	10
Proportion	66%	31%	24%	10%	3%	16%

Table 2: Energy efficiency issues among the surveyed households

As for the coping strategies that households used in order to reduce their bills, the majority cut back on their heating; see Figure 7. Based on qualitative evidence from the advisor visits, it seems that many households believed that such measures will have the most direct impact on bill decreases. However, because cutting back on lighting was not being adopted as a primary method for energy and money saving, residents were potentially leaving themselves vulnerable to cold rather than turning off lights when the latter could actually have saved them more money. A clear opportunity for information-driven behaviour change was identified here, because it became clear that some respondents did not

understand the difference in cost. In some cases, residents with inefficient boilers were actually exposed to disproportionately high expenses just to put the heating on. It is important to note, however, that hot water was not amongst the top items that were cut back – only 16 per cent of households relied on this coping strategy – even though hot water is most often provided through the same boiler system used for space heating, and is expected to cost a similar amount. This suggests that residents would rather be cold than lacking hot water for bathing and keeping clean.

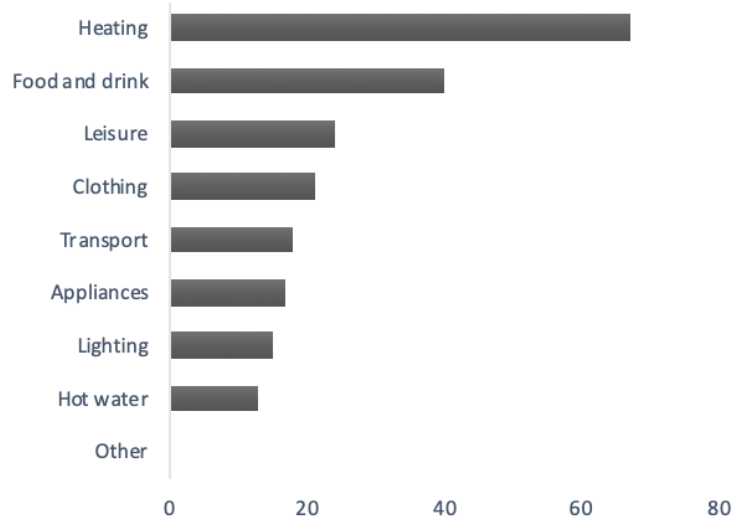


Figure 7: Household cut backs among the surveyed households, household numbers

The evidence from the advisor visits, visible in Figure 8, also indicated that people were more inclined to stay in their own house and only lived in one room– most likely a bedroom or a living *room (37 per cent of respondents)*, rather than necessarily leaving the house. Only 14 and 13 per cent of households who struggled to pay their bills, opted to use, respectively, the homes of friends and family, or public and community spaces. Moreover, the fact that only 8 per cent showered or bathed elsewhere correlates to the willingness of fuel poor people to continue to use hot water in their homes, despite struggling with bills.

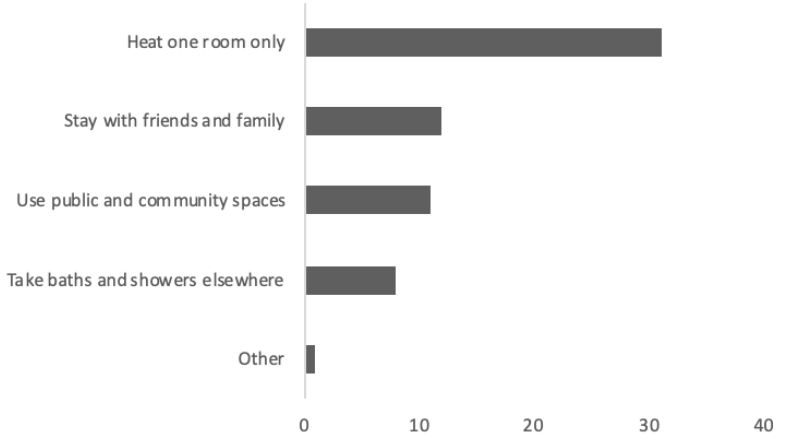


Figure 8: Coping strategies to address fuel poverty among the surveyed households, in total household numbers.

Energy vulnerability's scientifically well-established negative effects on health and well-being were highly visible in the data collected through the advisor visits – see Table 3. Respiratory ailments were the most common in the survey sample, closely followed by musculo-skeletal and circulatory problems. There was also a significant presence of mental health and well-being issues. From the data gathered, however, it is difficult to discern a significant difference in the number of people suffering with different health conditions. Such patterns conform to wider trends established by the relevant literature.

Health problem	Respiratory	Musculo-skeletal	Circulatory	Mental health and well-being	Other
Number	51	46	42	34	4
Share	34%	30%	28%	22%	3%

Table 3: Health issues among the surveyed households

In response to the advice received by the STEP-IN project, households pledged to implement a number of energy saving behavioural measures – from reducing shower times *(64 per cent of households)* to outside clothes drying *(2 per cent);* see Figure 9. Focus group discussions, however, indicated that the scope for such measures among vulnerable households was limited, and they were principally concentrated among the higher end of the income spectrum. During each visit, STEP-IN advisors also implemented a number of 'small' energy saving measures – see Figure 10. These were primarily the installation of LED bulbs *(in 74 per cent of households)* but also the introduction of reflective film behind radiators *(for 46 per cent of households)* and door brushes *(24 per cent)*. All other 'small measures' were adopted by fewer than 10 per cent of households, although it is worth noting that 9 and 7 per cent of households, respectively, pledged to switch electricity and gas suppliers after the first visit.

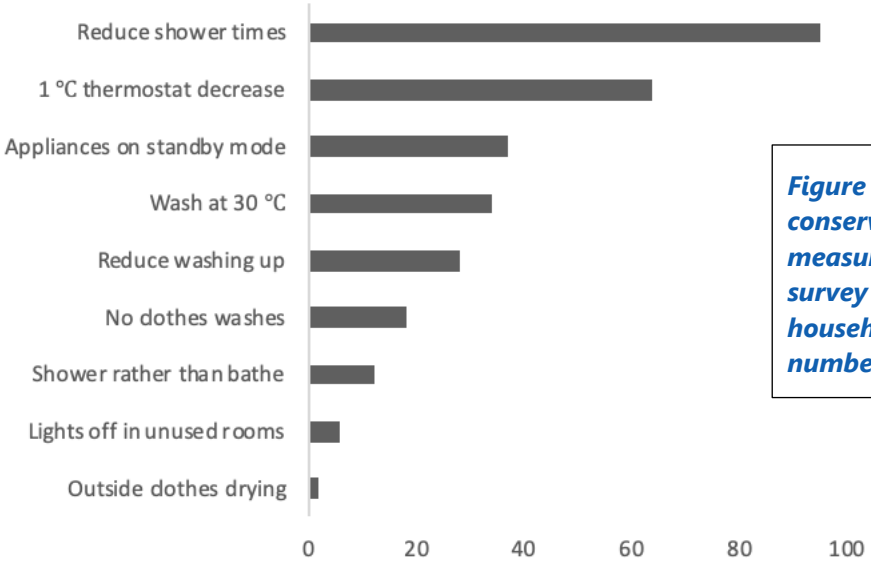


Figure 9: Energy conservation measures in survey sample, household numbers.

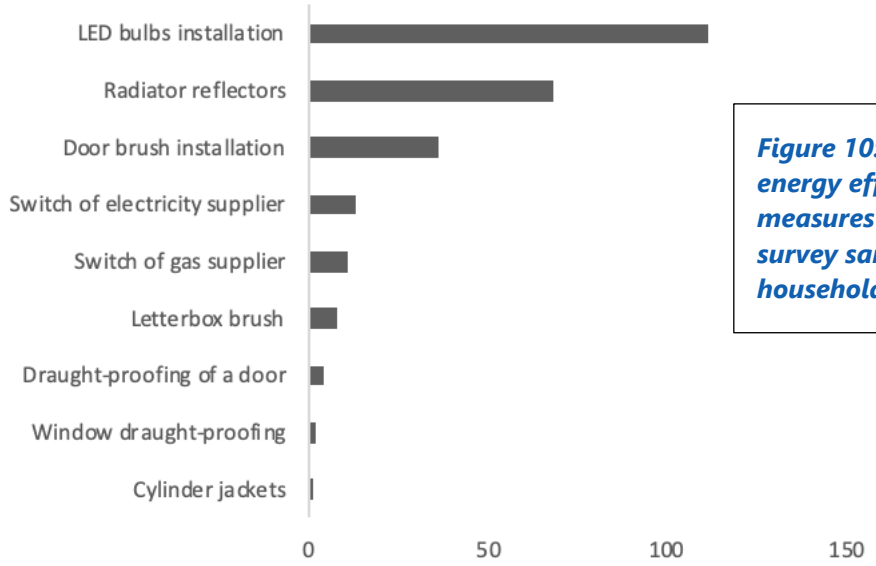


Figure 10: Small' energy efficiency measures in the survey sample, household numbers.

Many households were referred onto different external services as a result of the advisor visits. The majority of these were in the direction of income maximization services and the government's ECO energy efficiency scheme, although fire safety issues were detected in a significant number of homes and subsequently triggered a fire safety referral; see Table 4.

Type of referral	Income Max referral	ECO referral	Fire service referral
Number	48	34	21
Proportion	32%	22%	14%

Table 4: Health issues among the surveyed households

During the follow up visit, it became apparent that the majority of respondents were not struggling to pay their energy bills, with only 18 households – 22 per cent – giving a positive answer to this question. Sixty-four per cent of respondents stated that that their financial circumstances had remained the same, while 23 and 12 – respectively – thought that they had improved or worsened. The lack of a significant change between the two visits may be due to the fact that households did not have many financial indicators to rely on in the short space of time between the first and second visit in order to detect a discernible benefit from the decrease in bills, or the increase of benefit entitlement.

Out of the small number of households *(18 in total)* who were still struggling to pay for their bills, most were now cutting back on food and drink *(11, or 61 per cent)* as well as transport *(7, or 39 per cent)*. Only 7 households stated that they were cutting back on their heating – a dramatic decrease from the initial visit – indicating that the advice given to the residents had been taken on board, and that thanks to supplier switching and reducing bills they could now afford to put their heating on. At the same time, the proportion of residents with health conditions remained relatively consistent in comparison with the first visit; see Table 5. This would be expected to be the case due to the chronic nature of the problems. A total of 23 households *(45 per cent of the sample)* attributed their health problems to poor heating in the home.

Health problem	Respiratory	Circulatory	Musculo-skeletal problems	Mental health and well-being issues	Other
Number	24	22	23	9	4
Proportion	28.9%	26.5%	27.7%	10.8%	4.8%

Table 5: Health issues among the surveyed households at the follow-up energy advisor visit

The most frequent measures that had been implemented since the initial visit were switching tariffs *(25 per cent of respondents)* and a phone call from Citizen's Advice to help with benefits *(29 per cent of respondents)* – see Figure 11. This means that people who were unsure about switching or had to speak to a partner or other person about switching had seen that there is a saving to be made and have acted on it. It is worth noting here that, according to the energy advisors, Citizens' Advice phone calls require no upstart effort from the customer. This may be one of the reasons for the large number of people who reported this outcome. The measures that include home heating had small uptakes but this might be due to the time of year, and not many people having their heating on. A small number of respondents told the advisers that they do intend to change their heating patterns in the more distant future – but not at the time being. From the questionnaires that were completed, it also became apparent that the majority of household respondents had 'small' measures fitted *(63 per cent)* – this may, however, also be connected to the ease of connecting the initial intervention with the follow up visit thanks to the conversation with the energy advisor. Boiler upgrades *(25 per cent)* and central heating system installations *(3 per cent of households)* were the only other measures that had been implemented by the time of the second visit; see Figure 12.

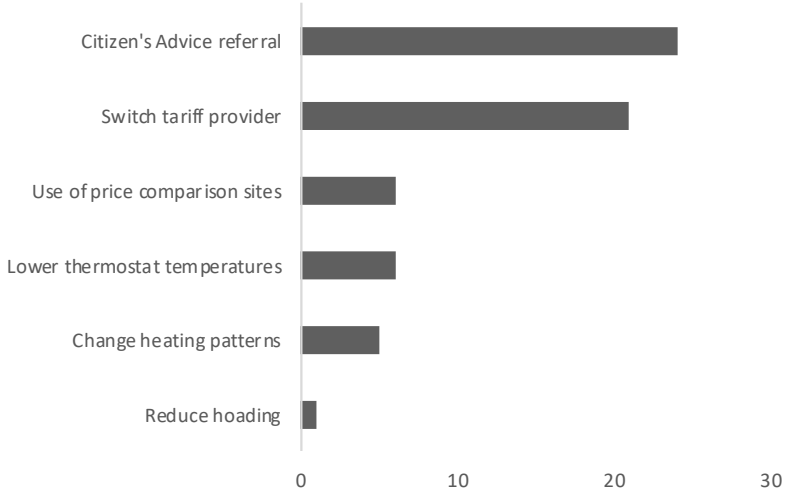


Figure 11: Follow up energy conservation measures in the second visit, household numbers

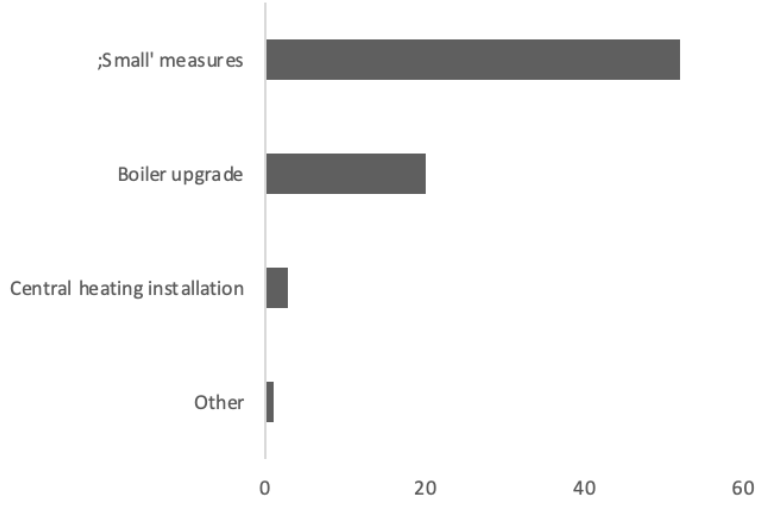


Figure 12: Follow up energy efficiency measures in the second visit, household numbers.

The multivariate logistical regression models indicated that the presence of electric heating, having a low income, living in a flat and the presence of small children were all key predictors in the statistic of households who reported inadequately warm homes and struggling to pay bills alike; see Table 6. The lack of loft insulation was an important influence in the case of switching gas or electricity supplier, while receiving benefits played a similar role when it came to 'small' energy efficiency measures. The

presence of small children in the household was important in the case of the one-degree thermostat pledge; see Table 7.

Variables	*Inadequately warm*			*Struggling to pay bills*		
	Coefficients	*95% CI 2σ*		*Coefficients*	*95% CI 2σ*	
Intercept	0.173	0.505		0.019	0.508	
Presence_of_older	-0.117	0.185		-0.103	0.186	
Presence_of_children	0.032	0.230		0.075	0.231	
Flat	-0.066	0.312		0.159	0.314	
Electric_heating	0.247	0.288	*	0.117	0.290	
Non.condensing_boiler	-0.179	0.228		-0.031	0.229	
Lack_of loft_insulation	-0.021	0.219		0.261	0.221	**
Private	0.108	0.215		-0.032	0.216	
Receving_benefits	-0.045	0.221		0.137	0.222	
Low_income	0.314	0.256	**	0.217	0.258	*
Poor_health	0.110	0.227		0.100	0.229	
Vulnerability	-0.253	0.241	**	0.040	0.242	
One_degree	0.049	0.194		-0.043	0.195	

Table 6: Linear logistic regressions – households reporting inadequately warm homes, and households struggling to pay their bills on time

Note: *p<0.1, **p < 0.05, ***p < 0.01, ****p < 0.001.

Variables	*Switching gas or electricity supplier*			*Installing small measures*			*One_degree Thermostat pledge*		
	Coefficients	*95% CI 2σ*		*Coefficients*	*95% CI 2σ*		*Coefficients*	*95% CI 2σ*	
Intercept	0.089	0.296		0.964	0.376	****	0.202	0.519	
Presence_of_older	-0.075	0.108		0.016	0.138		0.017	0.190	
Presence_of_children	-0.032	0.134		-0.134	0.171		0.220	0.236	*
Flat	0.079	0.182		-0.073	0.232		0.138	0.320	
Electric_heating	-0.092	0.169		-0.105	0.215		0.151	0.296	
Non.condensing_boiler	-0.029	0.133		-0.021	0.170		0.010	0.234	
Lack_loft_insulation	0.157	0.128	**	-0.104	0.164		0.000	0.226	
Private	-0.043	0.126		-0.056	0.160		0.127	0.221	
Receving_benefits	0.041	0.129		0.128	0.165		-0.068	0.227	
Low_income	-0.070	0.150		-0.045	0.191		0.066	0.263	
Poor_health	0.041	0.133		0.011	0.169		-0.005	0.234	
Vulnerability	-0.036	0.141		-0.110	0.179		-0.169	0.247	
One_degree	-0.077	0.113		-0.015	0.144		0.125	0.199	

Table 7: Linear logistic regressions – households reporting inadequately warm homes, and households struggling to pay their bills on time.

Note: *p<0.1, **p < 0.05, ***p < 0.01, ****p < 0.001.

In terms of the total annual savings achieved by the installed 'small measures' over a lifetime of 10 years, these have been estimated at a total of £9,846 for the entire household corpus, while total annual energy bill savings arising from switches to cheaper electricity and gas suppliers were estimated at £3,423 per year for the entire household corpus. An additional total annual saving of £2,607 from

larger energy efficiency measures is estimated to have occurred across the entire corpus. Assuming an average annual household energy bill of £1239, this means that the small measures and tariff switching altogether resulted in a **direct estimated energy bill saving of 8.6 per cent per year**[1] across the entire sample of 149 households.

Qualitative aspects

The energy advisor visits generated a significant amount of qualitative data – the advisors took notes - that is currently being analysed and will be presented in the final project report. A selection of statements from the advisors' notes is presented in Table 8.

Energy advisors' notes
Resident did not want to go through a comparison, regarding her Gas & Electric. Has only just switched 2 weeks ago. Pre-payment is the best method for her as well. Has previously struggled to keep up with bills when being on monthly direct debit …
She is on income support and child benefit, she has 3 children under 11 and is renting of housing association. She doesn't have a washing machine or fridge freezer at all because she can't afford any …
Customer lives in a park home, the electric and gas is paid for on site through the site managers. Arranged for telephone link service to be installed as she keeps having falls …
Resident did not want to switch energy providers, said she was happy with current supplier & method of payment. Resident mentioned that she gets draughts from her doors. I did offer to put door brushes on the bottom of the front & rear doors …
Resident currently has a debt of £1900 on his electricity account with Scottish power. I have now spoken to Scottish power, and provided them with electricity meter readings …

Table 8: Energy advisors – qualitative observations

Some broader preliminary findings – as reported by the energy advisors – are beginning to emerge. One of the greatest benefits for qualitative data collection came from the temperature and humidity readings that were taken in each household at the time of the advisor visits – see Figure 13. Taking the readings allowed residents to ask how the instruments worked and what the data was to be used for. They also proved useful in giving advice that was related to damp. If the monitors gave an indication that there was a high humidity in the home, it prompted the energy advisors to search the room or surrounding rooms during their visit for the potential source of moisture, and subsequently advise the resident that behaviour change could lead to a reduction in damp, with its associated health and economic benefits.

[1] Unfortunately, due to significant differences in standing charges from one bill to the next, it was not possible to estimate the kWh figure that these savings amount to. In the second iteration of the living lab, energy consumption data will be collected alongside energy expenditure data.

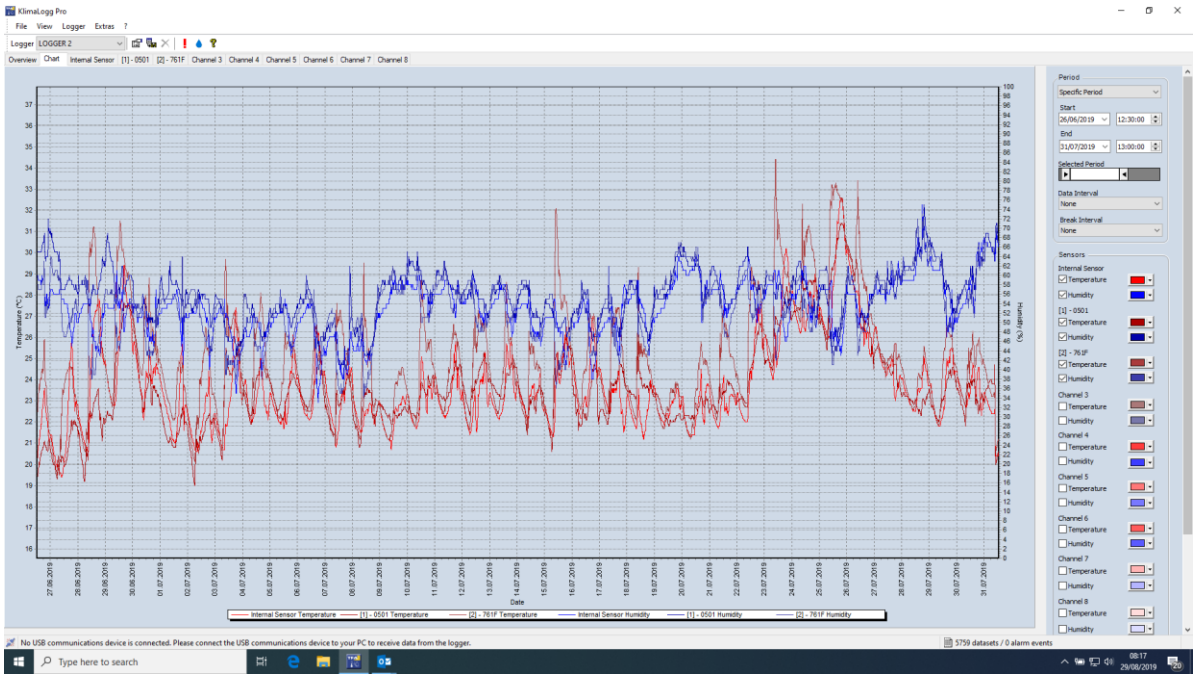


Figure 13: Temperature and humidity readings taken in each household during advisor visits

In terms of temperature, the monitors indicated if the heating was turned on unnecessarily and advice could then be given to the resident about how warm the home should be, and that having the thermostat set to 25^{0}C or 30^{0}C does not mean it warms up quicker. The monitor also prompted conversations about heating behaviours and behaviours that cause damp. These may necessarily have been noticed on face value.

The electricity consumption monitors allowed customers to use energy more efficiently and to understand how energy use translates into expenditure for them. This is particularly important given that some residents have trouble understanding their energy usage, and either don't want a smart meter fitting, or are waiting for one. The consumption monitors also made customers more mindful of the greatest electricity uses in the home, and a general decrease in bills was anticipated. The energy monitors reinforced energy advice, and allowed customers to improve their understanding of what their energy use means, to carry on with the behaviour changes that came from the installation. It was also expected to help some customers overcome their fear of smart meters and having technology in their house, as it showed that there are potential benefits in terms of information provision and day-to-day decisions.

Advisors also took ethnographic notes in the follow up visits – primarily so as to keep track of whether households needed additional support and any supplier switching that took place. It was also a useful tool to see the kind of feedback the project and advisors were getting, and any improvements that could be made to the service. This process also highlighted that not all advice that was given was energy-related, and again focused the need for partnerships with third parties. In the majority of cases, wider challenges were uncovered that the resident needed help resolving. These involved the visit taking longer than the allocated 30-minute slot, as phone calls had to be made and people needed further advice. The second visits also gave wider insights into the customers' practical circumstances situation post the initial LEAP intervention. In particular, they provided additional information around new boilers being installed, as well as issues that customers have had with energy installers and referrals.

4.1.2 Energy cafés

In the energy cafés, 86 per cent of respondents either 'agreed' or 'strongly agreed' that they had found the information and advice provided at the energy cafés to be useful. The remaining 14 per cent were 'neutral', with none disagreeing with the statement; see Figure 14.

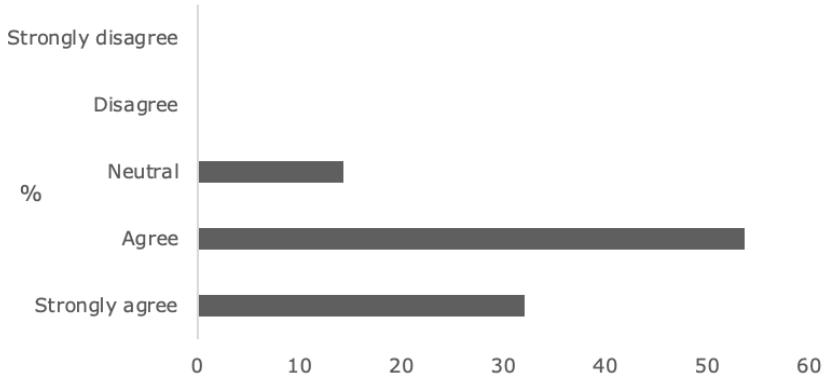


Figure 14: Responses to the questionnaire statement 'The information and advice provided was useful'

However, responses relating to the value of the events in improving attendees' knowledge about issues relating to their energy costs and consumption was more neutral; see Figure 15. In response to whether they agreed with the statement 'My knowledge of how to reduce my energy bills has increased'. As a result of attending the energy café, 64 per cent of respondents stated they were 'neutral', with 36 per cent either agreeing or strongly agreeing. Similar results were attained in response to the statement 'My knowledge of how to reduce my energy consumption has increased'.

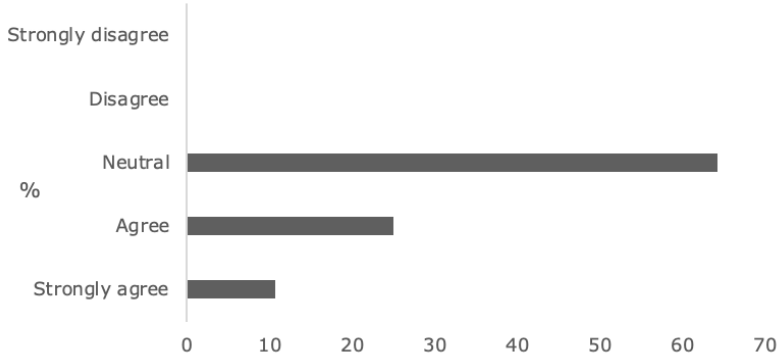


Figure 15; Responses to the statement: 'My knowledge of how to reduce my energy bills has increased'.

Verbal comments suggest that the reason for the relatively high proportion of 'Neutral' responses was that most respondents believed a specialized visit from a home energy advisor was necessary before they could confidently state their knowledge of these issues had improved. Whilst the information provided at the stall was relatively brief and generalized, a home energy advisor visit could provide more detailed advice based on each individual's social, economic and material circumstances.

Comments
'I will know more after the home visit'
'Will know after home visit'
'Received information but I'll know more after the visit from an energy advisor'
'Waiting for home visit from advisor"
'I'll change my water and electric tariffs'

Table 9: Qualitative feedback from the energy cafes.

Indeed, the questionnaire found that the most popular aspect of the event was the ability to arrange a STEP-IN home energy advisor visit; see Figure 16. Similarly, respondents also stated that learning about available advice organisations was beneficial. This suggests that for many attendees, the major value of the energy cafés was in enabling them to take the first step in a process of gaining more detailed advice about energy saving, for example through arranging a meeting with a specialist advisor.

Nonetheless, some respondents commented that the ability to learn about energy saving gadgets during the event had also been useful. Several respondents also stated that they enjoyed the opportunity to interact with others in their community, suggesting that the value of energy cafés goes beyond merely the provision of energy advice to also encompass important issues such as reducing social isolation and increasing social capital.

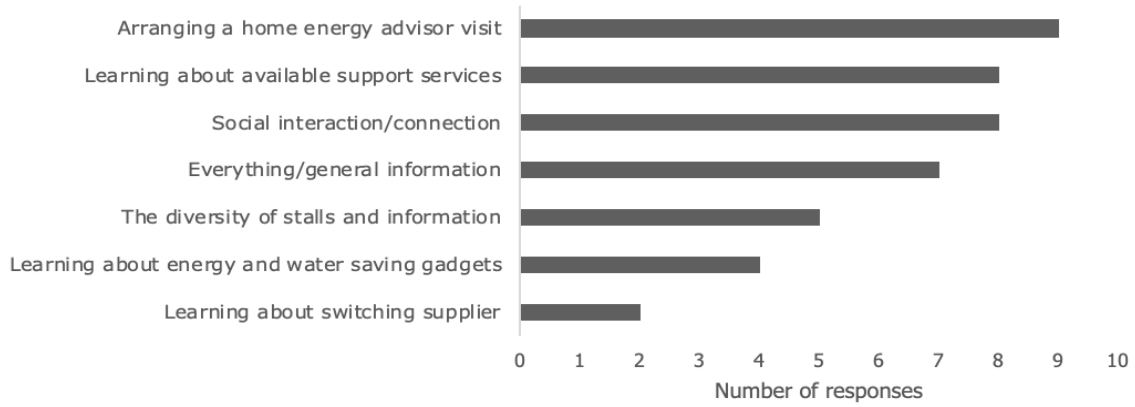


Figure 16: Responses to the question 'What aspect of the event did you find most beneficial?'

4.2 Dissemination Activities

The Lab also undertook a wide variety of dissemination and public engagement activities across a variety of contexts – from the local to the European. These activities helped increase the public visibility of the project while providing valuable inputs for the scientific process and the functioning of the Lab. Project leaflets were distributed at all these events.

Event title	Event location	Event dates	Attendees	Details/URL	Type of audience
Royal Geographical Society	Cardiff, UK	30.8.2018	Stefan Bouzarovski, UMAN	*Session discussant http://conference.rgs.org/AC2018/202*	Scientific community, civil society
Citizens' Energy Forum	Dublin, IE	20.9.2018	Stefan Bouzarovski, UMAN	*Chair and rapporteur https://ec.europa.eu/info/events/10th-citizens-energy-forum-2018-sep-20_en*	Civil society, media, investors
Workshop on Socio-Ecological Justice	Erfurt, DE	21.9.2018	Stefan Bouzarovski, UMAN	*Invited participant and presenter*	Scientific community
City Under Construction conference	Thessaloniki, GR	13.10.2018	Stefan Bouzarovski, UMAN	*Keynote speaker http://southeuropean-cities.arch.auth.gr/en/conference2018*	Scientific community, civil society, policymakers,

					media, general public
Third annual conference of the French energy poverty observatory	Bordeaux, FR	23.11.2018	Stefan Bouzarovski, UMAN	*Plenary speaker - http://www.planbatimentdurable.fr/le-3eme-colloque-de-l-onpe-aura-lieu-le-23-a1289.html*	Scientific community, civil society, policymakers, media, investors, general public
EU Research and Innovation in our daily life conference	Brussels, BE	27.11.2018	Stefan Bouzarovski, UMAN	*Plenary speaker - http://www.europarl.europa.eu/resources/library/media/20181025RES17358/20181025RES17358.pdf*	Scientific community, civil society, policymakers, media, investors, general public
Designing future energy policies conference	Brussels, BE	22.1.2019	Stefan Bouzarovski, UMAN	*Plenary speaker - https://www.friendsofeurope.org/event/designing-future-energy-policies*	Scientific community, civil society, policymakers, media, investors, general public
Energy systems workshop - working within the city of Manchester	Manchester, UK	25.1.2019	Stefan Bouzarovski, UMAN	*Presented the STEP-IN project to over 40 stakeholders from Manchester university and GMCA.*	Scientific community, civil society, policymakers, media, investors, general public
Roundtable meeting: How to drive engagement in the energy market for the most disengaged consumers	London, UK	2.4.2019	Stefan Bouzarovski, UMAN	*Chaired by Yvonne Fovargue MP, Chair of the All-Party Parliamentary Group on Consumer Protection, the roundtable discussion brought together representatives from parliament, industry and other experts in energy, consumers and markets to explore next steps and opportunities for driving consumer engagement – including how to engage the most vulnerable customers.*	Civil society, policymakers
Socio-Technical Interdisciplinary Approaches to Energy Studies	Cambridge, UK	19.2.2019	Stefan Bouzarovski, UMAN	*http://www.crassh.cam.ac.uk/events/28252*	Scientific community, civil society, general public
Disruptive energy conference	Plymouth, UK	23.3.2019	Stefan Bouzarovski, UMAN	*Session chair*	Scientific community, civil society
Goldman Award conference and reception	Skopje, MK	28.5.2019	Stefan Bouzarovski, UMAN		Civil society, policymakers, media, investors, general public
EUSEW	Brussels, BE	19.-20.6.2019	Stefan Bouzarovski, UMAN	*Chaired and took part in several sessions.*	Scientific community, civil society,

				https://www.eusew.eu/stefan-bouzarovski	policymakers, media, investors, general public

Table 10: List of dissemination activities.

Type of audience reached in the context of all dissemination & communication activities	Estimated number of persons reached
Scientific community - higher education, research	350
Industry	20
Civil Society	50
Policy makers	300
General Public	1500
TOTAL	**2200**

Table 11: Total people reached in Living Lab dissemination activities.

5. Conclusions

In its first iteration, the Manchester Living Lab undertook a wide array of public engagement, consultation, knowledge exchange and research activities. It is a unique social experiment both in terms of its geographic coverage – a large and complex metropolitan area – and its purpose: to reduce energy vulnerability, promote energy efficiency and affect everyday behaviours at the same time.

At the commencement of the Lab, an extensive baseline assessment was undertaken so as to identify the spatial extent and patterning of energy poverty. The assessment also identified some of the systemic challenges that the Lab's functioning would be likely to encounter – from economic, to cultural and technical. The baseline assessment found significant variation in the rate of energy poverty within Manchester, as measured by the UK government's official indicator – between 5 and 40 per cent.

This iteration of the Lab was bookended by focus group meetings so as to both steer and evaluate its content and aims. Three specialized 'energy cafés' were held during the Lab. Some of the main conclusions to emerge from the baseline assessment, focus groups and energy cafés were that small-scale 'behaviour change' or energy efficiency improvements are unlikely to significantly reduce levels of energy poverty in GMCA as a whole, as the problem is so deeply embedded in wider structural inequalities that require large-scale political-economic change in order to be addressed. However, there was evidence to suggest that advisor visits may result in important improvements in people's mental and physical well-being. We also found that focussing on particular vulnerable groups in inner-city areas may yield the greatest benefits.

A central component within the Lab were two energy advisor visits within the LEAP programme – an initial and follow up visit – accompanied by customized research questionnaires for the STEP-IN project. Both the advisor visits and the questionnaires proved invaluable information for the Lab, as they identified numerous highly specific energy, health and housing issues faced by local residents, while helping reduce energy consumption through the provision of energy advice, 'small' energy efficiency measures and onward referrals to relevant agencies. Some of the main benefits were incurred from improving house heating patterns and switching to a cheaper energy deal.

From the data gathered in the follow-up visits, it is evident that there was a marked improvement in the wellbeing of the residents that had been visited. The follow-up visits provided useful feedback on the boiler replacements and heating systems that were being installed. The follow-up visits also to help residents that had encountered wider obstacles that they could not overcome by themselves. However, the fact that some people's finances had worsened encapsulates the need for the visits to try and help residents in as many ways possible. This is where the LEAP programme and STEP IN itself are facing the wider structural limits described above. Through its multiple dissemination and engagement activities, the Lab reached an estimated 2700 participants; see Table 12.

Type of activity	Total number of participants reached
Focus groups	17
Advisor visits	290
Energy cafés	155
Dissemination activities	2200*
Total	2662

Table 12: Total number of people reached via the Manchester Energy Lab.

In its first iteration, the Manchester Living Lab has provided important analytical tools to evaluate the effectiveness of existing schemes and develop new methods of helping energy poor households. It has also generated new data on consumer attitudes to energy efficiency measures, particularly among urban low-income and fuel poor households – an area where research and policy have been relatively limited to date.

6. Bibliography

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7. Annexes

Annex 1: Initial visit survey questionnaire

STEP-IN INITIAL VISIT QUESTIONS

GMC Ref……

Date……

Instructions for energy advisors

1. Measure the indoor room temperature in the main living space at the time of the visit

_____

2. Is the household struggling to pay its energy bill? If yes, are they cutting back on some of the following items in order to be able to pay for their energy bill?

Tick all that apply.

Heating	
Food and drink	
Clothing	
Transport	
Leisure	
Lighting	
Appliances	
Hot water	
Other (please fill in)	

3. Do members of the household undertake some of the following in order to be able to pay for their energy bill?

Tick all that apply.

Staying longer in public and community spaces outside the house	
Staying with friends and family	
Taking baths and showers elsewhere (e.g. at gym)	
Live in one room only	
Other (please fill in)	

4. Do they think they have higher energy bills due to the poor condition of the building fabric of their home?

If yes, tick all that apply.

Draughty windows and doors	
Rot in window frames or door	
Poorly insulated walls and foundations	
A leaking roof	
Energy inefficient appliances	
Other (please fill in)	

5. Is there an indication that someone in the household might be suffering from some of the following health problems?

Tick all that apply.

Type of health problem	***Present?***	***Due to inadequate heating?***
Respiratory (e.g. breathing issues, coughs)		
Circulatory (e.g. heart & blood pressure problems)		
Musculo-skeletal problems		
Mental health and well-being issues		
Other (please fill in)		

6. Note total numbers of household members in each of the categories below:

Household members	***Men***	***Women***
Children below 5 years of age		
Children between 6-18 years of age		
Adults between 19-64 years of age		
Adults between 65-74 years of age		
Adults older than 75 years of age		
Unemployed adults		
Benefit recipients		
Children or adults with disabilities		

7. Any other notes or observations?

Please read this consent statement to the applicant and ask them to sign and tick that they understand and agree:

I consent to sharing my contact information with Groundwork who are delivering the STEP-IN project in Greater Manchester with the support of the GMCA and the University of Manchester. I agree for my data to be anonymised and shared with the University of Manchester and the GMCA. I understand that my personal information will not be shared with or used by anyone outside this programme without my explicit consent unless the law allows for the sharing of my information for the purposes of prevention and detection of crime or where I or another person would otherwise be at risk of serious harm.

☐ ---------- (please tick and sign)

Annex 2: Follow-up visit survey questionnaire

STEP-IN FOLLOW-UP ASSESSMENT QUESTIONS

GMC Ref……

Date……

1. Have households implemented the following measures as a result of LEAP advice previously received?

Tick all that apply.

Lowering thermostat temperatures	
Changes in room heating patterns	
Switching tariff providers	
Use of price comparison sites	
Reducing hoarding (if applicable)	
Citizens' Advice referrals	
Other (please fill in)	

2. Have the following energy efficiency measures been undertaken, or are about the undertaken, as a result of referrals?

Tick all that apply.

Boiler upgrade	
Cavity wall insulation	
Loft insulation	
Central heating installation	
Small measures (draught excluders, door brushers, light bulbs, shower aerators, chimney balloons, cylinder jackets, letterbox brushes, TV standby plugs)	
Other (please fill in)	

3. Is the household still struggling to pay its energy bill? If yes, are they cutting back on the following in order to be able to pay for the bill?

Tick all that apply.

Heating	
Food and drink	
Clothing	
Transport	
Leisure	
Lighting	
Appliances	
Hot water	
Other (please fill in)	

4. Also, have members of the household been doing the following in order to be able to pay for their energy bill:

Tick all that apply.

Staying longer in public and community spaces outside the house	
Staying with friends and family	
Taking baths and showers elsewhere (e.g. at gym)	
Live in one room only	
Other (please fill in)	

5. Are the following health problems still present, and if yes are they attributable to poor heating in the home?

Tick all that apply.

Type of health problem	***Present?***	***Due to inadequate heating?***
Respiratory (e.g. breathing issues, coughs)		
Circulatory (e.g. heart & blood pressure problems)		
Musculo-skeletal problems		
Mental health and well-being issues		
Other (please fill in)		

6. Have the household's financial circumstances improved or worsened since the last assessment visit?

Improved ☐ Worsened ☐

7. Any other notes or observations?

Please read this consent statement to the applicant and ask them to sign and tick that they understand and agree:

I consent to sharing my contact information with Groundwork who are delivering the STEP-IN project in Greater Manchester with the support of the GMCA and the University of Manchester. I agree for my data to be anonymised and shared with the University of Manchester and the GMCA. I understand that my personal information will not be shared with or used by anyone outside this programme without my explicit consent unless the law allows for the sharing of my information for the purposes of prevention and detection of crime or where I or another person would otherwise be at risk of serious harm.

☐ ---------- (please tick and sign)

Annex 3: Energy café evaluation questionnaire.

Evaluation questionnaire

Energy Awareness in the Community, 11 June 2019

1. Did the seminar content reflect the details in our communications?

☐ Very poor | ☐ Poor | ☐ Average | ☐ Good | ☐ Very good/ excellent

Comments

2. How would you rate the venue and administration of the event?

☐ Very poor | ☐ Poor | ☐ Average | ☐ Good | ☐ Very good/ excellent

Comments

3. How would you rate the attendance at the event?

☐ Very poor | ☐ Poor | ☐ Average | ☐ Good | ☐ Very good/ excellent

Poor		Average		Good		Very good		Excellent	
Comments									

5. What aspect of this event did you find the most beneficial?

6. What aspect of this event did you find the least beneficial?

7. To what extent do you agree with the following statements about your experience at this event

The information and advice provided was useful

☐ Strongly disagree | ☐ Disagree | ☐ Neutral | ☐ Agree | ☐ Strongly agree

My knowledge of how to reduce my energy bills has improved

☐ Strongly disagree | ☐ Disagree | ☐ Neutral | ☐ Agree | ☐ Strongly agree

My knowledge of how to reduce my energy consumption has improved

☐ Strongly disagree | ☐ Disagree | ☐ Neutral | ☐ Agree | ☐ Strongly agree

The information/advice was communicated in an understandable manner

☐ Strongly disagree | ☐ Disagree | ☐ Neutral | ☐ Agree | ☐ Strongly agree

I was provided the opportunity to ask questions and these were satisfactorily answered

☐ Strongly disagree | ☐ Disagree | ☐ Neutral | ☐ Agree | ☐ Strongly agree

I trust the people who provided the advice/information

☐ Strongly disagree | ☐ Disagree | ☐ Neutral | ☐ Agree | ☐ Strongly agree

Further comments

8. To what extent did today's event increase your knowledge about the following issues?

How to reduce energy consumption through more energy efficient appliances (e.g. washing machine, fridge, boiler)

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

How to reduce energy consumption by installing insulation in the home

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

How to reduce energy consumption by 'small' energy efficiency measures (e.g. draft-proofing)

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

How to reduce energy consumption by changing behaviour (e.g. not overfilling the kettle)

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

How to change energy supplier or tariff

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

Sources of further advice and support about energy costs or energy saving

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

Suppliers or installers for new appliances or home renovation

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

Other (please explain in the box below)

☐ Greatly decrease | ☐ Decrease | ☐ About the same | ☐ Increase | ☐ Greatly increase

Further comments

7. How likely are you take any of the following actions as a result of advice or information gained from this event?

Change energy supplier or tariff

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Purchase energy efficient lightbulbs

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Purchase energy efficient appliances

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Install insulation in the home

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Change behaviour to reduce energy consumption in the home (please describe what changes you plan to make in the 'further comments' box below)

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Seek further advice about energy costs or energy saving

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Report problems to landlord or other agency

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Other (please describe any additional planned changes in the 'Further comments' box below)

☐ Very unlikely | ☐ Unlikely | ☐ Unsure | ☐ Likely | ☐ Very likely

Further comments

8. Would you recommend this type of event to others?

☐ Yes ☐ No

9. If you were to tell someone about this event, what would you say?

10. What areas, if any, could we improve on for future events?

8. Document coding