ZERO CARBON

RUGELEY

Smart Local Energy System

Design Demonstrator

ZERO CARBON RUGELEY

WP17-D12-3: USER-CENTRIC DESIGN AND COMMUNITY ENGAGEMENT REPORT: DOMESTIC BUILDINGS AND COMMUNITY ENERGY

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USER-CENTRIC DESIGN AND COMMUNITY ENGAGEMENT REPORT: DOMESTIC BUILDINGS AND COMMUNITY ENERGY

Keele UNIVERSITY

UKRI Innovate UK

Contents

Executive Summary

This report covers four different activities that were carried out as part of the user-centric design and community engagement activities of the InnovateUK Zero Carbon Rugeley project between 2020 and the end of 2022, carried out by Keele University in collaboration with New Vic Borderlines. These activities focused on energy in domestic and community settings, in particular retrofit, smart energy management, peer trading (to a lesser extent), and community energy schemes. The activities covered a range of different approaches from more time intensive engagements such as online workshops, which attracted a small number of participants who were deeply interested and engaged in the issues, to 'pop-up' activities as part of existing community events which included a Jubilee street party, artisan market, and community eco-day. These activities involved much shorter engagements with members of the community visiting the Zero Carbon Rugeley (ZCR) stall, but enabled engagements with a greater number and diversity of participants. The final type of engagement involved the use of social media through a dedicated 'Engage ZCR' Facebook group, which was used to generate two-way discussion about relevant issues.

The findings from these many engagements are diverse and are summarised below:

1) A theme that emerged in many of the discussions with participants through the engagement activities is the need to 'educate people' to 'get them on board' with different low carbon initiatives. Some of the more engaged participants showed a willingness to play a part in helping others and advocate in their community to increase engagement with these topics. Some felt that they needed their own direct experience of these processes and new technological developments in order to bring authenticity to their voice with wider community members. This highlights the potential role of local champions in knowledge circulation and engagement within communities, and the benefit of supporting these individuals to make changes within their own homes.
2) A topic that emerged in many of the activities was the importance of language. In particular, the language around 'retrofit' and 'smart' was questioned by participants, with evidence of how this language was or could be misunderstood by the general public, and could also act as a barrier for engagement. These discussions highlighted the need as project implementors to test assumptions about the language used, and to ask for direct feedback from within the community on language and engagement approaches in order to iteratively develop a successful engagement approach for the community.
3) Although many of the participants in the more time intensive activities were already engaged in these issues, they were quick to comment on how other community members

may think about issues. These more engaged participants often showed less concern about issues such as data and privacy, that are known to be barriers to some smart technologies, but they showed an awareness that these may be barriers to others. Although the engaged participants were in general in favour of smart technologies, they still expressed concerns about some levels of control, such as appliances being turned on automatically when they were out or asleep, demonstrating a hierarchy of concerns, that could still act as barriers for some technologies, even for those already engaged. Even though these participants were engaged and willing to make changes in their own homes they expressed frustration at finding trusted sources of support to help them make decisions about changes in their own home. This highlights that sources of trusted support is a key existing barrier to the energy transition and highlights that understanding the barriers for even the most engaged and willing to make change members of a community can identify potential 'no go' barriers, and areas to prioritise work to overcome other barriers.

4) The online workshop about community energy demonstrated a desire from some members of the community for development of community energy schemes within Rugeley. However, there were a number of frustrations expressed around barriers to developing such schemes, with particular reference to the need for better communication and collaboration with the Council, as well as the potential for collaboration with other large organisations in the areas with significant roof space. This highlights a potential key role for project implementors in negotiating key relationships to enable the necessary collaboration for development of community energy schemes.
5) The shorter pop-up engagements which involved participants who were potentially less engaged with these issues, identified a number of areas of fear, uncertainty and doubt relating to new energy transition technologies (even though technological solutions were preferred over fabric first solutions), with concerns expressed about how long technologies such as solar PV and batteries would last. This highlights the need for better communication around these issues through diverse channels (and linking to point one, including peer networks) to help people develop confidence in these technologies.

These activities demonstrated the benefits of this range of engagement activities to i) enhance community members' understanding and engagement of the issues in question, ii) help inform the community engagement and user centric design approach itself, and iii) to help project implementors and design teams understand community perspectives about different approaches and technologies to help inform design and implementation approaches.

1. Introduction

This report synthesises the methodology and findings related to the user-centric design and community engagement work around domestic buildings (covering retrofit and smart energy management systems) and community energy schemes as part of the InnovateUK funded Zero Carbon Rugeley project. This work was led by researchers from Keele University in collaboration with New Vic Boderlines, and the wider Zero Carbon Rugeley consortium for specialist input where appropriate. The data discussed in this report was generated through three different types of engagement focusing upon buildings and retrofit. The first section presents findings from online workshops conducted with Rugeley residents that explored perceptions of what is termed for the purpose of this report 'Smart Retrofit', the second section presents findings from an online workshop about community energy. The third section presents data from short 'pop-up' engagement activities conducted in-person in Rugeley. The fourth section presents data collected through social media engagement primarily via the 'EngageZCR' Facebook page.

2. Activity One: Online workshop on ‘smart retrofit’

2.1 Activity outline

An online workshop was developed in order to explore participants’ perceptions of energy-related aspects of the domestic build environment. This workshop covered both the fabric aspect of retrofit as well as smart home energy management systems and peer trading of energy – the combination of all these aspects is given the term ‘smart retrofit’ for the purpose of this report. This workshop was designed to generate discussions surrounding retrofit, both helping develop participants’ understanding of different aspects of ‘smart retrofit’ and creating a space for them to explore their own thoughts with other community members.

The smart home energy workshop was conducted online in March 2022. The workshop was recorded and transcribed. This piece of engagement was designed along the principles of ‘cultural animation’ in line with other participant engagement throughout the Zero Carbon Rugeley project. One member of the Keele University research team took the lead as an ‘animateur’ who guided the participants through a story that was developed as a set of PowerPoint slides that followed three characters who were engaging in a retrofit process. Participants in the workshop were asked to relate to the different characters in order to explore their own thoughts and feelings towards, and questions about, smart retrofit. Four participants took part in this hour-long workshop. Figure 1 displays a slide taken from the beginning of the workshop, demonstrating the style of the workshop.

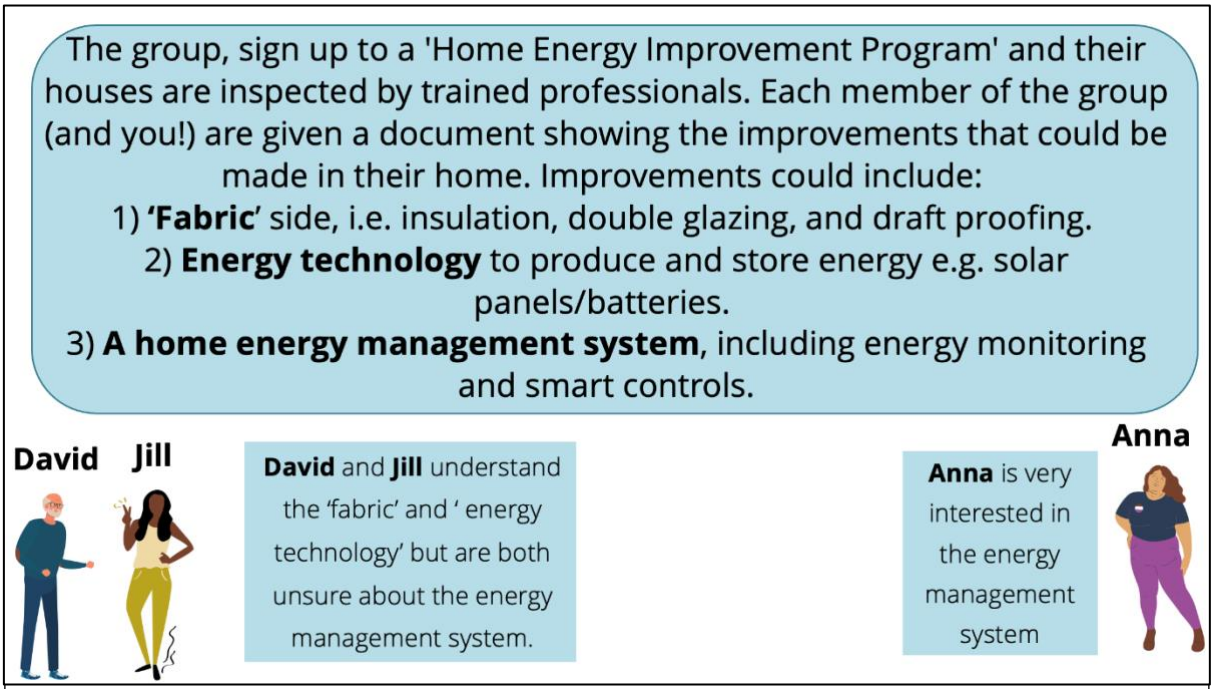

Figure 1: Introductory slide from the online workshop introducing the characters and outlining the retrofit process.

As displayed in figure 2, energy technology related to generation, storage, and space heating, were highlighted to participants, but the emphasis was placed upon the management of water, light, heating, and appliances through the use of smart controls. Direct quotes are used throughout this report to evidence points, with slight editing of repeated words and phrases for ease of reading.

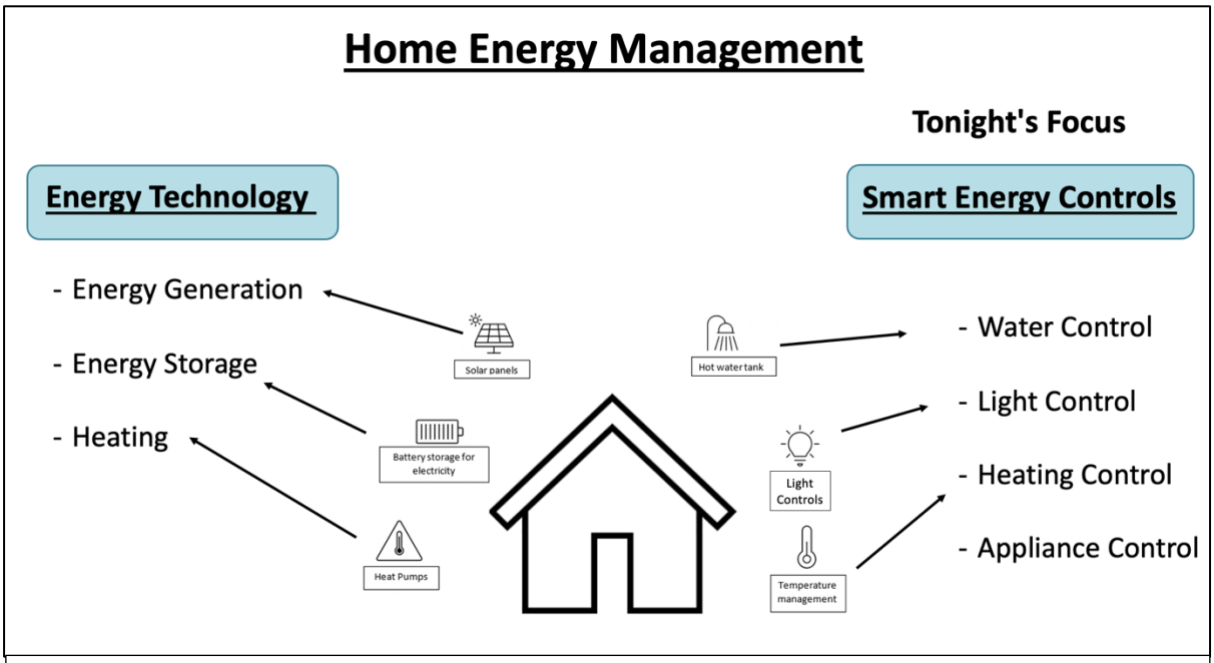

Figure 2: Slide taken from the workshop that outlined the focus on home energy management and smart controls.

2.2 Smart retrofit workshop findings

2.2.1 Perceptions of the term 'retrofit'

The workshop began by assessing the participants' initial perceptions of the term retrofit by asking them what words came to mind when they heard the word 'retrofit'. This was to establish the level of pre-existing knowledge about retrofit amongst participants, as well acting as an ice breaker exercise for participants. All four participants had a good understanding of what is meant by aspects of 'retrofit', summarised in the comment below:

> *Retrofit for me means erm, improving, replacing energy systems in a ready built property, in contrast with new build.*

When prompted to reflect on what retrofit means, participants were quick to discuss their perceived negative connotations associated with the word. Whilst all participants felt that they understood what retrofit is, they felt that others may struggle with the terminology as retrofit is synonymous with old, and not clearly associated with buildings. There was an assumption amongst participants

that the general public do not understand what retrofit means, and a suggestion that the terminology could be barrier for people engaging with retrofit:

> *Normally like retro means something old and I'm not sure whether or not people think that, with this, retrofit it's old technology that we are going to use so I am just wondering whether or not there's a better way describing this. I think we've spoken very briefly before about whether or not people are put off by, to even come to a zoom like this not knowing what maybe the title means.*

Speaking broadly about retrofit processes, and specifically about the word retrofit, one participant commented that retrofit was 'a nightmare'. When asked to expand on this comment, they discussed the 'unfortunate connotations' of the word retrofit:

> *Well because it kind of seemed so complex and as I think that someone identified, it's also it's sort of slightly has unfortunate connotations rather old-fashioned connotations I mean you say retro I think you know immediately smart old nice old clothes you know funky sort of wear.*

These discussions highlight that terminology, such as 'retrofit' which is used by specialists can be misunderstood by a non-specialist audience, and may create barriers to engagement in the retrofit process.

2.2.2 Perceptions of 'smart retrofit'

After a discussion about what might be meant by 'smart' technology. Participants were asked how interested they would be in installing smart technology in their own homes. This was assessed using a three-point scale which was returned to at various points throughout the workshop, with red meaning 'not interested', amber meaning 'I wouldn't be against it', and green meaning 'I want technology installed ASAP'. Three participants placed themselves in the green zone, with the remaining participant stating that they were between amber and green. When asked why participants felt this way, the general response focused on an interest in 'gadgets' and how they could be relevant to energy efficiency in the home:

> *I have a particular interest in technology, and I wouldn't say I've got all the latest gadgets but I'm interested in how gadgets work and particularly in internet connected gadgets.*

In a similar manner to perceptions of retrofit, participants were asked what they thought about the term 'smart' in association with technology and retrofit. One participant highlighted that they were most familiar with the word 'smart' in connection with smart meters:

> *Well straight away the word smart in connection with energy these days is always connected with a smart energy meters, whether or not that is connected or not I don't know.*

Mirroring suggestions that the word ‘retrofit’ is unclear and could be a barrier to people engaging with it, participants felt a similar way to the word ‘smart’, suggesting that it could be off-putting: *We've identified that both these terms carry perhaps unfortunate freight in that we are I don't imagine that we can change that the common coinage, but is there some, one way of changing coinage or changing a title is putting a subtitle underneath you know like you don't have to be smart to have a smart energy system, or something.*

2.2.3 Acceptance of smart controls in the home

Following the three characters in the story, the workshop discussed how two of the characters (David and Jill) were unsure about what smart controls could do, whereas one of the characters (Anna), who was interested in technology, explained that controls can monitor home energy usage and help to reduce energy wastage. When asked what participants thought of smart controls, one participant discussed how smart controls could be a solution to their current ‘reactive’ energy usage. This demonstrated how participating in the workshop, and discussing smart controls, encouraged participants to reflect on their own domestic energy use:

> *I think I'd say I'd side with Anna [character who is interested] because I think I think my home energy management as it stands is very reactive so you know if I’m going out I’ll turn the thermostat down and then when we come back will turn it up again. I don't know whether that’s efficient or whether I should leave the thermostat up while I'm out.*

Similarly, participants felt that smart controls would be beneficial to them as it could reduce how much they have to think about their thermostat and heating. This was discussed amongst participants primarily from a time saving perspective, with controls viewed positively if they could remove the need for individuals to think about their energy consumption:

> *I tend to take a weekday/weekend view and then I'm kind of worrying about it if the day turns out differently than normal I can go in and override it but I think if the system could predict somehow, you know learn our behaviours I think that would be helpful. Take some of that control overload off me.*

Participants were asked how they felt about their home energy usage data being monitored and collected to make their usage more efficient. Participants were generally open to their data being shared, with participants highlighting that data about themselves is already monitored in other aspects of their lives:

> *That data’s fine people want to know that about me that’s absolutely fine by me don't have issue I don't think that just generally people are interested then just want that to make things better and generally they like tracking your steps or sometimes even you know tracking where you are coz it’s pretty useful, so wouldn't be too concerned about it.*

The workshop also explored with participants how smart controls could dictate when larger appliances such as dishwashers were switched on so that they operated at times where electricity is cheaper and less carbon intensive. This received a mixed reception amongst participants, with three participants stating that they wouldn't feel comfortable with large appliances coming on when they are either asleep or not at home, largely due to concerns about fire risk. This highlighted that although participants would feel comfortable with smart controls managing appliances, they would still want to have an element of control to select a window of time in which an appliance could come on because of wider concerns that overrode the benefits of reduced cost of energy use:

> *There are things you wouldn't be comfortable with regards to not being in the house and the washers coming on, you'd need to make sure that there's an override on there somewhere.*

However, one participant viewed this type of control more positively, displaying an interest in how a control system could make decisions regarding when certain appliances would turn on:

> *Yeah I think there's an advantage in being able to divert some loads to night time when the cost is cheaper so I'd be interested in doing that, the system would need to know when I needed the dishwasher to run or the washing machine to run kind of thing so yeah I think I think that would be helpful.*

The workshop also discussed how smart energy management could also include management of electric vehicle (EV) charging. One participant, who owned an EV, expressed how this control would be beneficial to their lifestyle and charging habits:

> *I think it would be positive in our house, we have an electric vehicle I'm more happy to let the charge status of the vehicle run down whereas my wife would like to be full all the time in case there's a sudden demand that needs us to be somewhere else, which I get, so if that was managed for me that would be a great advantage.*

The workshop also presented the idea of peer trading to participants, pitching it as an additional layer of smart controls with homes being connected to each other in order to generate and distribute energy locally. There were mixed responses to this idea, with one participant stating that they had concerns regarding whether interconnected homes would mean that they would have to ration what energy was available:

> *I'll be comfortable about giving that control away but managing those different challenges of of demand yeah might be difficult I might be concerned about that.*

Within discussions of smart energy developments at the neighbourhood level, the workshop story discussed how the characters could benefit from lower costs if multiple houses signed up to smart retrofit developments at the same time. Two participants stated that they would feel comfortable discussing retrofit with their neighbours, however, one of these participants pointed out that they

would feel more comfortable doing so if they already had a home energy management system installed in their own home to be able to talk with authenticity:

> *I think I would feel able to discuss it with my neighbours yeah I think probably if I had some kind of home energy management system already I'd feel better able to talk from experience of using it yeah where is as of now I'm, it would be a bit more…*

2.2.4 Barriers to Retrofit

Throughout the workshop participants raised a wide range of issues or perceived barriers to the implementation of 'smart retrofit'. The two most common barriers raised were linked to the availability of retrofit companies and the disruption associated with having work completed in their home. Numerous discussions centred around difficulties in finding a universal company that can complete the entire retrofit process. Generally, participants who had researched companies and tried to make changes to their own home felt that they needed more guidance and support to do so:

> *I watched a YouTube video by Robert Llewellyn a few months ago and he touched on a company, I haven't found out which company it is, who will come into your home and, like the process on the previous slide, will suggest what would be appropriate for your home, whereas at the moment I'm kind of floundering around and thinking well what can I afford to do and yeah, struggling a bit with that.*

Participants also expressed distrust in companies given that their main goal is to sell their product and services. This raised a wider point around retrofit information and education, with participants stating that their main source of information is from companies:

> *Unfortunately, the only information you get about new technology is from the people who are selling it, it is very difficult sometimes to get an independent viewpoint on it.*

Even though the participants in the workshop were engaged in these issues they still expressed that there were significant barriers to engaging in the retrofit process, around the amount of disruption and time involved. Participants emphasised how they do not have the time to follow through with the process of finding a company and deciding what they want changing in their home. This point was emphasised by a participant who highlighted that although they are engaged in the idea of retrofit, the time commitment is challenging:

> *Even someone like me who theoretically is enthused, engaged and enabled, places a vast amount of value on time and you know not having to spend my time fussing about these things.*

Participants also discussed disruption from a perspective of the impracticalities of having to remove furniture for building work to take place:

I think its, one of the problems is the disruption, I know there is probably a bit of a push now on like under floor insulation and that may well save us money and make some savings on carbon, but just trying to move everything out of the house so that you can get the floorboards up, it's a big big disruption.

2.2.5 Appetite for Retrofit

Towards the end of the workshop participants were asked whether they would be interested in retrofitting their own home. Although there were numerous discussions centred around the disruption caused by retrofit, participants felt that disruption could be justified if it could be guaranteed that they would see a cost saving having their home retrofitted:

I think it would be acceptable if it could be shown up front that there would be a benefit to me, a cost saving.

One participant took this view further, stating that they would be happy to have their home retrofitted if a company was willing to cover the upfront cost and use the savings generated to pay it back. They emphasised that a cost saving was not their motivation for retrofit:

If they were to take the responsibility of the cost and the responsibility for saving and if they are so sure that it will work then why wouldn't they do that if somebody was to come and do that I wouldn't want to make a penny literally wouldn't want to make a penny.

Discussing appetite for retrofit, one participant stated that they viewed a fabric first approach as more important due to the reduction in energy use that they would see:

I think the that the fabric would seem more important to me I think it was on another call but said something about the cheapest form of energy is the energy that you don't use I think starting there just seems to make more sense.

The workshop concluded by asking participants where they would place themselves on the three-point scale of red, amber, and green. By the end of the workshop all participants placed themselves in the green category. However, the only participant who initially did not place themselves in the green category at the start of the workshop felt that they had now moved into the green category, but still expressed some concern towards retrofit:

I'm where I was that I think I have moved from amber into green but I'm only just in the green because probably I need some convincing.

Further benefits of taking part in the workshop were expressed by one participant who felt that the workshop had inspired them to consider how they operate their boiler and attempt to make it more efficient:

I think I can definitively say that after this that I will go and take control of my basic boiler you know boiler thermometer in a way that I haven't so even though that's not smart energy or retrofits it's an actual positive outcome.

3. Activity Two: Online workshop on community energy

3.1 Activity outline

In November 2021 an online workshop took place involving three participants. This workshop differed to the Smart Retrofit workshop as it did not follow a cultural animation approach and instead involved a member of the Keele research team sharing information on community energy in response to queries raised during the Energy Heritage day in October 2021, and facilitating an open discussion with participants. The workshop was recorded and transcribed. Key themes identified within discussions were as follows and are explored further within this report: 1) engagement; 2) collaboration; 3) communicating with Councils.

3.2 Community energy workshop findings

3.2.1 Engagement

All three participants displayed an interest in community energy schemes and a desire to see community energy schemes established locally. Participants discussed the importance of getting people on board and felt that education was one way to disseminate information and get people engaged. One participant suggested that running a series of workshops would be useful for increasing local understanding:

Those workshops those kind of things can be quite useful but you probably have to do more of them and obviously I appreciate the costs associated with that and there's people's time but you really need to start bombarding people with information to get the interest there at least (Participant B).

Alongside workshops to increase understand and awareness of community energy schemes, another participant felt that engaging people would require local individuals such as themselves acting as a spokesperson to champion engagement with community energy:

I'll be like look they've got these ideas, were not saying we want you to put your hand up and say me me I'll do it, but you know are you interested?... I am quite happy to go and be a cheerleader and going go 'right this is what we do, this is where we need to do it and here's the people who know how to do it. (Participant A).

These discussions highlight the need for significant effort to go into broadening engagement and interest in community energy schemes, and the potential role of a small group of engaged individuals within the community in supporting this activity.

3.2.2 Collaboration

All participants believed that 'collaboration' was fundamental to the success of community energy schemes being established in Rugeley. Collaboration was discussed in a range of different ways, from collaboration between individual community members to be able to work more collectively, to collaboration with large, locally-based organisations with roof space for significant solar PV installations, to collaboration with local community assets such as schools and libraries to support them with solar PV installations. For instance, participant A spoke of collaboration in an abstract sense, suggesting that community energy is dependent on multiple parties working together and combining their knowledge:

> *It's just seeing who wants to fit together and if people can fit together and if we can work together more like a socialist group as opposed to being like well I do this I did this so I do this and I can't possibly work with you because it's you know we're in our own little bubbles in our own little worlds…I think it's about getting those people together having those things, see who's willing to do what, who wants to do what you know (Participant A).*

All three participants also believed that collaboration with larger organisations would be one pathways into establishing a community energy scheme in Rugeley. For example, Amazon which has a large premises on the outskirts of Rugeley, was identified as a key opportunity for installing roof top solar:

> *Has Amazon in Rugeley put the solar panels onto their roofs yet because there's two or three sites that Amazon have got, bearing in mind the size of it is about four or five football pitches. Presumably we can start to look at utilising roof space within organisations, is that a possibility? (Participant B).*

In addition to organisations, one participant felt that collaborating with local schools and libraries could be another pathway for community energy schemes to develop. Within the theme of collaboration, participant A suggested that this would require support offered to schools, potentially in the form of helping them access grants, to kickstart the installation of solar panels:

> *You know if it could even be, getting a grant for all the schools… contact the schools and go 'look we'll help you sort the grant out, all you've gotta do is say yes we want this grant for solar panels', and actually then even that would start the community off wouldn't it. If all the schools with viable roofs had solar panels on as part of the community action group, that and the couple of libraries and all that kind of stuff (Participant A).*

3.2.3 Communication with Councils

Having discussed the importance of different aspects of engagement and collaboration, participants felt that Councils could be a stumbling block for establishing community energy schemes. This view was held for two main reasons: i) Councils are responsible for a lot of spaces of unused land and buildings that could be used for solar panels and difficulties with communicating with the Council on these issues had been experienced, and ii) different tiers of Council were seen as not communicating effectively between each other.

Two participants spoke of difficult experiences they had had trying to contact local Councils about acquiring unused land on brownfield sites.

> *I mean in Brereton for example that used to be an old library that they would class as a brownfield site that's owned by the Council, that was the primary school and a library on the main road, which is doing absolutely nothing, but yet the council won't let anybody near it, yet they'll send someone to cut the grass (Participant A).*

> *We actually looked at buying that land as well, but you cannot get the Council to give you an answer about who owns it or what they are going to do with it (Participant B).*

Participant C spoke of a similar interaction with councils regarding their enquiry of using old waste tips for solar fields:

> *I was just going to say that the County [Council] has quite a lot of redundant waste tips and negotiating with the Staffordshire County Council over using those for solar panels is quite difficult if you've got any suggestions of how that could work I don't know where they all are in Rugeley but we got two at least here which are fairly close, we want to use them but we can't get any answers from the County (Participant C).*

These participants felt that this experience with the Councils may mean that community energy projects could be challenging to establish on existing brownfield sites or County-owned buildings.

Participant A also highlighted unused buildings near to Rugeley that they felt should be put to use. They expressed frustrations at the existence of such buildings that have roof space that are not being utilised for roof top solar:

> *It's like Burntwood as well, there was a big care home that became one of those places that went from a residential to an open care facility, and it was just a blot on the landscape it's on one of the main roads and it's still there now, and it's like this proper old brown shack buildings, you know like the old civic buildings, they have them all over the country, there always like brown wooden shack buildings aren't they, and they just sit there (Participant A).*

There was also a perception that different tiers of Councils did not communicate effectively, which also created a potential barrier to the development of community energy schemes:

I think getting the county and the district and the parish to actually talk to one another its almost impossible (Participant C)

4: Activity Three: Pop-up engagement activities

4.1 Introduction to pop-engagement activities

The data covered in this section of this report was collected through a series of 'pop up' engagements relating to buildings and domestic energy, that took place in Rugeley town centre. The term 'pop-up' engagement activity is used to describe activities designed for short interactions with members of the local community, which take place within wider community settings. These activities therefore have the potential to engage with a wider range of participants who would not otherwise engage with longer workshops. On two occasions, a Zero Carbon Rugeley (ZCR) market stall was used to briefly engage locals passing through the town centre, in order to engage with people who do not typically engage with Zero Carbon Rugeley activities or social media. Data collection took place at two events: 1) the Jubilee Street Party (June 2022); 2) the Artisan Market (July 2022). It should be noted that these in-person engagements were unable to take place for much of the three-year period of the Zero Carbon Rugeley project due to COVID-19 restrictions. Further information on the pop-up engagement events and data relating to mobility-focused questions can be found in report number WP17-D12-2.

4.2 Jubilee street party pop-up engagement activities

This engagement took place during the Jubilee street party celebrations in Rugeley in June 2022. Given the nature of the event, the ZCR stall was themed around '70 years of energy', encouraging passers-by to think about the past, present, and future of energy. The data in Table 1 was generated through a 'button in jars' game, where people passing by were asked two questions and responded by placing a button in the corresponding jar. This is not designed to be a representative sample of the Rugeley community but gives a snap shot of the thoughts of those passing by. The first question asked participants if they would rather make changes to their home or to their travel. The second question asked whether people would be more likely to retrofit the fabric of their home or change the technology of their home. Facilitators at the stall then engaged people in conversation about why they had made their particular choice which were recorded on cards, while a researcher made

field notes about discussions. 54 people were engaged in these activities overall, with 33 people responding to the first question, and 25 responding to the second question.

Responses to the first question suggest that participants would rather make changes to their home than their travel patterns, although the majority would prefer to change both, while responses to question two suggest that participants preferred retrofit that prioritised technology over a fabric first approach, however, the majority would prefer both changes. 'Technology' was used to refer to technical solutions to energy generation, energy storage, and heating.

Table 1: Number of responses to the two 'button in jars' questions.

Total number engaged: 54	
1) Where energy comes from is changing again to help us reach net-zero. What would you rather change about your life as part of the transition and why?	Change my home: 12
	Change travel: 5
Total answers: 33	Change both: 17
2) Would you be more likely to retrofit the fabric of your home, change the technology in your home, or would you want to do both? Why?	Change Fabric: 1
	Technology: 11
Total answers: 25	Change both: 13

Table 2 summarises data generated from conversations with participants who stopped for discussions for an extended period of time, and draws on card responses and researcher field notes. This data was coded by the research team, which provides the structure for Table 2. The following questions were used as prompts for discussions:

Q1 - How do you use energy in your home? (Heating, electricity)
Q2 - What do you know about where the energy comes from? How do you feel about it?
Q3 - Has it always worked this way? (Have you ever been in a house with a coal fire). How did you feel about it?

Q4 - Where energy comes from is changing again. What about the house needs to change? What would you want to stay the same?

Table 2: Summary of participant discussions during Jubilee Street Party engagements

Code	***Example responses***	***Field notes***
Reassurance	*'Maintenance would be important'*	These responses were given by participants who had positive attitudes towards solar panels (SPV) and other renewable energy technologies (RET).
	'Would need a guarantee'	Whilst participants were keen to take up low-carbon offerings, these comments demonstrate concerns around the introduction of new technologies into their homes and the need for reassurance and safeguards.
	'Roof would have to be guaranteed'	
Cost	*'Motivated by cost of living'*	A common theme across the engagement was the energy price crisis. This context made cost both a barrier to uptake of low-carbon measures as well as a motivation to take up options that would reduce energy costs. Several participants were conscious of the tension between both the cost of taking up low-carbon measures and the cost of not taking them up. Some participants were also conscious that, even with removal of upfront costs, retrofitting represented a significant debt burden. Some participants outlined when they would be happy to take on debt and how long they would be happy for repayment periods to last.
	'Once I've paid off my mortgage'	
	'15-year payback period'	
	'10-year payback period'	
Governance	*'Council should pay for solar power'*	Most discussions of energy governance centred on more top down, centralised forms of energy management. Both local authorities and central government were seen as key players in a more planned energy economy (including covering the costs of the energy transition for end users), with current energy markets being seen as too sporadic and difficult to coordinate/regulate.
	'Need to change how energy is managed'	
Practicalities	*'Roof space is small'*	These comments were given by participants who had positive attitudes towards domestic low-carbon solutions but represent concerns about

	'Batteries don't last'	introducing new technologies into the home. These included doubts about the amount of energy solar PV could produce (owing to small roof spaces to fit an array) and concerns about how long technologies will last before replacements are needed.

4.3 Artisan market pop-up engagement activities

In comparison to the Jubilee Street Party, the Artisan Market in July 2022 had a much lower footfall in the market overall compared to the Street Party. The activities carried out as part of the ZCR pop-up engagement at the Artisan Market followed the same format as for the Jubilee Street Party outlined above. The data in Table 3 outline the responses to the 'button in jars' game. 16 people engaged in these activities in total, with 10 responding to question 1 and 6 responding to question 2. Responses to question 1 showed an even split between a preference in response to the net zero challenge of making changes to participants' homes or to their travel patterns. Similarly to the Jubilee Street Party, making changes to both homes and travel patterns was the most common response. The responses to question two demonstrated that participants overwhelmingly favoured a technological retrofit over a fabric retrofit approach. This is similar to the results from the Jubilee Street Party engagement, which saw a strong preference for technological versus fabric retrofit approach, however, in the Jubilee engagement, a selection of 'both' approaches were the majority choice. It should be noted, that confusion over the term retrofit and fabric retrofit where participants did not engage in a longer conversation or explanation of these terms could have influenced participants' choices.

Table 3: Summary of results from the 'button in jars' activity at the Artisan Market pop-up event.

Total number engaged: 16	
Q1) Where energy comes from is changing again to help us reach net-zero. What would you rather change about your life as part of the transition and why? **Total answers: 10**	Change my home: 3
	Change travel: 3
	Change both: 4
	Change Fabric: 0

Q2)Would you be more likely to retrofit the fabric of your home, change the technology in your home, or would you want to do both? Why? **Total answers: 6**	Technology: 4 Change both: 2

The data in Table 4 were generated from conversations with participants who stopped for discussions for an extended period of time. Data were recorded though participants writing on cards and researcher field notes. Responses were coded by the researchers into thee themes of governance, costs, and practicalities. These were three of the same codes used in relation to the Jubilee Street Party data. An area of discussion that had not emerged strongly from the Jubilee Street Party event, but was part of discussions at the Artisan Market, was perceived energy justice issues, and concerns that the 'able to pay' bracket would be unfairly advantaged by any support as they were more able to afford rising energy costs.

Table 4: Summary of participant responses from discussions at the Artisan Market pop-up event

Code	**Response**	**Field notes**
Governance	*'People want it but won't go for it themselves.'*	These participant responses relate to a perceived appetite in the community to take-up low carbon offerings for buildings. Participants shared the point of view that without central government funding cost was too significant a barrier even for the able to pay demographic.
	'Needs central investment (government)'	
Cost	*'Cost/Benefit doesn't add up. Would rather wind.'*	This participant was commenting on a perception of solar PV as only lasting a short amount of time comparative to the cost and viewed wind as a better option.
	'On benefits so can't afford.'	Highlighting cost as a barrier particularly for those already economically disadvantaged.
	'Cost savings felt by able to pay.'	Participant commented on a perceived injustice with the roll out of energy saving measures to able-to-pay demographics as this group are most able to afford rising energy costs.

Practicality	*'Solar panels only last so long'*	The perceived short life of solar PV was a common barrier across this engagement activity.
	'Heavy metals need disposing of'	There was a common perception across the particpants that the materials of low-carbon measures have negative impacts on the environment.
	'Too old to think about doing that now'	This participant saw the repayment period as unworkable at their age.

4.4 Rugeley eco-day pop-up engagement activities

The Rugeley Community Church and Centre hosted an 'Eco-Day' event in April 2022 bringing together local groups who focus on sustainability. The aim of the day was to encourage networking between local groups and connect with the community. Given that the event was focused specifically on sustainability, activities that involved a greater level of engagement and discussion than the 'button-in jar' activity were chosen as the appropriate engagement method under the assumption that attendees would be willing to stop and chat. Engagement focused upon the topics of mobility, mobility hubs, and community energy, posing key questions to attendees about each topic using a blank Monopoly board (Figure 3) to collate responses throughout the day. This report focuses on responses to the questions about community energy. Further details of these activities and the responses relating to mobility can be found in reports WP17-D12-1 (mobility) and WP17-12-2 (pop-up engagement report).

Figure 3: Monopoly board used for data collection.

Key questions explored with participants in relation to community energy included: 1) What do you think community energy is? 2) What do you think are the benefits of community energy?; 3) What kind of energy project opportunities are there?; 4) Where should surplus funding generated from community energy project go? These questions generated a range of responses outlining the perceived benefits and opportunities of community energy schemes in Rugeley (Table 5).

Table 5: Summary of monopoly board responses about community energy schemes from the Rugeley Eco-Day.

Questions	**Response**
What do you think community energy is?	Responses to this question were focused around specific words that people used to describe their understanding of community energy: • Give. • Take. • Share. • Local. • My Money.
What do you think are the benefits of community energy?	• Connections with others. • Control of energy and part of a group. • Keeps bills down, healthy, new jobs. • Sustainability project. • Reduce CO_2 output and reliance on fossil fuels. • Create a community interest group, bounce ideas off each other.
What kind of energy project opportunities are there?	• Water source heat pump. • Wind turbines. • Car sharing. • Electric vehicle charging point. • New development as host for energy projects. • Solar panels.
Where should surplus funding go?	• Electric buses x3. • Tree planting x2. • Mental health support in Rugeley. • Improve the look and spaces of Rugeley, cleaning, fixing, planting. • Expanding geography, bigger area.

These responses highlighted an interest in community energy schemes and a desire for these schemes to support further sustainability initiatives as well as wider social improvements for the town, and the potential to influence community energy developments in a wider geographic area.

5: Activity Four: Social media engagement around retrofit

Throughout the Zero Carbon Rugeley project social media (mostly Facebook) was used as a method of community engagement (see report WP17-D12-4). A Facebook page called 'Engage ZCR' was established early on in the project. A ZCR Discussion forum was also created on Facebook to allow community members to comment and share their views. This was initially established in response to needing to find community engagement approaches that would work given COVID-19 restrictions, but continued throughout the project as it enabled access to a diverse audience, and was part of a portfolio of engagement approaches. Social media was used as a method of two-way discussion in keeping with the principles of user-centric design and community engagement core to the Zero Carbon Rugeley project, rather than is often the case, as a one-way dissemination tool. There were over 500 followers of the EngageZCR Facebook page.

In relation to activities specifically related to the focus of this report Facebook was used to post questions related to retrofit to generate responses from the members of the Rugeley community who engaged with the Facebook page. Figure 4 shows a post from the discussion forum in relation to retrofit following a talk during the October 2022 Energy Heritage Day. The post demonstrates how this individual is interested in developing a local retrofit programme built upon collaboration between actors with different skills.

Figure 4: Example feedback about retrofit.

Figure 5 shows a post from a Keele staff member asking the Rugeley community about the disruption in their home that retrofit could cause.

Figure 5: Example of post about retrofit.

Figure 6 shows a response to the question asked in figure 5. This response is a typical response, and demonstrates limited engagement with posts on retrofit, and the challenges around the language of 'fabric' retrofit.

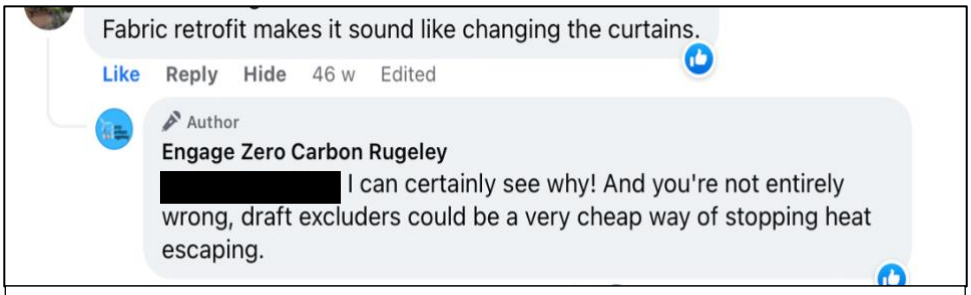

Figure 6: Participant response to figure 5.

It should be noted that the researchers' use of language around retrofit developed in response to feedback from community members, and that this relatively early post did not describe what was meant by 'fabric retrofit' which could have caused some confusion, or contribute to a lack of interest in readers of the post – as demonstrated in the response show in Figure 6.

Figure 7 displays an informational post created by a Keele staff member which aimed to explain the terminology being used within the project, as well as the adoption of the new term 'smart retrofit'. The post received one response, with one person stating, "great explanation". This suggests that providing community members with clear definitions of retrofit terminology is beneficial.

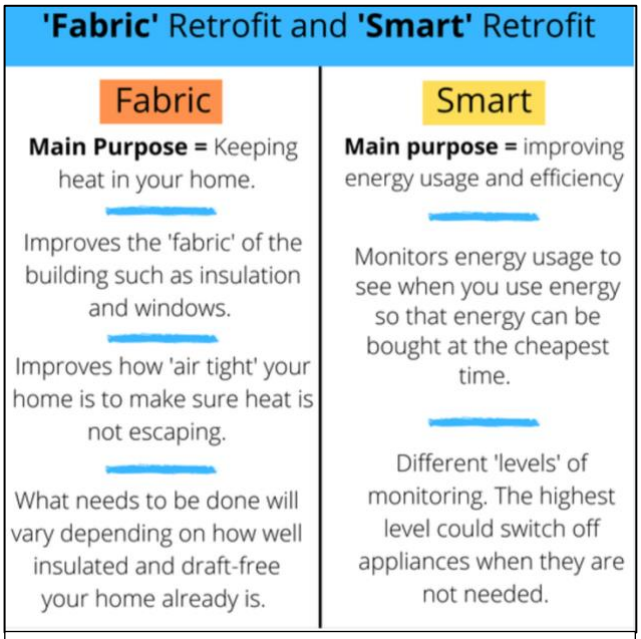

Figure 7: Example of informative post.

Figure 8 is taken from the ZCR discussion forum showing a comment made regarding the difficulties an individual had experienced trying to access feed in tariffs from solar panels. This reflects the sense of distrust in large companies that emerged from other engagement activities, and highlights the need for sources of information to support even the individuals who are engaged and willing to make significant changes in their own homes.

I've just had 5kw of solar panels fitted with 10kw of storage. Do you guys know what I can do about exporting electricity to the grid? My energy supplier (shell) are worse than useless. They can't even tell me if I get anything for exporting or not. Any ideas where I can go for good advice what to do? Octopus told me they could help if I had a smart meter which I got fitted, but then said they couldn't help. Had I kept my old analogue meter that would have run backwards on export which would have been ideal. I've been let down very badly so far and all I'm trying to do is reduce my carbon footprint to zero.

Figure 8: Example of comment made in ZCR discussion forum.

The following section presents further screenshots of comments made in the Zero Carbon Rugeley Facebook page and discussion forum. Figure 9 shows a post by a Keele researcher asking members of the discussion forum why interest in retrofit had generally been low on social media. This post generated responses from seven different people. This suggests that in Rugeley, individuals were

more likely to engage with why retrofit is perceived as inaccessible to them than engaging with retrofit itself. These responses led to the generation of the informative post about the language of retrofit used by the project shown in Figure 7.

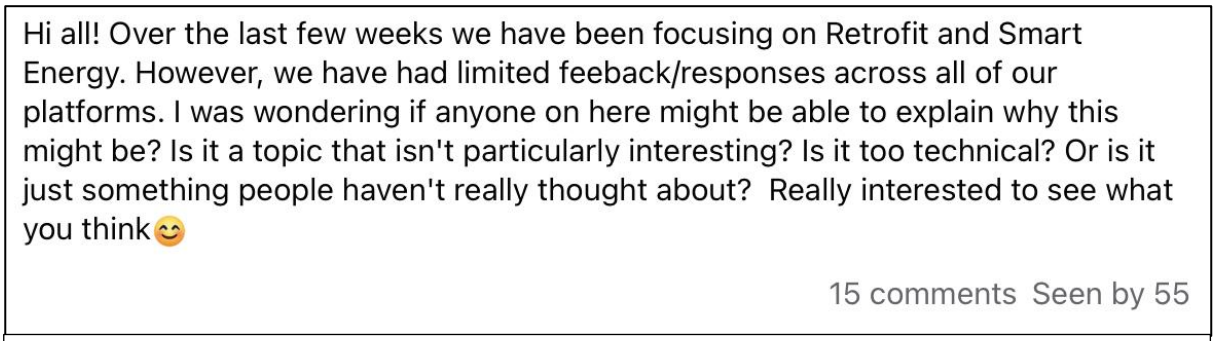

Figure 9: A post by a Keele researcher in the ZCR discussion forum.

There were a range of responses to the question of why Retrofit is difficult to engage with. The language and terminology (Figures 10 & 11) of retrofit were cited as a barrier to engaging with the topic. Individuals felt that it is too technical (Figure 12), and that engagement would increase if the benefits of retrofit could be realised in a shorter time frame.

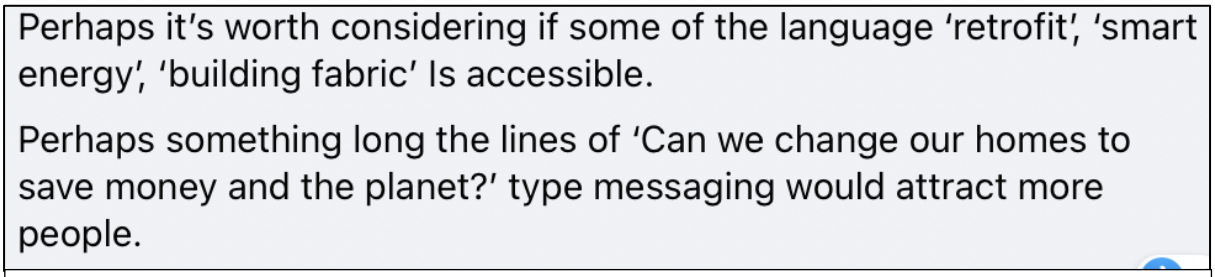

Figure 10: A response from a Rugeley community member.

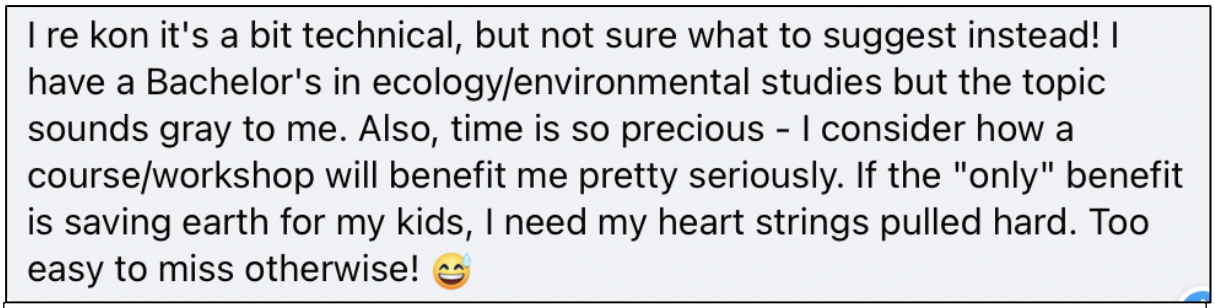

Figure 11: A response from a Rugeley community member.

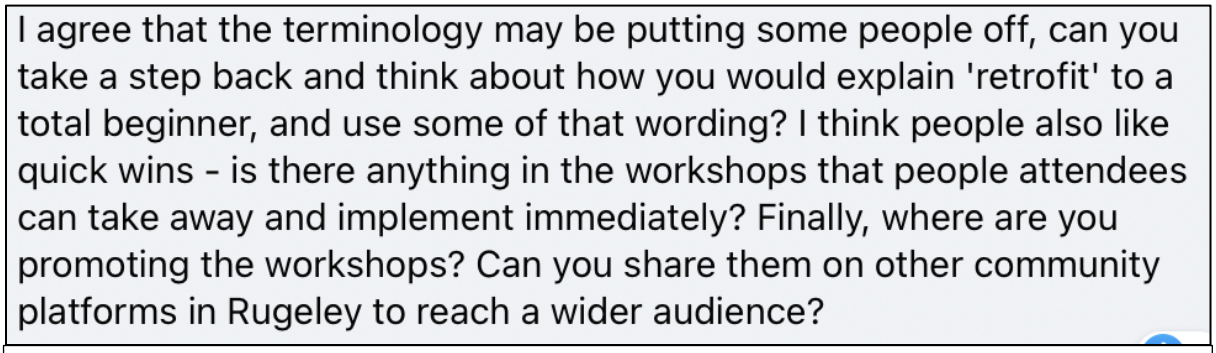

Figure 12: A response from a Rugeley community member.

Alongside language and terminology being perceived as a barrier, cost was viewed as an additional barrier to engaging with retrofit. Four individuals expressed that retrofit was not worth engaging with due to the perceived costs associated with it (figure 13, 14, 15, 16). This view highlights that although participants view retrofit terminology as inaccessible, they feel as if they understand the topic enough to be aware of the high costs.

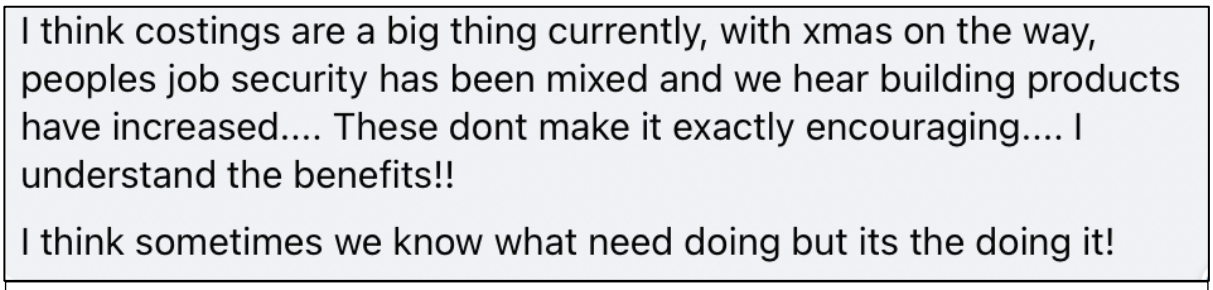

Figure 13: A response from a Rugeley community member.

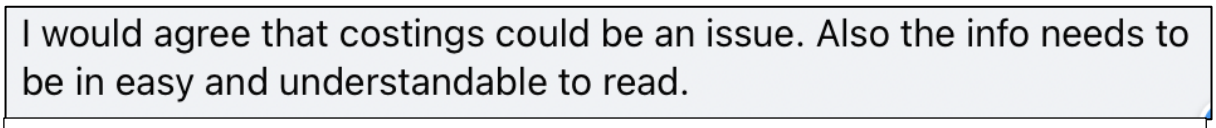

Figure 14: A response from a Rugeley community member.

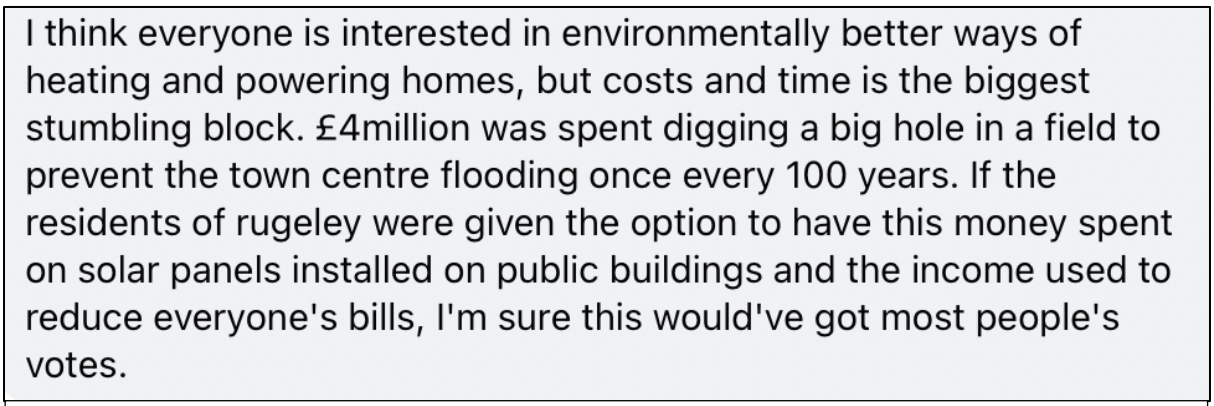

Figure 15: A response from a Rugeley community member.

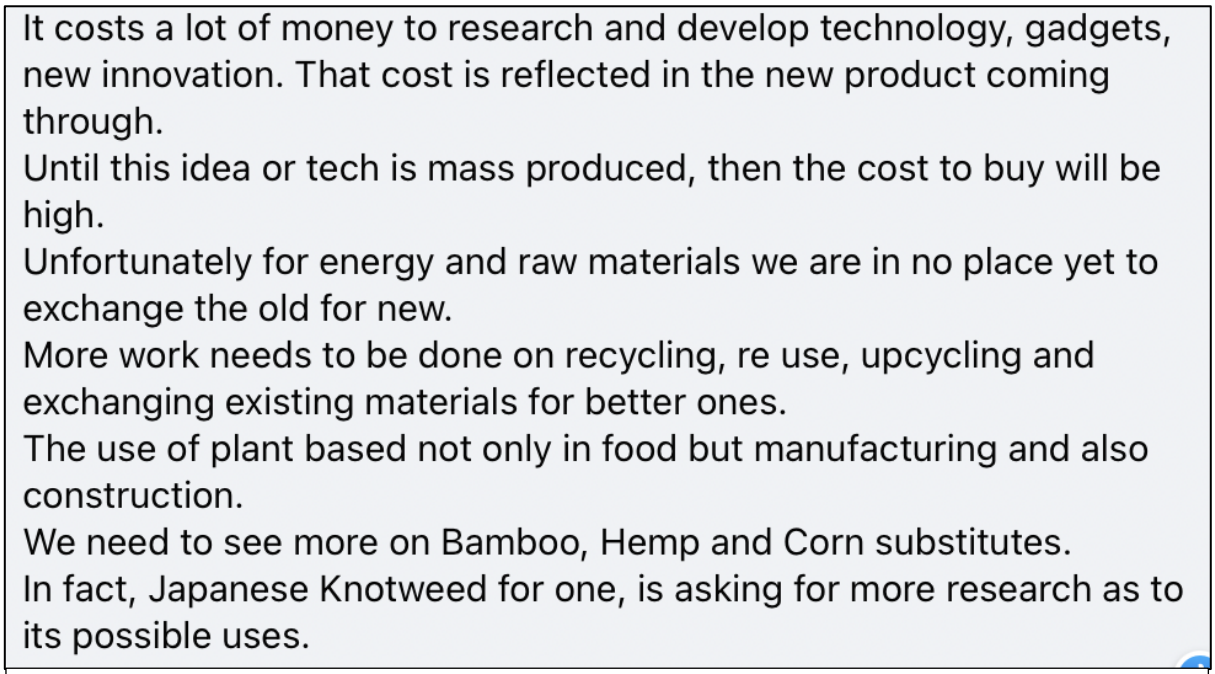

Figure 16: A response from a Rugeley community member.

These discussions carried out through the Engage ZCR Facebook page highlight the importance of language in communicating to community members about the more technical aspects of the net zero transition, as well as the benefit of asking for feedback directly from the community to iteratively inform the approach to communication with the community.

6. Conclusion

This report covers a number of different activities carried out as part of the user-centric design and community engagement activities as part of the Zero Carbon Rugeley project. These activities were focused on two different elements of the smart local energy system design: 1) retrofit, smart energy management systems and to a lesser extent peer trading within a domestic energy setting; and 2) community energy schemes.

Some of the more intense activities, such as the online workshops, were only carried out with a small number of Rugeley residents, and these were largely the Community Ambassadors (see report WP17-D12-4), who were engaged to different degrees throughout the three years of the project. Other activities such as the pop-up engagement activities and social media discussions engaged a wider range of people within the community. These different approaches helped to highlight key barriersand potential priority areas of future focus to enable the implementation of low carbon solutions in domestic and community energy settings.