

6 Citizens' Subsystem

6.1 Factors Affecting Bristol's Citizens' subsystem

Drawing on the analysis from the interview data, we have formulated the causal model of Bristol's citizen system, as shown in Figure 8¹², and briefly explained below.



Figure 8: Causal model of Bristol's Citizens' Subsystem.

Our citizen data is drawn from interviews and workshops exploring citizens' views and motivations relating to the changing energy system and, more specifically, to aspects of energy demand management and automation of domestic systems. Overall, the respondent Bristolians were motivated by environmental, financial and efficiency outcomes for signing up to energy management and automation.

Many of them said that the **environment was a primary motivator**, because they want to be supportive of environmental protection as long as is practical within their household arrangements. Some participants said that they were even prepared to cope with disruption and inconvenience *if there were positive environmental outcomes*, for instance:

"I would sacrifice, you know, if something was maybe a bit disruptive or not perfect, then I would rather sacrifice that to reduce the energy consumption" (PE5).

"I would be very willing to change the way that I do stuff, even at the cost of convenience or money, if that's really going to make a difference" (PE9).

However, given that the personal impact on the environment due to smart energy system use is both intangible and indivisible, the respondents were worried that their actions were not "...really going to make a difference", and many asked that the system should provide *feedback on the actual environmental impacts*.

Where **energy efficiency** is a core ambition for users, they are aiming for a better use of resources. Here, the respondents consider automation to be a positive force, as the energy man-

¹²This model can be simulated through this url: https://energysystems.blogs.bristol.ac.uk/2021/01/08/ citizens-bristol/



agement system can make decisions based on the availability of renewable energy, which will then help the grid to be used more efficiently. Some respondents also noted that energy storage for use at peak demand times and that ensuring electric vehicles are charged when renewable energy is plentiful should be part of the future automation.

Most interviewees wanted to have financial savings, even when their primary motivation was environmental, for example:

"Obviously I do want to save the world. But I don't want it to cost me" (PE7).

"I suppose environmental issues which would be the main driver and benefit, save me money as well, that'd probably be a second factor" (PR11).

Some interviewees noted that financial return is expected in recognition of the effort put in by the householders, the disruption of their routines, and for getting to grips with a new system, e.g.:

"It doesn't sound like it will be that inconvenient. If it was massively inconvenient, then 'no'. I'd want more of a financial incentive. So 'yes', it's a sliding scale of inconvenience" (PE6).

Here, they also noted the parallels with other sectors:

"It's a bit inconvenient, but I'll have the food delivered at 10 o'clock at night. Oh, I've got to stay up, but it's £2 cheaper" (PE10).

"That's kind of the standard model for a lot of things, isn't it? It's like flights or you know, Uber" (PR2).

Furthermore, a number of participants recognised a degree of **social responsibility** to engage in managing energy better, both for supporting current users and future generations, e.g. Participant PE9 notes "...*if you're looking socially irresponsible to not do it then that would motivate me*."

6.2 Trust, Risk, Complexity and Loss of Control

In our discussions of the likely benefits and problems envisaged due to the use of an automated system, the main themes emerging were related to trust, complexity and risk. Some themes found from the interviews are reported below:

6.2.1 Trust

Through the interviews, trust came up in different guises:

a. Trusting a system to work properly

Lack of trust that the **system would work as expected** seems to be backed up with direct experience of technology use and by other people's stories of things going wrong. For instance: "*I just don't trust computers generally, and their ability to continue doing the right thing. You know? Because they go wrong, don't they?*" (PE7). "*I only like to use that when I'm there because recently my friend's dishwasher set her house on fire*" (PE6).

Clearly, once such a story is embedded into "common knowledge", it is difficult to change and it gets repeated and spread around.

b. Trust in the operator

The 3rd party system and service providers must be trusted to make the right decisions for the benefit of the users, although such a trust still needs to be earned, e.g. "*I don't think I'd trust an outside authority to make those decisions for me*" (PR4).





Respondents were more inclined to trust the local authorities or academic research, rather than the big businesses who were seen as chasing profits. *"I'm with Bristol Energy so I trust them. If I was with one of the big six, I might be a bit reluctant to let them have it [energy data]. Yeah it probably depends who's supplying my energy"* (PR11).

c. Trust in use of data

Data privacy was an underlying concern, but it was also one that most participants didn't feel that they had much control over.

Many respondents accepted the idea that energy companies could hold and use detailed data, especially if it helped them to manage supply and the grid better, thus doing good for the planet:

"for the common good, not for the private benefit" (PE1) "if the main aim is to save energy, it's about doing something good" (PE10).

However, to others, the need to make data available might be a demotivator for participation in energy management:

"I can't say I'm enthusiastic about it, no. It would act as something of a demotivator. If I thought the whole thing was a really great idea, maybe I'd accept that, but I don't really like the idea" (PE9).

6.2.2 Risk

Participants were concerned about several aspects of the risks involved:

a. Risk of Financial Loss

The respondents wanted to have some assurance that the smart energy system either generated rewards or, at the very least, ensured than no penalties were passed onto the households.

b. Risk of System Malfunction

The risk of system malfunction (e.g. causing appliance failure, overheating, or damage) or incorrect operation (e.g. starting up a remotely controlled appliance at an inappropriate time of the day) was noted by several participants. To counter this (to some degree), the respondents suggested that the smart system should be able to inform users of various issues which could cause malfunction/failure (e.g. need to deep clean appliance and filters; detection of a power surge or burnout; over-capacity loading, etc.).

6.2.3 Technical Complexity

The respondents were concerned about technical complexity and their own technological literacy (e.g. *"I'm not techno savvy so I probably wouldn't do it anyway because I just switch things on and let them do their thing." (PR7); "I just don't trust computers generally, and their ability to continue doing the right thing. You know? Because they go wrong, don't they?*), which impairs their willingness to engage with the smart energy systems.

6.2.4 Loss of Control

The respondents were worried about losing control over their daily lives and their ability to use the appliances as and when they wanted (e.g. *"like you're kind of losing control over what it's doing, that you don't know"* (PE 2) and *"I don't kind of like the way that's sort of managed and how*





everything speaks to - you know, there's a lot of wireless technology involved in that isn't there, which is slightly worrying?" (PE12)).

6.3 **Provision of information**

The participants said they wanted more information on how much energy is used, on savings, on environmental impact, etc. Feedback is thus extremely important for engagement. The system should show energy / CO2 savings and potential benefits, enabling users to think differently about their consumption. Greater knowledge should mean that energy is used more consciously, thus enabling people to make changes and improvements to their own practices.

"Information about those peak times and how much energy is being used nationally at those times, and my average daily and weekly usage. Information like that would be good, because I haven't got a clue." (PR3).

Other information might include how much energy is wasted when using standby or leaving lights on. The system could suggest the best way to use appliances, give an overview of how energy has been used and how these compare with (relevant, comparable) others.

"I think there should me more sort of advice about how you can be more efficient and that sort of thing. And maybe sort of tailored to you, rather than just random" (PE7).

6.4 Training needs for the Citizens' Adoption of SLE

6.4.1 Areas of Training Needs

The SLE SoS skills deemed relevant by our interviewees to the citizens of Bristol are summarised in Figure 9 and are briefly explained below:

- *SLE overview, uses, implications and engagement processes*: what the SLE SoS are, why are they replacing the traditional energy system, what could householders do to benefit best from the SLE SoS (e.g. invest into battery or roof-top PV, etc.) and how.
- Opting in and out of SLE services: where SLE SoS provide optional services, the households should be able to choose which services to take up or refuse.
- *Preferences setting*: what the customisation options when participating in SLE SoS are (e.g. demand side response, peer-to-peer trading, etc.)
- *Manual override for automation options*: where 3rd parties control any in-house appliances, what can be manually overridden and how, if necessary.
- Security Procedures for successful SLE SoS participation: where the security threats are and how to avoid pitfalls.
- *Privacy Settings with SLE technologies*: where the privacy concerns are, and how they can be handled (e.g. data sharing and ownership).
- Knowledge of *who to contact for which issues and where to find this information* is necessary to help alleviate the worries of the householders.



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- Knowledge of what *warranty and guarantee provision* is available for SLE SoS services and activities and how to access these will be equally relevant in alleviating financial loss concerns.
- A set of "How to" procedures to help householders navigate the concerns on how to:
 - monitor company activities;
 - observe the environmental impacts of SLE;
 - monitor their own financial gains and losses due to engagement with the SLE SoS;
 - observe the impact of SLE SoS on the community.

6.4.2 Modes of Training

Given that the knowledge of and willingness to engage with the SLE SoS needs to be communicated to citizens of all parts of Bristol (including the current minors who will become adults by 2030, current property owners and investors, as well as tenants of all ages), the training modes must be adapted accordingly. Thus, training should be delivered:

- To all, via media campaigns, explaining the structure and aims of the SLE SoS, overview of technology, opportunities and impacts, as well as where and how to look up further information. This can be achieved through *television, radio and social media advertisements* (akin to the UK-wide 'Don't Drink and Drive' campaign);
- To school children: more detailed understanding of the SLE SoS as a system, its key technologies, their roles and their impacts. This can be *integrated within various areas of the school curriculum* (from science to citizenship);
- To property tenants, explaining the available SLE SoS services' opportunities, costs and benefits, via energy service delivery companies, citizens' advice services, the council website, post and community groups.

6.5 Insights and Recommendations on SLE SoS for Citizens' Subsystem

6.5.1 Citizens are the Foundational Subsystem

While the Citizens' subsystem is the most "informal" (i.e. least organised institutionally) out of all the SLE SoS subsystems identified in Fig.1, it is also the most fundamental one: *ultimately all professionals (including those in other SLE SoS subsystems) as well as those outside of the current workforce, are citizens.* Thus, *if the citizens, as a whole, are well-informed, willing and able to engage with the SLE agenda, the progress of this agenda across all other subsystems is also assured.* Consequently, all efforts and costs committed to engagement with and the education and training of this subsystem are well worth the investment for all involved.

6.5.2 Channels for Impact

Several channels for access to citizens within this ecosystem (as noted above) are the broadcast media (i.e. television and radio) at the local and national levels, and their related social media





outlets; citizen information and advice services, as well as utility providing companies. However, additional channels within Bristol can be engaged for the maximum impact, including Bristol's:

- Citizen Assembly;
- Extinction Rebellion and other environmental groups;
- · Community / neighbourhood groups;
- Museums (such as We the Curious, where permanent art and technology exhibits can be commissioned on SLE SoS and their technologies for children and parents);
- City events, whereby activities (such as art competitions or Treasure Hunts) can be arranged around SLE SoS projects, etc.

All of these channels will require the appropriate engagement materials to be prepared and shared. This report contains a set of simulation models, which is the kind of engagement and exploration material that could be informative for a wide set of users. However, much more of the relevant material must be developed and distributed at speed.

