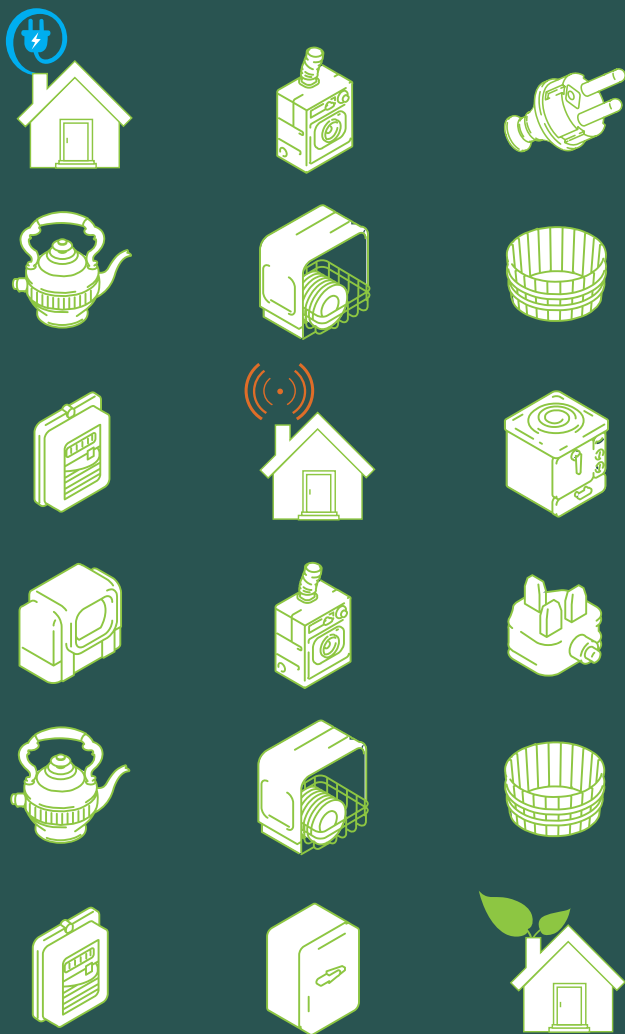# 3-E HOUSES

saving Energy & the Environment across Europe

Best practice guide

Introduction

The 3e Houses project was designed to help residents in social housing reduce their energy consumption through use of ICT and SMART metering systems. The project sought to evaluate whether ICTs can affect attitudinal and behavioural change in social housing, with a target of 20% reduction in energy consumption. To achieve this pilots were set up in both Germany and Spain where they ran for one year from 2010.

The Spanish pilot worked with participants in three buildings located in the town of Sant Cugat del Vallès, in the North-West of Spain.

The German pilot was implemented in one residential building in Leipzig and in a further two in Bitterfeld. These three buildings are owned by two German housing associations.

3 - E H O U S E S
Saving Energy & the Environment across Europe

Following the successful completion of these two pilots, the project was repeated in both Bristol in the UK and in Langenfeld, in Germany. Both of these replicators ran for one year. The UK 'replicator' was implemented in two parts of Bristol: Knowle West and Dove Street. The Dove Street location consisted of appartment blocks in an area where the population tends to be transitory and there was a mix of people from different ethnic backgrounds. Knowle West on the other hand, is a well-established and older area of social housing, mainly semi-detached and terraced homes. Here generations of the same family tend to stay in the area for many years.

Monitoring equipment was installed in each household, and participants' energy data was collected in a central database for analysis and then presented back to participants through an ICT interface. In the UK, an artist worked with some participants to enhance user interaction with the interface and understanding of their energy consumption.

As a result of this work across the two pilots and two replicators, the 3e Houses project demonstrated an enormous range of impacts. One pilot saw a very small increase in energy use, whereas others saw reductions in excess of the 20% target. This variety of results demonstrates the complexity of undertaking behaviour change projects such as this, and underlines the importance of getting behind the data to understand participants' contexts and motivations.

"It's important that all SMART metering devices in the future provide information on energy consumption."

People

The effectiveness of any ICT solution will be determined by how well you can engage with people on an individual 'human' level, to raise awareness of the importance of energy efficiency and secure interest in the aims of the project itself. The following section will give you some key tips for recruiting and engaging participants, as well as how best to sustain their involvement with your project.

● Key points:

• Recruitment works best using a variety of methods, from leaflets and social media to door knocking and face-to-face visits.

• Consider literacy rates within your pilot area and those for whom English is not their first language. Calls and community links had to be used as much as written material in the recruitment campaign.

• Once recruited, ensure there is a named person participants can go to with any queries.

• All participants should sign a form agreeing to the usage of their individual consumption data and their participation in surveys, workshops etc. This will also help ensure commitment and guarantee confidentiality.

• Provide on-going support through visits, calls and workshops – especially for those who find technology difficult or have literacy problems.

• Maintain a relationship; participants are more likely to respond to requests e.g for surveys or to keep equipment online than if they were left to themselves.

• Make sure your relationship with the participants is based on trust and accountability, so you can communicate bad news as well as good.

• Tablets are a good choice for viewing energy interfaces, but need to work well. Tenants also liked to log into a website portal and/or televison portal with their own smartphone or PC. The development of a smartphone app would be a good idea to enable the interface to be used on other devices.

• Regular newsletters on the interface and letters sent to homes are important to keep participants updated and maintain engagement in the project.

• In the UK pilot, it was a huge advantage to be a known and trusted organisation within the community which had so much contact with local people and had already run several environmental projects

• The experience in the Spanish pilot showed that participants were much more engaged when they understood the objectives of the project and the importance of energy efficiency.

"Good communication channels were considered very important to enable participation. The user could be informed of any doubt or problem and this increased feedback."

Remember:

• **It is important to state clearly what your expectations are of the participants in the pilots.**

• **Even the advertising of winning a smart phone did not bring the expected increase of interface access in the German pilot.**

• **Local events are a good way of attracting interest.**

• **Face-to-face meetings are important as they provide a name for people to put to the project.**

• **Many of the Spanish participants were recruited because of the technology offered.**

"The good relationship of the building owner with the tenants in Bauverein Langenfeld resulted in the recruitment of 39 participants after the first phone calls."

References:

Further details of our experiences in engaging and recruiting participants can be found in our project deliverable documents 2.4, 3.4, and 4.2

Case study 1: Bristol
(UK Replicator)

"The whole family has been involved in this project…"

When the Griffiths family saw an advert about the 3e Houses project they were keen take up the challenge of saving household energy. Father Steve is a true eco-warrior, involved in other environmental projects and keen to cut his carbon footprint. Partner Nina also wanted to save money and find out exactly what they were using. With two teenage sons aged 17 and 19 living at home – they found the project was a good way of the whole family being involved in energy saving. Steve says:

"The main thing has been finding out what the boys use in their rooms, with the Xbox left on, TV and stereo and how much it costs. It's made them cut back and they don't leave things on standby now."

The family has taken the project to heart – attending every workshop and checking their usage on the tablet daily. They now switch everything off when not in use and have even cut washing down to just twice a week. And despite the UK experiencing the coldest spring in 50 years - they have managed to cut their bills by up to £24 a month. Nina says:

"I've thoroughly enjoyed all of it – I liked the workshops, finding out how things worked and how other people were saving…"

"The installation of electricity monitoring equipment was quick and easy and we were sometimes able to install 5 to 6 properties in one day. We had a lot of difficulties installing the gas monitoring equipment though, and sometimes were only able to install in 2 to 3 properties in one day."

A participant looking at their energy usage on a Toshiba tablet.

Technology

The second crucial element in any successful project is the technology that you use. Both the way you monitor energy consumption and the way you present this to participants are equally important if you want to change behaviour in a sustainable way. The following section gives some brief headlines about what technology we found worked best, how you could address network issues and how to create a 'user friendly' interface for the people involved in your project.

● **Key points:**

• The technology used in individual households needs to be flexible enough to work with a range of existing energy management systems.

• The technology must be easy to install with little or no cabling. Radio transmission devices are preferred as tenants do not like additional cables in their staircases and dwellings. Energy harvesting devices are a good option to reduce maintenance costs e.g. changing batteries etc, but need to be reliable.

• The technology that the tenants use must be simple and robust. If it is too complicated there is a chance that some tenants will lose interest in using it.

• All technology used should be simple to configure, allowing installation by a non-ICT trained team.

• It should be portable and scalable across different private networks.

• Tenants should be able to use their internet connection to access their own consumption data because the information and control of their energy needs to be integrated into their daily lives.

• Ensure the unit cost price for each piece of equipment is viable given your selected sample. Consider whether or not in the savings you expect, you can reduce the cost of the devices.

• Consider the 'invest to save' possibilities of the technology, as a higher investment may lead to higher reductions in consumption and greater savings.

• Consider if the equipment can be fully integrated into the buildings themselves.

• If your consortium partners are not providing the technology themselves, consider how easy it is to acquire the equipment. Consider if the supply chain is effective and if there is a maintenance agreement.

• If you are procuring the equipment, make sure you have built in sufficient time in the project life cycle to allow for this.

• Conduct some 'soft-market testing', asking your participants their opinions on the various possible options.

• Think about how your technology can be developed as part of people's regular use of the internet.

• Remote management of the technology will reduce disruption for the participants. The technology should be visible without being intrusive.

🇬🇧 *"The chosen gas monitoring equipment could only be used on non-digital meters."*
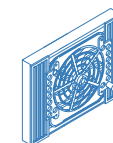
Remember:

• **Network solutions should protect the security and privacy of the energy data and the residents' network.**

• **All installation of devices should not inconvenience the participants.**

• **Not all devices will fit with the infrastructure of all buildings.**

• **It is a good idea to monitor and control the energy consumption of central systems in blocks of flats or appartments. For this, you will need the consent of all participants.**

• **Technology can be integrated as part of a 'smart home' approach, increasing wellbeing not just decreasing energy consumption.**

• **We strongly recommend using a 'control group' as your participant sample. This way you can account for any factors (such as changes in household size) which may have affected energy consumption other than your intervention.**

🇪🇸 *"In the case of the Spanish pilot, an effective intervention was the increase of the gas boiler efficiency, by changing the boiler control system in one of the buildings."*

References:

Further details of the technological solutions can be found in our project deliverable documents 3.1, 3.2 and 4.1

Case study 2: Längenfeld
(German Replicator)

"I switch the tablet on every day… and watch my consumption."

Pensioner Michael Gurk has checked his energy usage more than any other participant in the German project – switching his tablet on as soon as he gets up.

As a retired couple, he and his wife joined the project to keep energy costs down, although they had never been high users. They attended a meeting after seeing a poster in their apartment block and were particularly interested in the technology – which they have found 'very useful'.

Michael explains: "I've a better overview, where I can spend, or save something or not because I can watch my consumption every day. It is very helpful to see the actual prices. I can see where I used more and where less." The couple also found that during the project they had used less energy than the previous year, although they hadn't really changed their behaviour. Michael says: "I will take care that it stays like this and can use the web tool perfectly for this purpose."

And he has found one of the main benefits of using the tablet has been passing the message of energy conservation on to their grandchildren. He says:

"My wife and I are already taking care not to waste energy. From the beginning I used energy saving bulbs, which we're still using… but I can show my grandchildren if they keep the light on the whole day!"

Tenants' homes in Längenfeld.

"Some tenants receive monthly subsidies from the local employment agency for heating and water consumption. The tenants explained that it is very difficult to subsequently justify an increase in energy consumption and thus costs in the following year to the employment agency."

People & Technology

The 3e Houses project aimed to reduce energy consumption through raising awareness and providing clear information for consumers. This mean creating a synergy between technology and people. The following section will outline how best to manage the relationship between your participants and the technology you choose. Based on our experiences in the UK, Spain and German the following key messages regarding installation, support, maintenance and communication should be kept in mind.

Key points:

• Outline at the beginning of the project what your main objectives are and how you want participants to be influenced by the technology.

• Think carefully about when to install the technology. A longer 'lead-in' period, where equipment is installed and switched-on in stages, can be effective in providing good baseline data and gives you time to troubleshoot any problems.

• Define responsibilities: different aspects of the monitoring process may be the responsibility of different partners. If this is the case, then there needs to be a clear protocol for who will do what and when if an issue occurs.

• Installation and testing equipment is vital. We recommend using either pilot properties to test equipment before roll-out, and/or using a 'test-lab' environment to address any server and network issues.

• Maintain a single point of contact for participants. Our experience shows that continuity of support and clear processes for reporting problems is essential.

• Have a clear communication process. Maintaining effective relationships with participants and between partners is essential if the technology is going to be utilised proactively. Make sure you have regular project meetings and share information across your consortium.

• Establish an accurate baseline by ensuring that either a full set of billing data has been provided by the relevant utility company, or by installing the monitoring devices before the interface in order to gather your own information.

• Even the use of incentives, like free WiFi-access, free tablet-PCs, shopping vouchers or the opportunity to win a smart phone couldn't convince tenants to participate in an expected manner, so think carefully about how to recruit and maintain interested people.

• In the case of German pilots the potential for savings was not large to begin with. We would recommend targeting a group where it is known that energy consumption levels are significantly and relatively high, so as to achieve the greatest reduction.

• Whoever you chose to install the equipment has to be familiar with the technology that you have selected. Ideally, we would recommend that the same party who installs the equipment is also responsible for maintaining this, so training is essential.

• Workshops are a great way for people to come together with a common aim- and to share experiences and learning from each other during the project.

"In Germany there were different heating radiator valves so the smart thermostats did not fit all of them."
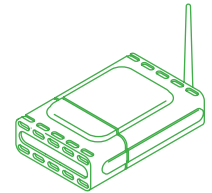
Remember:

• **Don't assume people have the internet or even a telephone landline.**

• **Resources should be allocated for translation and Interpreting.**

• **In most cases the big win is to change old energy consuming appliances like fridges, heaters etc. with modern A+++ appliances.**

• **There is greater success where participants have a sense of community and involvement.**

• **Think about the exact definition of 'social housing' you wish to adopt, as it means different things in different countries. Not all social housing buildings are owned by central or local government. This will influence who you work with.**

References:

For further information regarding how to set up a local consortium, create a maintenance and support infrastructure and for all other best practice guidance, please refer to our project deliverable document 3.4, available at: www.3ehouses.eu

For specific information regarding our German and Spanish Pilots please refer to our project deliverable documents 2.4 and 2.5, available at: www.3ehouses.eu

🇬🇧 *"Knowle West Media Centre, which organised the workshops, has a strong reputation for local community projects, so we recommend using existing community networks and organisations where possible."*

🇩🇪 *"The LWB GmbH in Leipzig is the owner of about 35,800 dwellings. Due to its size, the LWB has quite an anonymous relationship with its tenants in most cases. In Bitterfeld the NEUBI GmbH is a smaller company, which owns about 3,500 dwellings. It is a smaller town with a better, more personal relationship between the tenants and the building owner. Here, the roll-out of the engagement campaign had better support from the building owner."*
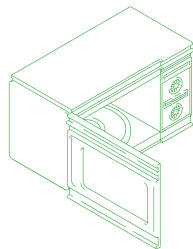
🇪🇸 *"The total energy savings achieved in the Spanish pilot were successful, at 21.52%, more than the initially estimated 20%. Not only were control strategies successfully implemented but also the 'eco points' system had positive results on tenants' behaviour, where 10.06% of savings were achieved."*

Case study 3: Sant Cugat del Vallès (Spanish Pilot)

"I think the incentives are a good way to engage people."

Thirty-four-year-old Christian Buesule lives in a small one-room flat in a block of appartments. He is a sound technician and loves music, often practising at home. This means that besides the typical energy appliances, he also owns a lot of devices that are high energy consumers - such as sound systems and an electric piano. Christian was not very interested in energy issues at first but became more motivated after the project started. Although he didn't use the interface much to look at his energy consumption, he was keen to use all the devices to reduce his energy. He says:

"I have changed my behaviour a little. For example, I close the terminal grid when I'm not using my electrical music equipment."

He also used the regulating thermostat during the winter, which has made him reconsider his habits around heating. Although his energy consumption was lower than the Spanish average at the begining of the project, he managed to achieve savings of 35%. Christian has been extremely involved in the project from start to finish. He says:

"This has been a good experience. Now I'm more conscious of energy issues and I'm concerned about saving energy in my home."

15

"It has been observed that when people receive more information they show a growing interest in the pilots and participation increases too..."

Conclusion

The success of projects like 3e Houses is not simply about selecting and deploying the right technology. Any project looking to effect behaviour change needs to build a relationship with participants and build a deep understanding of their contexts and motivations, in order to increase levels of engagement and participation. Users need to feel involved at every stage of the project's development, and see that their participation is valued and that their input can have a real impact.

For further information about the 3e Houses project and to download project reports and videos of our experiences, visit our website:

www.3ehouses.eu

🇪🇸 *"We have concluded that providing detailed information about the running of the devices and offering different communication channels is very important to remove barriers."*

🇬🇧 *"Having a relationship with participants meant that behind the data was knowledge of a much more complex story. Our participants were not just a statistic to us and awareness of their lives could enrich our research."*

🇪🇸 *"People who participate actively in the project are mainly people with energy efficiency awareness."*

A participant workshop in Knowle West, Bristol.

🇬🇧 *" The data collected was used to help one participant to query and then reduce her monthly energy pre-payments. She was able to show that she was in fact using less energy than they thought she was."*