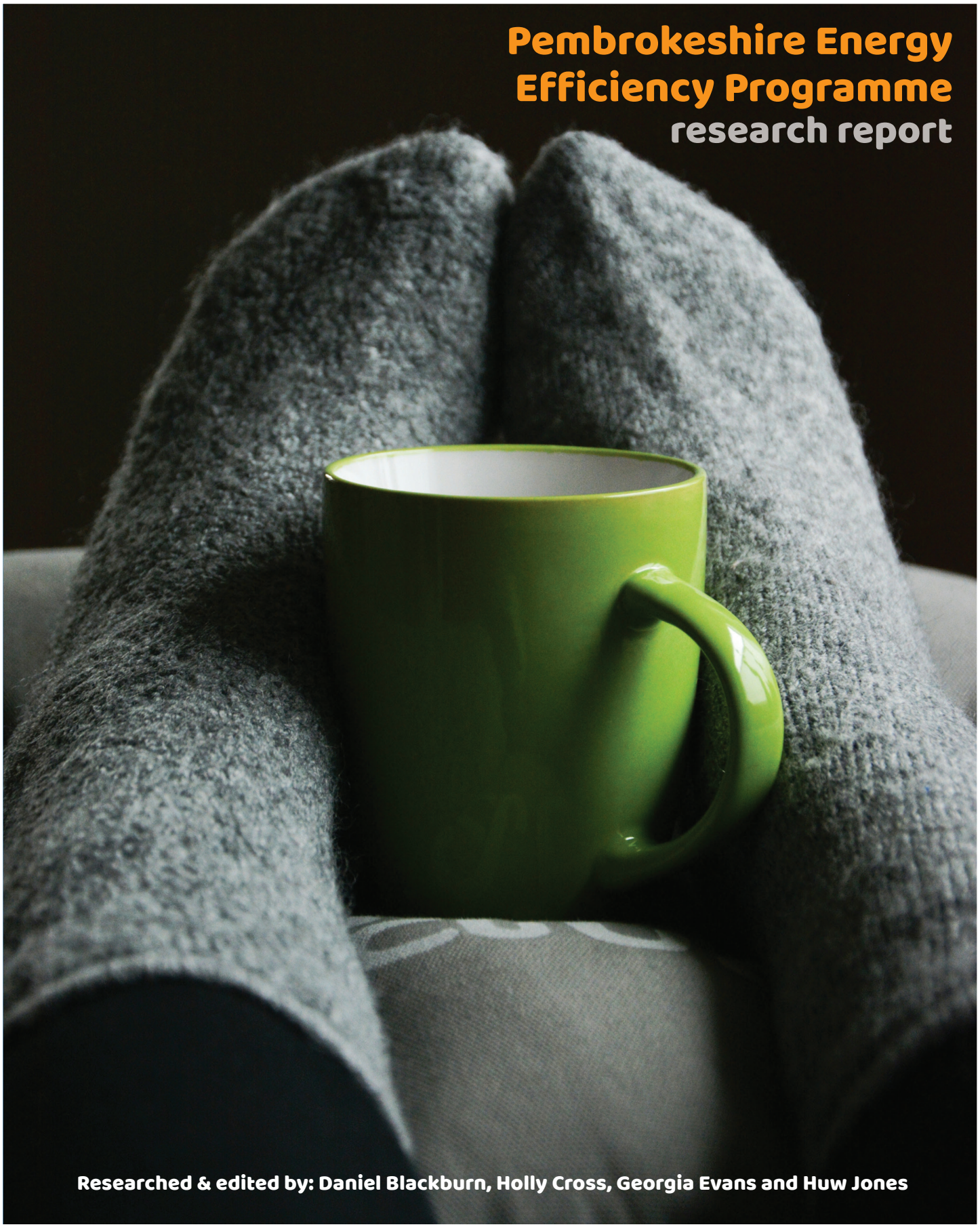
Pembrokeshire Energy Efficiency Programme

research report



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Sustainable Development Fund
Cronfa Datblygu Cynaliadwy

CARE
cwm arian renewable energy


CAUTION:
PRECAUCION:

Contents

The Research

Almost a quarter of households in Pembrokeshire are in fuel poverty, and around 20% of carbon emissions in Wales originate from domestic properties, yet there is no obvious credible, central source of support to help householders combat these problems or their potentially severe consequences.

Given this conspicuous gap in provision of domestic energy efficiency support, the objective of the research summarised in this report was to gain an insight into what kind of strategies might best mobilise people to take significant steps towards making their homes more energy efficient.

Cwm Arian Renewable Energy Ltd (CARE) have reviewed past and present energy efficiency strategies and support services, identified relevant psychological factors, and carried out semi-structured interviews and an online survey with Pembrokeshire householders.

Findings could support the development of effective programmes promoting comprehensive domestic energy efficiency not only in Pembrokeshire and not only by community organisations, but throughout Wales and by organisations in all sectors.

A guide to this report

Nine 'mobilisation strategies' have been chosen to represent commonly practised methods for promoting household energy efficiency.
The strategies are presented here in summary, and each one is examined in the context of a pertinent psychological factor and relevant insights from people living in Pembrokeshire. In the interactive version of the report, there are clickable links to further details on each of these areas of research.

The report also includes further facts and figures about energy efficiency in Pembrokeshire (and beyond), and an overview of support available to householders at the time of writing.

Sustainable Development Fund
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Conclusions and recommendations

We are not offering a blueprint of the perfect design for a domestic energy efficiency support strategy. People and their homes vary so much that developing a single strategy which successfully mobilises every householder in Wales to make their home cosier and cheaper to run, whilst also causing negligible CO2 emissions, is impossible.

However, each mobilisation strategy reviewed in this report has its own merits, and elements of them are worth adapting and adopting to create bespoke strategies depending on the audience – the only limits need be the resources available and the scale of your ambition! Here is a brief insight into what our research shows are the most crucial points to consider when designing a strategy.

Organisations wishing to deliver an effective energy efficiency support strategy will best succeed if they;

- **are impartial, have expertise, and set a positive example**
- **employ messages and methods that are persistent, specific and consistent**
- **get to know their target audience and involve them in decision-making**

People will be most likely to change behaviours if they;

- **are given very clear and memorable information**
- **have opportunities to try new things in interactive and social scenarios**
- **are empowered to learn and make changes at their own pace, and develop skills on their own terms**

Cwm Arian Renewable Energy is currently working to build on this research to develop and deliver a strategy in Pembrokeshire – we thrive on collaboration and would welcome contact from potential partners. Please get in touch.

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Mobilisation Strategy

Home Energy Coaching
Households are mobilised to make changes in their energy use by either repeated home visits or repeated remote contact from energy mentors.

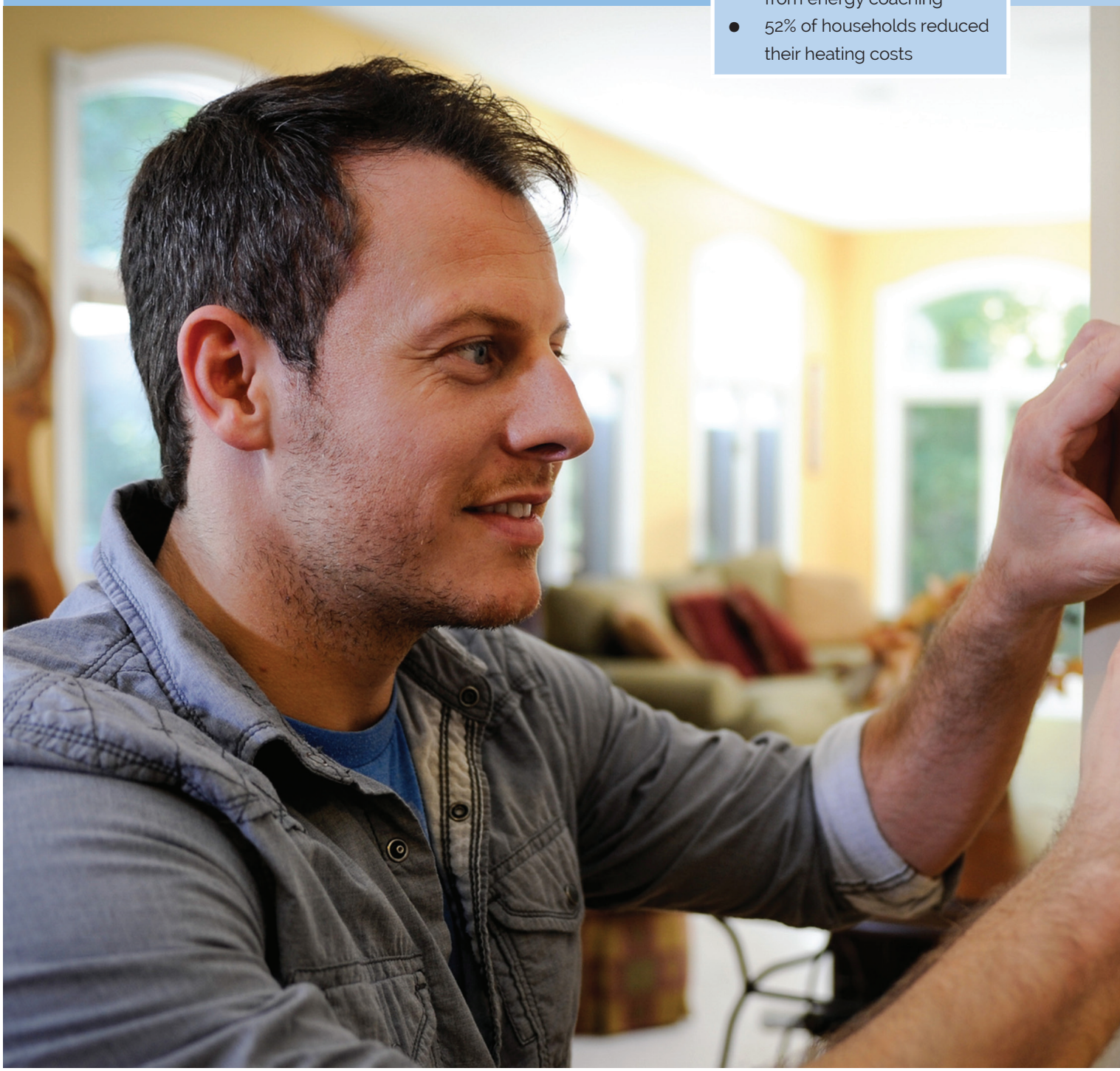
Case studies

Keep Cosy pilot in Ceredigion:

- 41% of households decreased electricity consumption without decreasing living room temperature
- average household energy consumption reduced by 16%

Coaching pilot in Scotland

- 66% of people benefited from energy coaching
- 52% of households reduced their heating costs



Pros and Cons

Pros

- reduces energy whilst empowering householders to take action themselves
- information is tailored to the specific household
- can provide a 'whole house' approach to energy use
- coaches visiting households can identify simple changes to make an immediate difference to comfort & efficiency

Cons

- can be costly if home visits are carried out (instead of online coaching)
- finding willing participants can be difficult

Key psychological factors

Forming new habits

Habits are automatic behaviours, usually performed in a stable context, which are reinforced by repetition and immediate positive rewards - and habits linked to our home energy use are notoriously difficult to break.

Coaches could increase mobilisation by supporting householders to form new habits through goal setting; e.g. "I will stop leaving appliances on standby", and implementation intention (a concrete plan on how, when and where you'll perform the behaviour), e.g "I will turn the TV off at the socket every night just before I go to bed" (Steg et al, 2014).

What Pembrokeshire people think...

Our interviewees were highly motivated by trust, so home energy coaching would be a more mobilising strategy if coaches were completely impartial;

"I would [take energy advice] if I trusted the company and didn't think they're trying to steer you in a particular direction"

The majority of survey respondents (66.7%) were likely or very likely to seek advice from people who had themselves made home improvements for energy efficiency, indicating that people with direct experience would be the best choice of coaches.

Home Energy Coaching

Click here for more detailed information

Mobilisation Strategy

Peer Mentoring
Trained energy advocates act as mentors or 'champions' - usually within their home community - giving face-to-face support through existing social networks.

Case studies

Energy Academy in Manchester:

- trained 17 community mentors
- mentors supported household carbon reductions of 4,300 tCO_2
- project budget of only ~£30,000.

Energy Experts in Finland:

- volunteers trained at a cost of only ~€100 each
- peer mentors supported household energy reductions of 5% in heating, 10% in electricity, 20% in water

Peer Mentoring

Click here for more detailed information

Pros and Cons

Pros

- cost effective
- mentors know their audience and tailor messages accordingly
- positive peer pressure
- mentors are more accessible and responsive than statutory or private services

Cons

- often relies heavily on volunteers, so schemes cannot demand too much of the mentors
- difficult to standardise messaging

Key psychological factors

Trust & acceptability

The basis of trust is the expectation that others can be depended on to fulfil their commitments (Steg et al, 2014); promises about outcomes must be carefully made and kept to. People accept change even better when they feel or see the positive effects of the change for themselves or when anticipated negative effects of change are less than expected (Schuitema et al, 2014).

Peer mentors would need to be carefully trained to ensure the people they are supporting are not being promised miracles.

What Pembrokeshire people think...

Peer mentors are in a strong position to mobilise the people they are supporting – overall, our interviewees really wanted to speak face to face with someone they could trust; **"having somebody come to me that happened to be my neighbour, and saying 'shall we have a look at this [funding for home improvements]', it incentivised me"**

This is also illustrated by only 23.5% of our survey respondents being likely or very likely to call a helpline for energy advice, compared to 51.1% likely or very likely to attend social events to gather information.

Mobilisation Strategy

Home Energy Monitoring
Householders make reductions to their energy use by being supplied with an indicator of the amount of energy that they are using in real time and how this fluctuates

Case studies

Smart Meters in the UK:

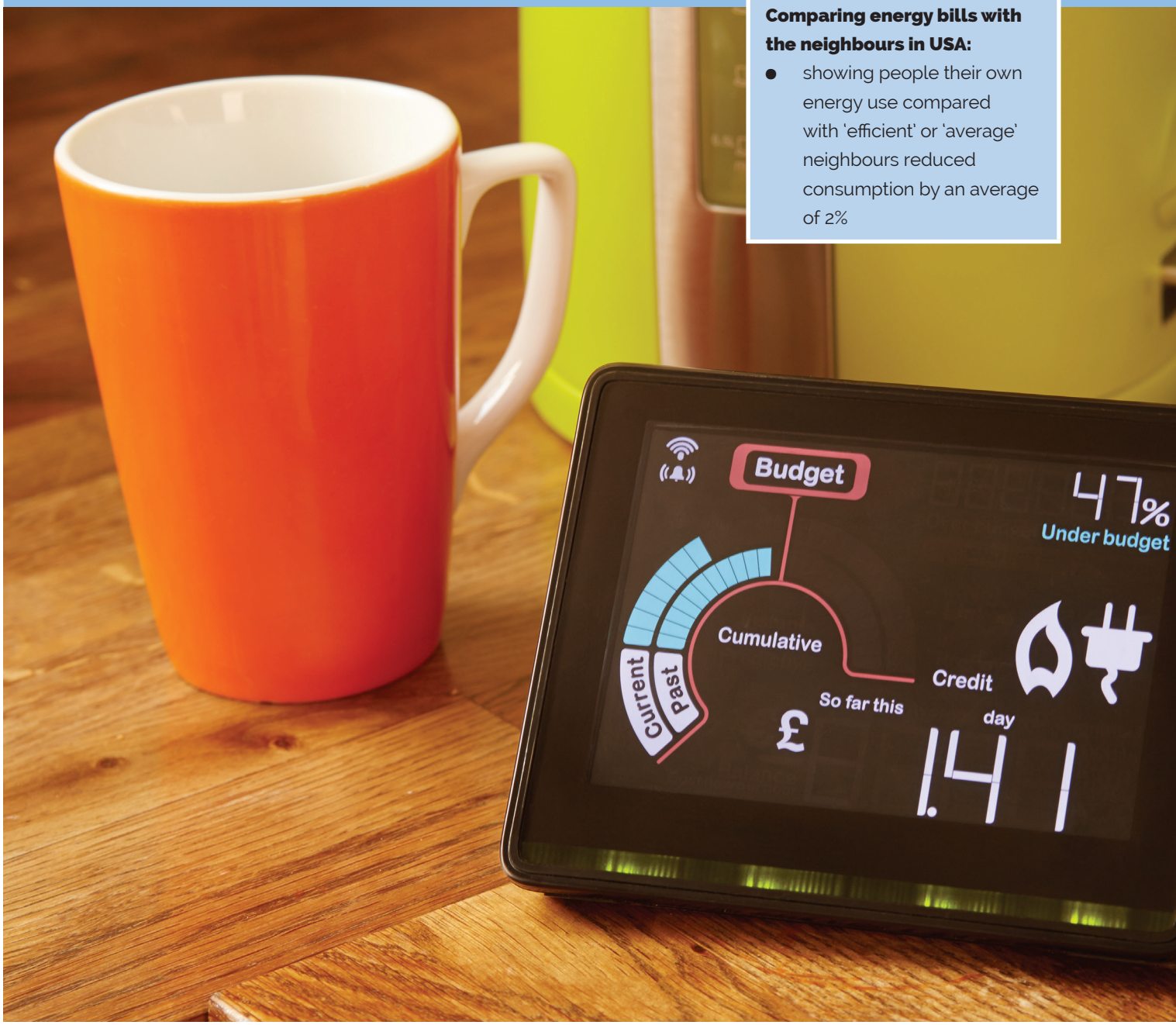
- 86% of people with a smart meter made reductions in household energy use
- with a smart meter, electricity use was reduced by 2.3% and gas by 1.5% on average

Gamification in Sweden:

- making a computer game of peoples' energy reduction, with rewards and on-screen visuals, reduced energy use by an average of 5.81%

Comparing energy bills with the neighbours in USA:

- showing people their own energy use compared with 'efficient' or 'average' neighbours reduced consumption by an average of 2%



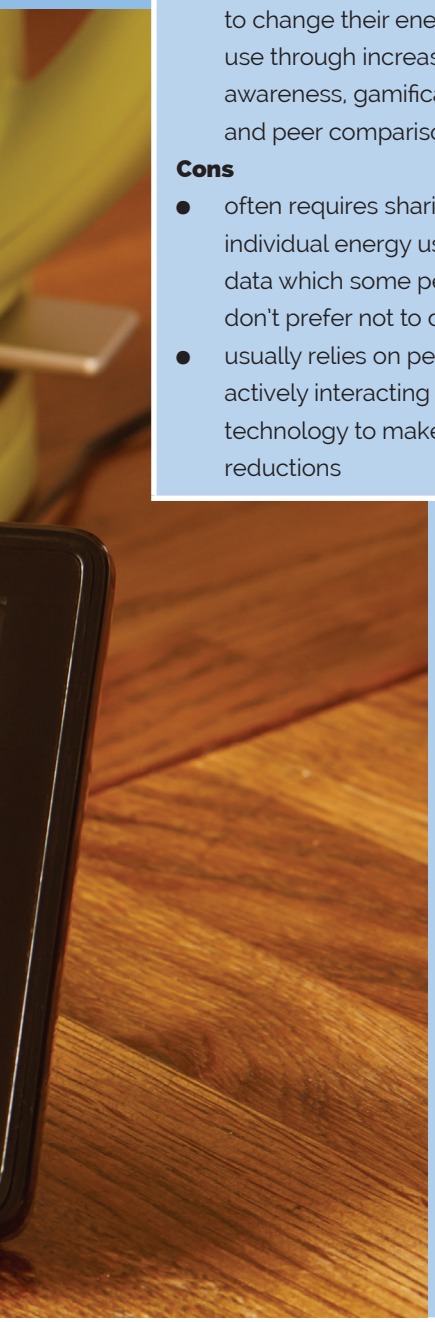
Pros and Cons

Pros

- smart meters can inform the national energy grid about consumption, so it can be more effective
- could enable 'energy local' initiatives where householders buy from local renewable energy producers
- can help spot problems, e.g. if appliances are malfunctioning and using loads of energy
- enables householders to change their energy use through increased awareness, gamification and peer comparison

Cons

- often requires sharing of individual energy usage data which some people don't prefer not to do
- usually relies on people actively interacting with the technology to make energy reductions



Key psychological factors

Self efficacy

When people don't understand their own energy usage, they feel powerless, which can lead to anxiety and in turn to limited problem solving capacity, which in some cases can lead to anger and frustration directed at energy companies (Jacques et al, 2016). However, if people feel self-efficacy - i.e. that they are capable of managing life situations - they are more likely to take action (Bandura, 1977).

People need to be well supported to understand how to effectively monitor their home energy use, to stimulate a sense of control and self-efficacy in them and avoid the pitfalls of doubt or apathy that can come with disempowerment.

What Pembrokeshire people think...

Interviewees recognised the need to be actively engaged in energy monitoring for it to be effective **"it's balancing that comfort of life to being a bit anal about switching everything off all the time... and finding that medium"**, and admitted to being confused about the options **"it's like whether you have these energy meters that the big companies are saying you should have - smart meters - now some people say they're fantastic, some people say they're the devil's work... I dunno!"**

Of the 8 options given, survey respondents voted for 'getting equipment and skills to monitor home energy use' as the 3rd most likely strategy for helping people improve their energy efficiency.

Home Energy Monitoring

Click here for more detailed information

Mobilisation Strategy

Home Energy Audits

A home's energy performance is assessed (without any follow-up monitoring or external support), to give the householder an understanding of their home's performance so as to identify areas for improvement to efficiency and comfort.

Case studies

Energy Performance Certificates in the UK:

- 22.5 million EPCs have been carried out in the UK since 2008
- EPCs give information and advice about how to improve efficiency and the associated costs & savings

The CHEESE (Cold Home Energy Efficiency Survey Experts) Project in the UK

- visual, interactive audit reports were produced with householders
- helped reduce average consumption of gas by 24.1% and electricity by 16.7%

Pros and Cons

Pros

- audit reports can lay out information clearly to increase awareness about how to improve energy efficiency
- participatory, novel and/or visually appealing audit methods can aid behaviour change
- energy ratings given when buying & selling a house can help encourage investment in energy saving improvements

Cons

- it's easy to file away an audit report and forget about it!
- where audits are carried out without participation of the householders, there is limited potential for them to result in education and behaviour change

Key psychological factors

Informing & awareness

Giving information is not enough in itself to make attitudes and behaviours change, but it can't be denied that understanding a problem is vital to us understanding how to solve it. When faced with too much information we start to feel overwhelmed and helpless, even if that information has succeeded in increasing our concern about a problem like energy use (e.g. Levin, 1993).

In general, when presenting information, an energy audit should be designed to consider that people;

- dislike being disoriented or confused
- prefer learning at our own pace through exploration & discovery
- wish to participate and feel helpful and competent (Kaplan, 2000).

What Pembrokeshire people think...

Interviewees generally found that confusing information about home energy efficiency was a barrier to action. **"in essence we're up for doing anything but we're just finding it all too expensive and too complicated... it is overwhelming and you don't know who to trust".**

One interviewee who had some experience of buying and selling houses recently was very candid about the limits of the EPC system; **"the energy performance certificate kind of [says]... you could upgrade the loft insulation, you could maybe get better windows, that's as far as they'll go - they don't say let's bring this house into the 21st, or 22nd century"**

Home Energy Audits

Click here for more detailed information

Mobilisation Strategy

Community Based Approach
Change comes from the 'bottom-up' rather than from the 'top-down' – it is led by communities using peer-to-peer support.

Case studies

Ashton Hayes Going Carbon Neutral in England

- a whole village tackled climate change with the help of their community council, to become one of the first carbon neutral villages in the UK.

Bristol Energy Network in England

- a group of volunteers acted as an intermediary to help other community energy groups to develop, avoiding the pit-falls of top-down solutions which focus on growth

Pros and Cons

Pros

- addresses specific local need directly because it is community-led
- affordable as it mobilises volunteer effort
- likely to create persistent behaviour change due to normalising efficiency behaviours & creating informal conversations

Cons

- can be demanding for volunteers
- interventions can wane over time
- no standardised approach or predictable timeline

Key psychological factors

Social learning

When we are faced with a multitude of minor decisions every day, in lives that are already over-crowded with choices, we need quick cues to help us decide quickly and effectively. These cues often come from observing the behaviours and responses of others around us and modelling our behaviour on what they do (Bandura, 1973).

We imitate behaviours after observing the positive example of people who are attractive or inspiring to us, for example peers, parents, celebrities, and people who are similar to us, and when we then begin to perform these learned behaviours successfully. This reinforces our commitment to performing that same behaviour again, and puts us on the road to forming a new habit.

What Pembrokeshire people think...

Some of our interviewees expressed doubt about accepting support from governmental bodies, compared to their preparedness to take advice from 'expert' friends;

'What are the reasons not make your home more energy efficient?'

"...some of it's trust – even trusting what the government is putting out because a lot of it is coloured in a way, and you find out you can possibly have help and it looks as though it's out there but either it's not for you or... it's just 'yep, we'll help you, we'll give you a long term loan' but actually that's all it is."

"...if it's whatever [my friend from a community energy project] tells me will be the best thing to do, then I'm up for it, yeah."

Community Based Approach

Click here for more detailed information

Communities of Practice

Mobilisation Strategy

Communities of Practice
A group of people meet regularly to discuss and declare their energy use, with the help of a facilitator.

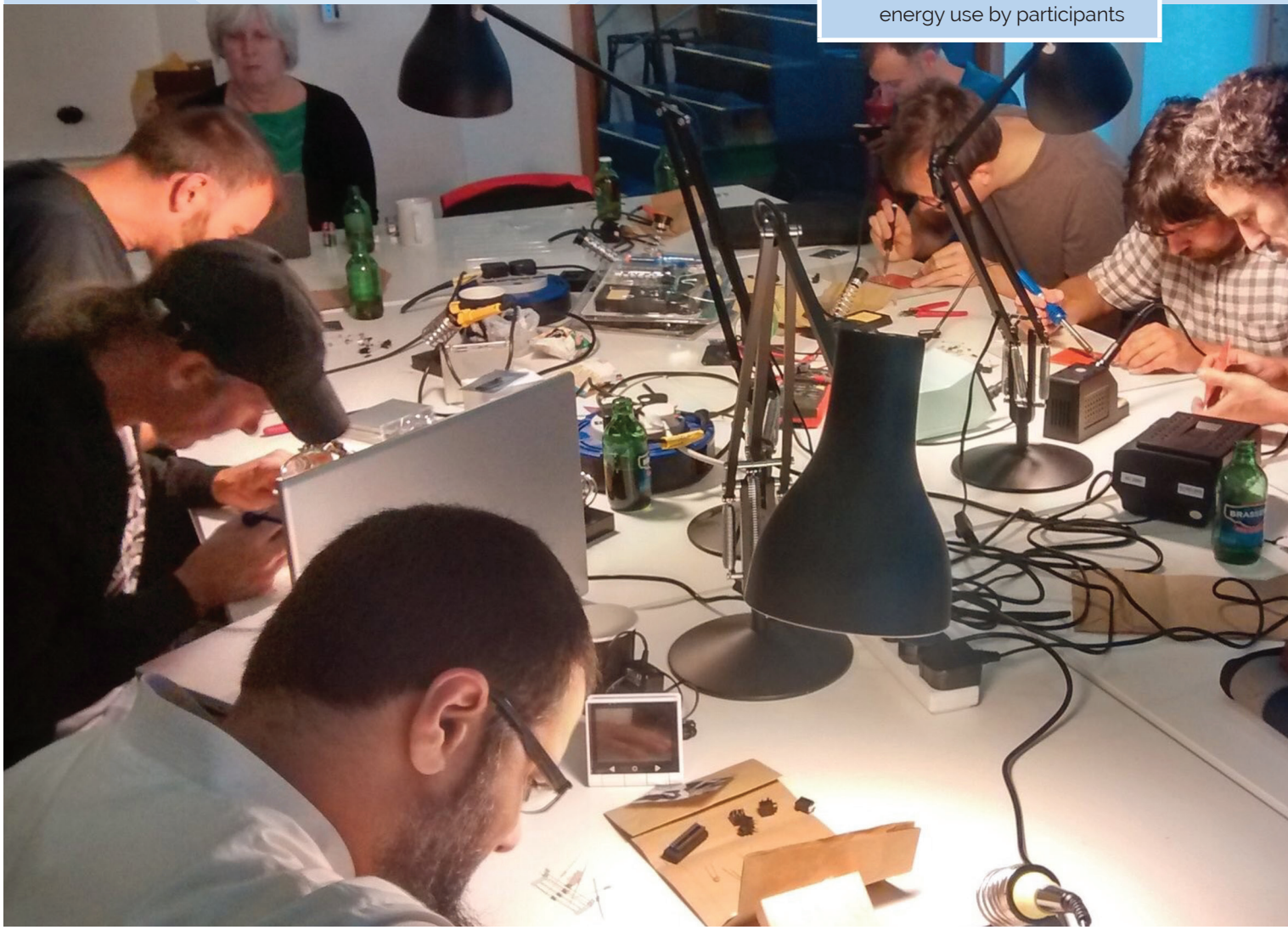
Case studies

Eco Teams in London, UK

- used internationally to reduce energy consumption and promote other pro-environmental behaviours
- achieved 7% average reduction in electricity use by participants

Familles à énergie positive in France

- meetings of small teams of family, friends and neighbours, with 1 trained member supporting
- teams have online access to a resource of other teams' achievements and energy saving tips etc
- achieved 17% reduction in energy use by participants



Pros and Cons

Pros

- builds social capital and group commitment
- behaviour change is reinforced and therefore persistent
- measurement of impact is inherent in the strategy design

Cons

- not a widely used approach in the UK so there's little infrastructure for adoption or expansion

Key psychological factors

Participatory problem solving
This approach combats the overwhelm and disempowerment that comes from giving people too much or unclear information. People are helped to understand a problem and are invited to explore possible solutions via co-production within partnerships made up of individuals and experts from across all sectors (Kaplan, 2000).

The approach is most successful when the focus of participation is on getting effective change, and there is adequate support in the form of appropriate infrastructure and institutions (Jackson, 2015).

To build a national infrastructure of successful communities of practice like the Familles à énergie positive, community organisations and government need to participate in co-production activities alongside the public, not just be an external agent giving information and asking passively what the public want to do.

What Pembrokeshire people think...

'Joining a support group of householders sharing experiences' was not the most popular type of support our survey respondents would seek, with this option seeing the highest number of fence-sitters - 37% - who would be 'moderately likely' to join a group.

This indicates that this unfamiliar concept of support groups could be difficult to initiate in communities unless there was a dynamic sociable or interactive element to them.

Click here for more detailed information

Mobilisation Strategy

Home Energy Tours
People allow others into their homes to see and learn from what they have achieved in reducing their energy consumption.

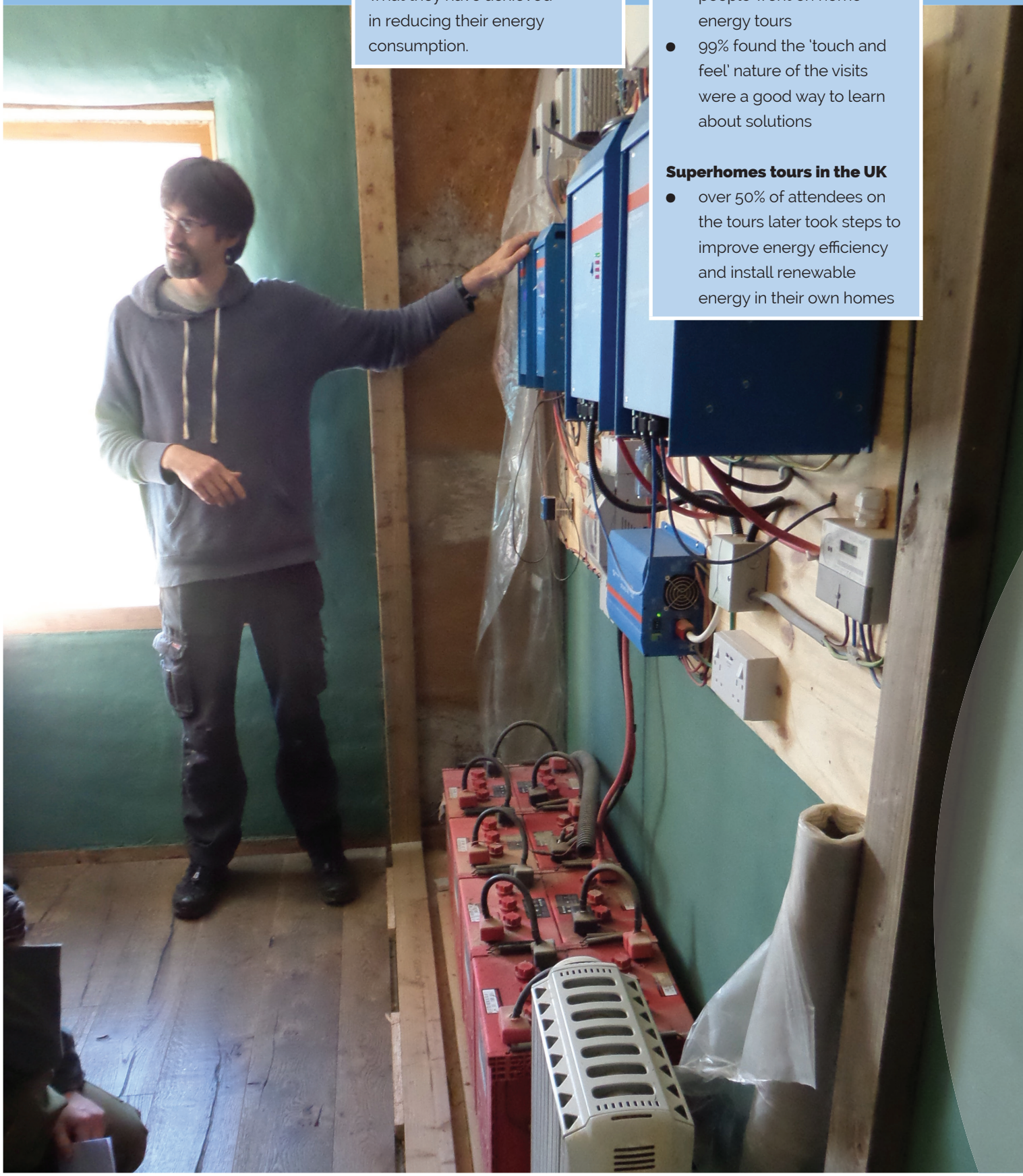
Case studies

Eco Homes Open Days in the UK

- in 2007/2008, over 26,600 people went on home energy tours
- 99% found the 'touch and feel' nature of the visits were a good way to learn about solutions

Superhomes tours in the UK

- over 50% of attendees on the tours later took steps to improve energy efficiency and install renewable energy in their own homes



Pros and Cons

Pros

- information is learnt via a personal narrative, often within a social network, making it relevant and easy to connect with
- shows what other people do in similar circumstances 'to me', so can reinforce positive social norms
- a fun activity that appeals to a broad audience

Cons

- difficult to standardise messaging
- usually only anecdotal evidence of the changes achieved by householders
- relies on good will of householders during the tours and often in answering follow-up questions afterwards!

Key psychological factors

Social norms

Social norms have a powerful influence on our behaviours, as we usually aim to conform to what other people think or do. In a study into energy conservation behaviours, it was found that providing people with information about how their neighbours were conserving energy was more effective in changing energy behaviours than information about environmental protection, social responsibility, saving money or giving energy saving tips (Nolan et al, 2008).

Home Energy Tours are likely to be a powerful tool for making the most of our tendency to conform to norms, as research shows that social norms have even more influence on our behaviours when they are;

- made relevant to the context
- performed by a group
- performed by people who are 'like me'.

What Pembrokeshire people think...

Several of our interviewees had experience of quite major home renovations for improved energy efficiency, and we found they had learnt a lot from the process and were very willing to share, so as to demonstrate the perks and pitfalls to others.

"We've got a 1970's built fairly standard thing, semi-detached... we must be able to renovate it and make it more energy efficient, there must be people doing it and if not we want to show that it's possible, but actually it's really hard. Everyone will tell you something different, most people who you ask actually have an interest in selling you a product so you get the sales pitch, you don't know how much of it to believe or trust"

Home Energy Tours

Click here for more detailed information

Online Tools and Resources

Mobilisation Strategy

Online Tools and Resources
From social media campaigns to video-conferencing; the internet is a repository of tools to inform, start conversations and facilitate learning about energy efficiency.

Case studies

Better Buildings Social Media Toolkit from USA Dept. of Energy

- found that social media works best when there is a dialogue (i.e. it's not just informational)

Energy Communication Toolkit from London Science Museum

- social media can do the important job of making information meaningful and relatable to people

- both case studies agreed that social media only plays one part in the complex matter of 'getting the message across'

Pros and Cons

Pros

- can allow engagement with a broad range of people e.g. through virtual communities
- information is available on demand
- people can seek out information that is meaningful to them

Cons

- inaccessible to people who are offline or are not digitally literate
- questionable energy footprint of having the majority of our social interactions online

Key psychological factors

Persuading

Given the prominent role social media seems to have in helping us make decisions, it'd be easy to believe that people simply learn a persuasive message and then act accordingly. According to cognitive dissonance theory, which suggests we prefer to behave in a way that is consistent with our own attitudes, motivations, past behaviours and interpersonal relationships (Festinger 1957), we will actually take a more actively cognitive role in responding to messaging than that.

So, online campaigns which aim to persuade people to change energy consumption behaviours will have most success when the messaging;

- comes from a highly credible source
- is simple, direct, immediate and very positive
- has emotional and/or imaginative appeal
- is relevant to the respondent
- made relevant to the context
- performed by a group
- performed by people who are 'like me'.

What Pembrokeshire people think...

Two interviewees who'd experienced household renovations for improved energy performance were sceptical about how useful online resources had been;

"finding all this kind of information out it's been really hard. It's not just all online, and it's very generic the information you get online anyway"

"I don't think it would have been easy for someone who isn't tech savvy, someone who isn't aware of the processes"

Survey respondents were moderately eager about social media, with 43.5% being very or extremely likely to use it to find advice and recommendations about saving energy. However, if an intervention were to use online videos giving local examples of energy savings ideas, it might meet with a warmer response as a whopping 69.14% of people surveyed said they'd be very or extremely likely to use this method, making it the most popular one proposed.

Click here for more detailed information

Mobilisation Strategy

Energy Advice Services
Services which digest all the relevant resources, and contextualise it for a local audience, then train experts to make the information available via telephone helplines and face to face in the community..

Case studies

Energy Efficiency Advice Centres (EEACs) in the UK

- from the late 1990s up until 2012 there was a network of 52 EEACs across the UK
- carbon emissions were reduced at a cost of only £1 per tonne of CO2
- benefitted consumers by saving them an average of £115 for every tonne of CO2 reduced

Pros and Cons

Pros

- a useful service for people who are already mobilised to seek energy advice
- can be a cost effective way to deliver energy efficiency measures

Cons

- does not automatically reach those who are un-motivated to change energy-use behaviours
- can rely on the assumption that people don't know much, and so miss the psychological and social factors that mobilise behaviour change

Key psychological factors

Framing & values

Values are our guiding principles – they are our broadest motivations and influence our attitudes and behaviour (Schwartz, 2011). The way information is framed – i.e. what is left in and what is left out of a message – can stimulate our values either positively or negatively. For example, someone who has conservative values, for whom tradition and security are important, will be more motivated to contact an advice service whose messaging about energy efficiency is framed in the context of 'doing your bit' for national energy security. They would be less motivated by messaging framed as 'protecting the environment' (Hawkins et al, 2011).

Understanding your target group's values and the framing that will appeal to them would be a great foundation for the communication plan of an energy advice service.

What Pembrokeshire people think...

The least popular of the options in our survey was 'calling a telephone helpline' to get energy advice - only 23.5% of respondents were either very likely or extremely likely to do so.

On the other side of the line; there was a mixed response from interviewees about receiving cold-calls offering energy advice. Some had been very glad of **"one of those random phone calls from someone saying the Welsh Government are doing grants for people to get boilers... I was just lucky... they've been brilliant, absolutely brilliant from start to finish"**, and others felt that **"it's hard to decide whether they are genuine... I usually politely knock them back and say I'm doing my own research if you don't mind".**

Energy Advice Services

Click here for more detailed information

Energy efficiency in context

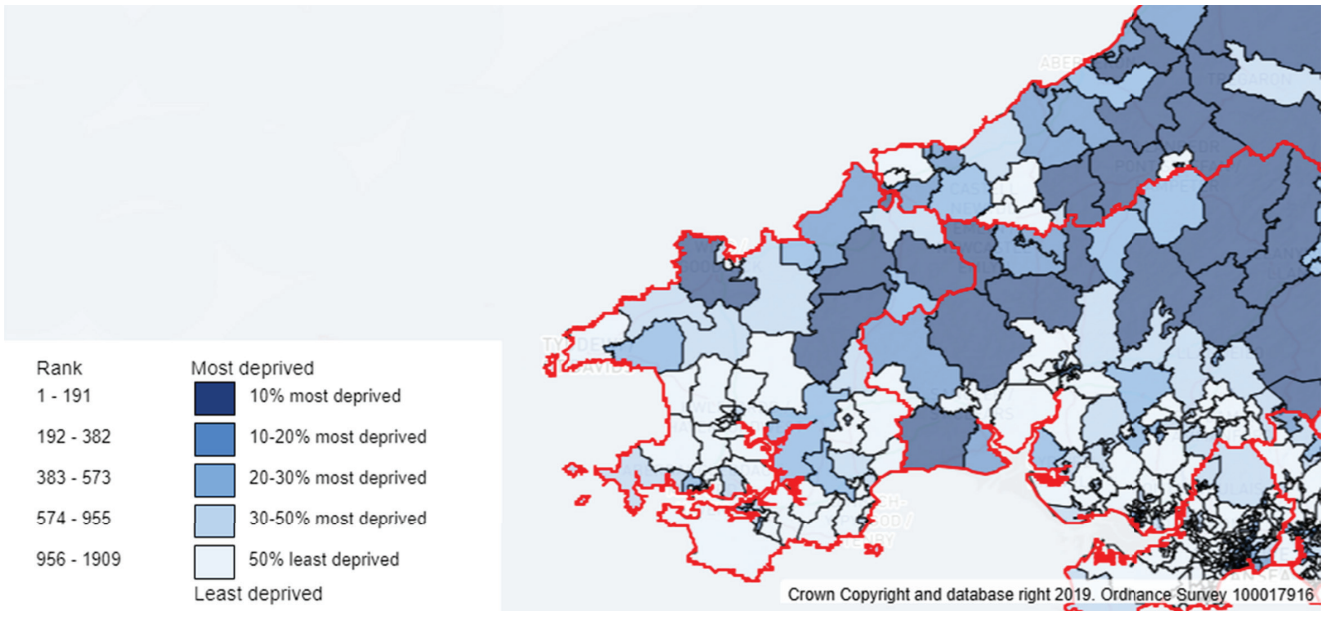
Pembrokeshire, Wales, the World and Climate Change

Who lives in North Pembrokeshire?
Pembrokeshire consists of a population of approximately 125,000, with 17% under 16 years of age, 25% being 65 and over, and with 73% of the population of 16-64 year olds in employment (Pembrokeshire County Council (PCC), 2019).

Within the county, one-quarter of the population of adults are living in poverty and 23.3% of Pembrokeshire residents overall are reported to having long term illness (PCC, 2019), with areas in North Pembrokeshire witnessing more deprivation per household than the south of the county (Welsh Government (WG), 2019).

Cold homes can impact the health of older and vulnerable members of the community and 'fuel poverty is a major challenge for many older people across Wales', with national figures from 2013 showing that '1,700 people over the age of 65 died from cold-related conditions' (Hedges, 2014).

With a relatively high proportion of the Pembrokeshire population being older or vulnerable, it is important for homes in the county to be effectively heated.



Housing, heating and energy efficiency in Pembrokeshire

District heating is considered a viable solution for effective street-scale heating in urban settings, and the most suitable types of housing for this method are densely populated buildings such as flats or apartments, especially when there is a high number of storeys. Within Pembrokeshire, not only are the majority of the conurbations small rural villages, the largest blocks of flats in the county are typically of a maximum of four storeys, and this ultimately reduces potential for district heating schemes and prevents this scale and type of improvement of home energy in the county (WG 2019). Pembrokeshire County Council (PCC) maintains around 5,650 houses for social housing with a very good average Standard Assessment Procedure rating (PCC 2021). This has been achieved by PCC measures to improve efficiency through methods such as the replacement of 550 out of 805 oil boilers with 'ultra-efficient condensing combi boilers' and a gas-boiler replacement programme in homes where the tenant has accepted the work (PCC, 2021).

Overall, 12.7% of houses in Pembrokeshire are still without central heating; higher than the average across Wales of 7.5% (PCC, 2021).

In 2013, Pembrokeshire electricity demand was 0.35% in the UK and 6% in Wales, and 1.5% of heat demand in the UK, and 20.5% in Wales (National Energy Foundation, 2017). This relatively high heat demand is a direct result of the age of the houses in the county.

Wales has the oldest and least thermally efficient housing stock in the UK, with over a quarter of Welsh homes built before 1919; under 20% of this age of homes have adequate energy performance, compared to 78% of homes built after 1980 (Future Generations Commissioner for Wales (FGCW), 2020). In comparison to UK housing overall, 'Wales has higher proportions of solid-wall homes - 29% as against 27% for the UK - and properties off the gas grid - 21% as against 15% for the UK' (Committee on Climate Change, 2017), both of which lead to Wales' domestic energy use being of low efficiency.

Older homes and those with solid walls are more difficult to heat and require more energy to retain heat, and the high demand for heat in Pembrokeshire is further exacerbated by many homes being off the gas grid, and therefore relying on multiple sources of energy for heat, including from electricity.

It is predicted that by 2032 demand for electricity in Wales will increase by approximately 15% - it is expected that, by that time, 70% of electricity and heat consumed will be generated by renewable energy (FCGW, 2020).

Over 90% of Welsh dwellings have roof insulation although to varying degrees, and only a small number of homes within Wales have installed renewable energy, with social housing having the greatest uptake of renewables, and the private rented sector having the lowest use of renewables (Green et al, 2018).

So what exactly is fuel poverty?

Fuel poverty can be defined as 'having to spend more than 10 per cent of income (including housing benefit) on all household fuel use to maintain a satisfactory heating regime' (WG, 2019). The World Health Organisation recommended satisfactory heating to be 23˚C in the living room and 18˚C in other rooms. A household is defined to be in severe fuel poverty in Wales when 'expenditure on all household fuel exceeds 20 per cent of income' (WG, 2010).

In Pembrokeshire approximately 22.5%-23.5% of all households are in fuel poverty (Green et al, 2018).

Fuel poverty has significant degrading impacts environmentally, socially and economically, and cold homes can result in outcomes such as health issues like increased respiratory illnesses. Fuel poverty can negatively impact the local economy and education due to increased absences within schools and workplaces from illness, and can create further issues in communities such as social exclusion whereby those suffering with fuel poverty and high fuel bills may be left with less money for essential provisions such as, food, social activity, transport (Green et al, 2018).

Whilst it's likely that people living in fuel poverty are already seeking ways to reduce their energy use so as to reduce costs, 'achieving decarbonisation targets requires a combination of fabric retrofit, a transition to low-carbon heating and a significant renewable component' (Green et al, 2018).

The occurrence of fuel poverty is likely to diminish a household's ability to take up the most prime opportunities for decarbonisation, given the predicted cost of an energy efficiency retrofit is around £22,000 for a flat and for houses is around £30,000 (PCC, 2021).

There are some opportunities and support available to low income homes for renovations that allow for greater energy efficiency (reference to this section in report), although whether these are sufficient to meet decarbonisation targets is yet to be seen.

As households that are privately owned and often wealthier are responsible for more energy use by comparison to lower income homes, it would be beneficial to design interventions and improvements for energy efficiency on these households too. It is wealthier homes within the private sector that have poorer energy efficiency compared to social housing (ONS, 2020).

If decarbonisation is the focus of interventions, it could be more beneficial to target those households that can afford to improve efficiency, rather than focusing upon low-income homes.

Is improving household energy efficiency really going to make a difference to the environment?

The domestic sector creates 21% of all carbon emissions in Wales, slightly lower than the UK overall where the domestic sector contributes to 29% of all emissions (Green et al, 2018). It is predicted that climate change – driven by carbon emissions - will increase coastal erosion and extreme weather where even Wales will be exposed to very long spells of hot weather during the summer causing droughts, and heavy rainfall in the winter causing flooding (Slingo, 2021). Due to its peninsular geography, Pembrokeshire could suffer greatly with erosion and flooding, both inland from rivers and coastally.

The majority of areas that may be at risk of coastal flooding in Pembrokeshire are 'without significant flood defence infrastructure' (Natural Resources Wales (NRW), 2021), resulting in potential severe loss and damage to property if climate change cannot be lessened through measures such as efficient energy use.

'Spatial patterns of UK climate change depend more on regional climate and weather responses to global warming than the level of future global greenhouse gas emissions' (Slingo, 2021), meaning there is an absolute necessity for strong and urgent regional and local responses to the threat of climate change.

Climate change will have an impact on the everyday life of Pembrokeshire residents; health issues such as heat stroke and skin cancers will increase, food availability will be affected by changes in the agricultural sector, the rise in living costs we are already experiencing will continue as food, fuel and insurance get more expensive, extreme weather such as severe rain will impact transport links, and Pembrokeshire residents could witness more water shortages due to droughts or freezing pipes (Bradford Government, 2021).

In order to reduce the risk of the impacts of climate change, there are many benefits to be had from decarbonisation and a reduction in the emissions the domestic sector contributes to the problem. We require 'strong, rapid, and sustained reductions in greenhouse gas emissions, and reaching net zero CO2 emissions' with the need for decarbonisation being a 'code red for humanity' (IPCC, 2021). Individual households reducing their personal emissions by improving energy efficiency, through adapting behaviours and materials within their homes, would contribute significantly to a reduction in the extent of damage and loss currently predicted from climate change. We can all do our bit to make a difference.

Energy efficiency support available in Pembrokeshire

The energy support currently available to Pembrokeshire residents is outlined here, and divided into four sections:

- **home improvement packages**
- **advice and guidance**
- **financial support**
- **loans**

Home Improvement Packages

The following help is available to make improvements to home energy efficiency.

The Nest Scheme

This scheme is part of the Welsh Government's 'Warm Homes' programme, which also includes the regionally targeted Arbed Am Byth scheme; the latter is not currently available in Pembrokeshire.
The Nest Scheme provides tailored packages of free home energy improvements such as new boilers, central heating systems, and insulation to certain households. To be eligible, you either have to be in a low income household or, if in a slightly higher income bracket, have a household member that suffers from a mental health, chest or heart condition. In addition, the scheme offers a range of free, impartial advice to all.
https://nest.gov.wales/

Domestic Renewable Heat Incentive (RHI)

The Domestic RHI is a UK Government financial scheme to promote the use of renewable heat. The incentive is designed to switch householders to heating systems that use eligible renewable energy sources to enable the UK to reduce its carbon emissions and meet its renewable energy targets.
People who join the scheme by commissioning an eligible heating system receive quarterly payments for seven years for the amount of renewable heat their system is estimated to produce.
Types of installation include Air Source Heat Pumps, Ground Source Heat pumps, Solar thermal, Biomass boilers and stoves. The Domestic RHI is due to come to an end on 31st March 2022.

Boiler Upgrade Scheme (BUS)

This scheme which starts on the 1st April, 2022 replaces the domestic RHI and pays a flat grant amount of £5000 to anyone replacing a fossil fuel boiler with a low carbon alternative. The grant will be eligible for the following alternatives: air source heat pumps, ground source heat pumps and, in rural areas only, biomass. This scheme was announced by the UK Government within a few weeks before the time of writing, so full details are not currently available.

Energy Company Obligation Flexible (ECO Flex) Funding

The aim of the scheme is to install energy efficiency measures in properties that are currently energy inefficient with the aim of reducing household fuel bills. This is an opportunity if your home qualifies for potential improvements such as a heating system, upgrades to the existing heating system and/or insulation measures. Support is possible through this scheme even if you are not on a low income, provided that your home qualifies.
Access to this scheme is through private companies with a profit motive, and all suggested improvements might not be completely grant supported, so care needs to be taken in selecting both a company to work with and the best offers of improvement interventions.
There is a list of known private companies who offer the scheme in Pembrokeshire and they can be found on this webpage: https://www.pembrokeshire.gov.uk/private-housing/energy-efficiency

Advice and Guidance

There is a multitude of guidance websites on energy efficiency which are not covered here. In relation to providing telephone or one-to-one guidance on energy efficiency the following is available for Pembrokeshire residents:

Pembrokeshire Smart Energy Support Service (PSESS)

This is run by CARE and at the time of writing has resources until 30th April 2021 to provide general energy efficiency advice, signposting to the best support, advice on smart meters and in-home assessments.
https://www.cwmarian.org.uk/energy

Citizen Advice

Citizens Advice offices in West Wales offer support through the Big Energy Savings Network (BESN) and the Energy Advice Programme (EAP). They are able to offer advice and are carrying out case work with people needing energy support.
https://www.pembscab.org/

The Nest Scheme

The Nest Scheme provides a free energy advice service as mentioned above.
https://nest.gov.wales/

Financial Support

While this is not directly related to energy efficiency, there are a number of ways people suffering from fuel poverty can get direct financial support.

Warm Home Discount Scheme

Electricity and mains gas customers can get a one-off discount of ~£140 on their energy bills during the winter months, if they are low income or receiving pension credit.
https://www.gov.uk/the-warm-home-discount-scheme

Winter Fuel Payment

People that were born before 26th September 1955 are eligible to annual winter payments of between £100 and £300.
http://www.gov.uk/winter-fuel-payment

Cold Weather Payment

People who are on certain benefits or support for mortgage interest can receive payments of approximately £25 if the average temperature in their area is recorded as, or is forecast to be, below zero for 7 consecutive days. They will receive this repeatedly for every such 7 day periods between 1 November and the 31 March each winter.
http://www.gov.uk/cold-weather-payment

Energy Efficiency Loans

Pembrokeshire County Council, like most other Welsh local authorities, offer loans for household energy efficiency improvements. In Pembrokeshire loans up to £25,000 per household are available without any annual interest payments, however they do require loan arrangement fees of 10% to 15%, depending on the length of the loan.
https://www.pembrokeshire.gov.uk/private-housing/home-improvement-loan-scheme

Interviews

We carried out interviews with 7 Pembrokeshire residents between August and October, using an interview schedule as a guide to the conversation;

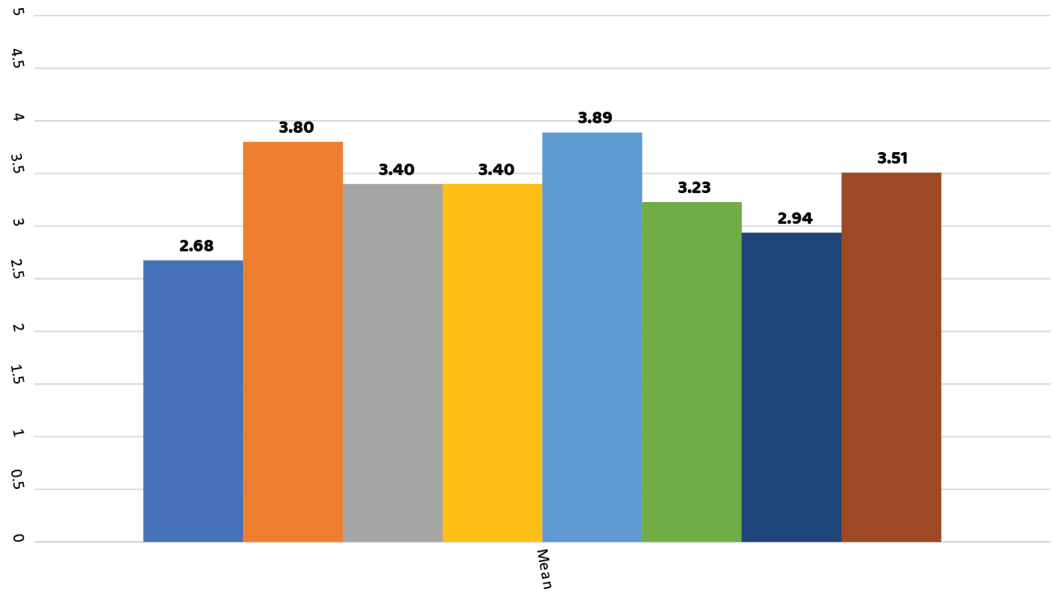
1. **Have you ever sought support for home energy use/efficiency? If No go to question 8**
2. **How did you find the support you needed?**
3. **What support did you get?**
4. **Who provided the support?**
5. **How would you rate your experience of the support you were offered?**
6. **Did anything change because of the support offered? Please explain**
7. **Was the support offered clear, understandable and effective? Please explain**
8. **Can you give reasons for not seeking support?**
9. **What would help overcome barriers to seeking support?**

Survey

- The overarching questions survey respondents were asked was: **What support would help you and your family improve your home and life through better energy efficiency while reducing your environmental impact?**
- The survey was conducted between August and September 2021, through CARE's network via social media and e-newsletter
- We received 80 unique responses
- Survey key;
  1 = extremely unlikely
  2 = slightly likely
  3 = moderately likely
  4 = very likely
  5 = extremely likely

Click here for more detailed information

Mean average score for survey questions



- Would you call a telephone helpline?
- Would you attend social events or workshops to gather information?
- Would you watch videos showing local examples of energy saving ideas and tips?
- Would you join a support group of householders sharing experiences?
- Would you actively seek the experience of people who had already made improvements?
- Would you take part in a home tour to see what can be done to reduce energy usage?
- Would you use social media to find advice or recommendations?
- Would you get the equipment and skills to monitor your home energy use?

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Acronyms

BEIS	Department of Business, Energy and Industrial Strategy
BESN	Big Energy Saving Network
BUS	Boiler Upgrade Scheme
CARE	Cwm Arian Renewable Energy
CHEESE	Cold Homes Energy Efficiency Survey Experts
CLASL	Community Learning for Action and Sustainable Living
CSE	Centre for Sustainable Energy
DECC	Department of Energy and Climate Change now part of BEIS
DOE	Department of Energy, United States.
EAP	Energy Advice Programme
ECO	Energy Company Obligation scheme
EEACs	Energy Efficiency Advice Centres
EPC	Energy Performance Certificate
HEEPS	Home Energy Efficiency Programmes for Scotland
IHD	In Home Display
LED	Light Emitting Diode
MECH	Making Energy Change Happen
PAS 2035	Publicly Available Standard
PEEP	Pembrokeshire Energy Efficiency Project
PSESS	Pembrokeshire Smarter Energy Support Service
RHI	Renewable Heat Incentive
SAP	Standard Assessment Procedure
SEGB	Smart Energy Great Britain
WG	Welsh Government
WPD	Western Power Distribution

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