

Experimenting with Heat Plans to discover how to help businesses and governments harness energy services to build an energy system people will want to pay for

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There is a growing consensus that we need to put consumers at the heart of the energy system if we are to transform it successfully. Standard consumer research is instructive, but struggles to guide the complex choices that need to be made about the future energy system. For instance, what combination of generation and storage should we build where, what networks should we invest in and how much capacity should we build? People do not know exactly what they want and cannot say which they will prefer of futures they can barely imagine.

The decisions made will shape how people can use energy in their lives every day. The networks built to heat buildings in each area will influence how many households have to insulate their homes and install hot water tanks to get comfortable and clean as conveniently as they can today. The amount of capacity built will determine whether everyone can use electricity when they like, or some will have to go without at peak times.

Consumer choices have helped guide similar decisions in other sectors. The telecoms sector has used market feedback to decide what networks and how much capacity to build. This has revealed consumers are willing to pay for unlimited broadband access and mobile coverage. Similar techniques could help the energy sector decide how to transform the system.

Previous work has shown that people care more about their experiences using energy, than how they are delivered. They like the idea of buying services, like a warm home, rather than kWh of fuel and a boiler. They are open to their provider changing their energy supply as long as they can get the heat experiences they want.

Energy services create opportunities for entirely new business models and policy options. Businesses who can sell high quality energy services will find it easier to attract and keep customers who will pay more, complain less and be more loyal. Network investors and operators could work with energy service providers to plan network upgrades that deliver service levels consumers want to pay for. Long-term, technology-neutral, carbon targets could persuade providers to decarbonise their services, as they have for car manufacturers. This would open up new channels to market for low carbon device vendors.

The concept of energy services is not new, but the maturing of 'smart home' infrastructure means they are now becoming commercially viable and technically feasible. With the support of the Energy Technologies Institute and the Department for Business, Energy and Industrial Strategy, the Energy Systems Catapult has built a capability to help governments and businesses take this opportunity to design delightful low carbon energy policies, products and services. This includes creating a segmentation of consumers' energy product and service needs and connecting a 'living lab' of 100 households to a Home Energy Services Gateway platform. The platform has an open architecture designed specifically to enable businesses to work together to offer many households a range of energy products and services. Consumers' reactions to these offers could reveal their requirements for a low carbon energy system.

Method

Over the Winter of 2017-18 the Catapult ran an experiment using this Living Lab to test Heat as a Service with 100 households. This involved:

- Upgrading homes to the 2020s level of data and zonal heating control;
- Co-designing three types of Heat Plan with households (see Figure 1):
 1. The FixedTime plan is the cheapest and most restrictive. Participants pay a fixed price for their schedule, but they cannot change it and are charged more for every Extra Warm Hour.
 2. The FlexiTime plan allows participants to change their schedule and includes a bundle of Spare Warm Hours. They are charged for each Extra Warm Hour they use.
 3. With the Unlimited Plan there are no restrictions. Participants pay a fixed price for an unlimited number of Warm Hours to use as they like.
- Tailoring offers to suit each households' heating preferences;
- Using data to estimate the expected delivery cost in each home;
- Offering participants the chance to 'buy' a Heat Plan; (Note: this was a simulated purchase, we did not become their energy supplier)
- Using interviews, surveys, blogs, diaries and home visits to understand households' reactions to these Heat Plans; and
- Measuring the actual cost of delivering Heat Plans.

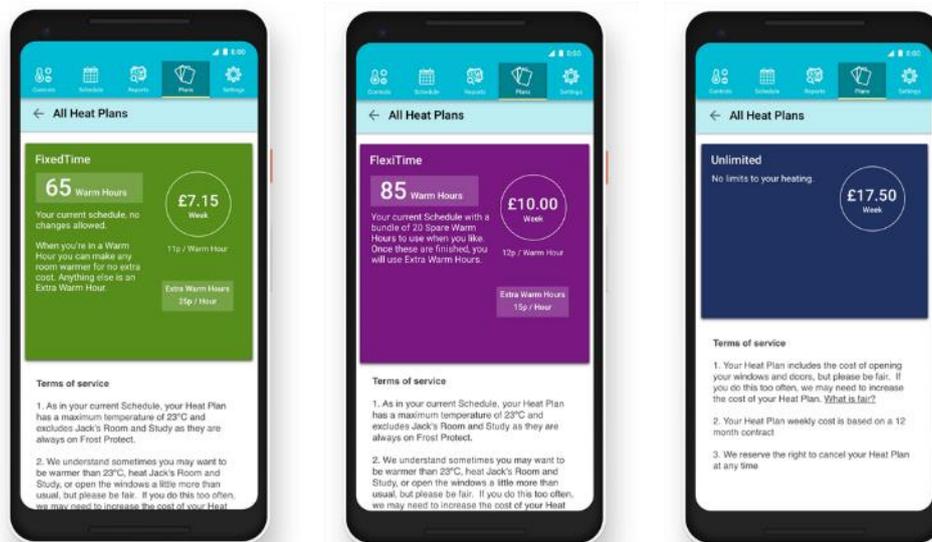


Figure 1 – The three Heat Plans

Results and discussion

We collected a vast amount of data from consumers, sensors and system interactions and will publish a full report later in the year. This extended abstract summarises early, emerging insights. They may be subject to change upon more detailed analysis.

There was huge diversity in how participants chose to use their zonal controls. Their temperature settings and schedules revealed how warm they wanted different rooms to be at different times of day. The frequency with which they adjusted their settings revealed how much flexibility they wanted. Very different factors determined the cost of delivering the warmth participants wanted, including the weather, when they wanted their home warm and how well insulated their home was. These differences between what drives consumer value and the cost of heating create opportunities for businesses to design energy services that cost less to deliver than consumers are willing to pay.

Just under half of our homes 'bought' a Heat Plan. We are confident they found the simulated purchase fairly realistic because they took time to think about offers and discuss them with spouses before accepting them. Around half selected the FixedTime plan, and half selected the FlexiTime plan, with only one choosing Unlimited.

Those who decided not to 'buy' a Plan had various reasons. The most frequent, cited by around half of participants, was that the Plans we designed were too inflexible, for instance because the proposed 'contract' lasted one year. Another reason given was that the cost seemed too expensive. In fact, we initially offered Plans at a premium to discover what participants were willing to pay, then offered 'discounts' if price was a major sticking point. This technique revealed that some participants saw real value in energy services.

Nonetheless, this is far higher uptake than we had expected given the novelty of the concept and our efforts to avoid recruiting technology enthusiasts (no participants had previously bought 'smart controls'). We categorised participants according to whether they were more focused on comfort, cost or balancing both to get value for money. This revealed that 'comfort-focused' participants were much more likely to purchase a plan, particularly those who had enjoyed higher levels of comfort with zonal control.

Conclusions

These findings give cause for cautious optimism that energy services could indeed reveal consumers energy preferences. They also provide evidence that energy services could improve consumers' experiences of energy at home, create new commercial opportunities for businesses and open up new options for policy-makers to decarbonise heat.

However, there are also reasons to treat these early results with some caution. After all, the trial was only relatively small-scale, and some participants chose not to purchase a Heat Plan.

Next steps

Perhaps most importantly, it will be critical to test energy services in real life. We rapidly discovered numerous simple ways to improve the Heat Plans we offered based on consumers' feedback. The Catapult's Living Lab is designed to accelerate others' efforts to design energy services consumers will enjoy using. This coming winter we plan to help early pioneers begin the journey to becoming Energy Service Providers.

More information

We have published several papers that contain more background on this work and will publish detailed findings later this year. Interested readers are encouraged to get in touch. For more information, see:

- Lipson (2018) How can people get the heat they want without the carbon. Energy Technologies Institute Insight Paper. Available at: <https://es.catapult.org.uk/wp-content/uploads/2018/02/FINAL-How-can-people-get-the-heat-they-want-at-home-without-the-carbon.pdf>
- Batterbee (2018) Domestic Energy Services. Energy Technologies Institute Insight Paper. Available at: <https://es.catapult.org.uk/wp-content/uploads/2018/02/FINAL-Domestic-Heat-Energy-Services.pdf>
- Lipson (2017) Consumer challenges to low carbon heat. Energy Technologies Institute Insight Paper. Available at: <https://www.eti.co.uk/insights/smart-systems-and-heat-consumer-challenges-for-low-carbon-heat>