Using digital technologies to reduce household energy consumption

A new digital platform is helping one of the UK's largest energy suppliers to support and encourage its customers to adopt more sustainable behaviours to reduce their energy bills.

On the 30th June 2016, the UK Government accepted the 5th Carbon budget committing the UK to reduce its greenhouse gas emissions by 57% by 2030, based on a 1990 baseline. Decarbonising space and water heating is one of the biggest challenges for carbon budgets as it accounts for 23% of UK energy demand and 20% of the nation's carbon emissions (ETI, 2012). Low-carbon heat currently accounts for less than 2% of heat demand. For both heat and energy efficiency, there is significant further potential to reduce emissions through more efficient appliances, insulation and through deployment of low-carbon heat including heat pumps (CCC, 2016).

There needs to be a widespread adoption of low carbon technologies by householders to help the UK meet its climate change targets. However, the supply and installation of equipment has a financial cost, and a key challenge is how to convince passive energy consumers to pay for these technologies and reduce their energy use.

What the IDC did

IDC researchers worked with EDF Energy to explore the role of digital technology in encouraging householders to install energy efficiency measures such as insulation and smart thermostats in an attempt to improve residential property performance.

Compared to measures such as switching off lights and appliances, improvements in space heating have the greatest potential to reduce residential energy consumption and thus have a greater impact in reducing carbon emissions. Working with EDF Energy's customer facing department the IDC team gathered data on consumer energy use, usage patterns, and adoption and use of energy saving devices, such as smart thermostats.

Using stakeholder engagement and system thinking problem structuring techniques, the IDC developed a novel "Power Law of Engagement for Energy Saving" model, which sets out eight stages of engagement, along with supporting digital tools and devices, to support and empower consumers to embark on a journey to invest in energy efficient devices.

The outputs of the work showed that by initially providing free interventions such as a smart meter, providing clearly articulated feedback and information to the customer regarding energy savings and available technology that the consumer can be moved gradually from being "disengaged" to becoming a "master" of sustainability (Weeks, 2014).

The Impact

The outputs of the project supported EDF Energy by providing them with deeper insights into the habits of its 5 million plus customers through the provision of tools which were based on customers' actual behaviour rather than rudimentary assumptions. EDF Energy in turn could utilise the tools and techniques to help their customers become smarter users of energy reducing overall carbon emissions:

- EDF Energy has developed a dedicated "Digital Innovation Team" which has grown from 4 to 13 staff, securing more ambitious strategic and transformational projects which are five times larger than previously and developed an excellent reputation within EDF Energy.
- The Digital Innovation team embodies the culture of creativity and systems thinking with the strong academic rigour which the Research Engineer brought to the project.
- The EDF R&D UK Centre has received very positive feedback from customers across EDF Energy regarding the project and the insight that has been provided.
- An outreach programme with schools to provide tools and educate school teachers and pupils regarding energy challenges which engaged over 468 teachers from 186 different cities across the UK.

The Future

The pressing need for action to reduce carbon emissions and meet the binding targets adopted by the UK Government, EDF Energy will continue to use the tools developed in the project to work with its customers to adopt lower carbon technologies and more sustainable behaviours.

Related publications

Weeks, C. Delalonde, C. and Preist, C. (2014). Power law of engagement – "Transferring disengaged householders into retrofitting energy savers" 2nd International Conference on ICT for Sustainability (ICT4S 2014)

Weeks, C., Delalonde, C. & Preist, C., 2015. Investigation into the slow adoption of retrofitting - What are the barriers and drivers to retrofitting, and how can ICT help? 29th International Conference on Informatics for Environmental Protection (EnviroInfo 2015) Third International Conference on ICT for Sustainability (ICT4S 2015), (EnviroInfo), pp.325–334.