

Ten Things *about* Energy Users at Home

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What's this all about?

The design of any product or service is enormously improved if it springs from a valid and comprehensive understanding of the humans who will use it.

Who are they? What's important to them? How do they think about their world?

Unfortunately, when it comes to energy, and energy-efficiency products in particular, it seems that some of today's offerings are based on flawed assumptions about their potential users. As a result, products don't sustain consumer interest, businesses are less successful than their backers hoped, and everyone is left wondering why.

This is not just a "user interface" problem, nor even a "product design" problem. The problem is that our understanding of how people really behave at home, what they really think, and how they really act, is simply not yet fully complete. But we can make a start. Building on the latest published research (see *Bibliography*), we can already usefully inform the design of successful energy products. The ten claims made here can shed some real light on what will work, and what will almost certainly not.

What things about users of energy at home do we already know or suspect to be true?

Let's begin with the obvious, progress to the subtle, and then ask an important question.

1. Consumers aren't very energy literate

Energy is an abstract physical quantity, and as is common with such quantities, its behaviour is usually expressed and understood numerically. Unfortunately, much of the ordinary population is not very numerically confident, so dealing with energy “in the raw” is fraught with challenges.

Even worse, energy is usually expressed in units that don't lend themselves to naïve reasoning. *Kilowatts* doesn't sound like a rate of consumption (compared with, for example, *miles-per-gallon*), and *kilowatt-hours* doesn't sound like an amount consumed (compared with, for example, *gallons*). Energy even behaves in strange ways: you can't see it; it can be converted from one kind to another, and is never destroyed; and yet some is “lost” each time it is converted; it exists in high-grade forms (such as electricity) and low-grade forms (such as warm water). Many people remember that they never understood all this at school, and are therefore put off wanting even to try to think about it again.



Consequence: Any attempt to talk with consumers about an amount of energy is at risk of confusion. Unfortunately, the tempting alternative quantity, money, also introduces other complications. Whilst people tend to be more money-literate, using money moves the whole dialogue into the economic realm, which may not be helpful either (see later). If consumers were motivated to save money, talking about money would make sense. But if consumers might be motivated instead to save energy, talking about money clouds the issue because the vagaries of dynamic and ever-rising tariffs mean that genuine reductions in energy use can be masked or even appear reversed. (*“My bill is bigger this month, even though I used less energy.”*)

2. Consumers aren't rational economic actors

Looking at it “logically”, we might assume that if consumers were presented with transparent information about the economic consequence of their past and possible future actions relating to energy, that they would choose a “sensible” course of action that would minimise their costs and maximise their “utility” (the benefits of their expenditure).

This logic is what motivates a lot of systems to express energy in terms of money. But in fact, consumers don't appear to consider economic consequences as the most important factor in reasoning about energy use. Instead, they reason perfectly rationally about a host of other factors that govern the choices they make about energy consumption. See *Comfort & convenience trump cost & carbon*, for example.

Consequence: To whatever extent that we might be seeking to actively influence consumer behaviour (for example, to reduce consumption), we should be wary of trying to do so merely by showing comparative economic data – whether historic or future. Despite what we may think is true about humans, or even what “ought” to be true, financial economics is simply not what drives many people's decisions about energy consumption.



3. Consumers don't consume energy at all

It's not obvious that people think of themselves as “consuming energy”. In fact, consumers don't seem to consciously reason specifically about energy very much at all. Instead, people engage in the everyday activities of life that happen to consume energy as a necessary enabling side-effect.

People don't consume gas; they heat their home. People don't consume electricity; they watch the television. People don't consume hot-water; they shower every morning. People don't consume petrol; they travel to the shops. And so on...

Consequence: We should consider trying to move the dialogue between the user and the machine out of the domain of energy, and into the domain of the things the user actually thinks and makes decisions about, accepting that this can be a very challenging design problem.



4. Comfort & convenience trump cost & carbon

Many of us have come to consider the comforts and convenience of the 21st century as normal life. We expect to get out of bed to a warm house and to have freshly laundered clothes at our disposal. We don't tolerate noise from a dishwasher or a boiler. We don't like altering our household or social routines just to save energy. We even complain at the colour of low-energy light bulbs and how they take a few seconds to come on. In general, we are not at all motivated to change our behaviours in any ways that impact either comfort or convenience, even if they're more economic or environmentally friendly.

The relatively poor energy efficiency of many household energy systems (especially central-heating and domestic hot-water) makes it fairly easy to improve energy efficiency without reducing comfort. Indeed, comfort can often be improved at the same time. However, a number of other initiatives that are sometimes proposed – for example relating to things like shifting electrical load to other parts of the day – are at great risk of falling foul of consumers' love of convenience.

Consequence: Remember that business fortunes have been made from selling people even minor conveniences at a premium price (dishwasher tablets you don't even have to unwrap, or apples that are already peeled?). Most people won't tolerate even minor inconveniences just to save money. Consumers may not want to do their laundry at night, even if it is cheaper, if it means having to empty the machine at breakfast time. See also, *"Consumers are not rational economic actors"*.



5. Affluence buys ignorance

Above a certain minimum level of income, one of the rewards of enjoying a reasonably affluent lifestyle is not having to worry about (or even to think about) certain types of expenditure.

Because it's invisible, energy may well fall into this category of deliberately unmeasured expenditures that people simply prefer not to have to think about. Being reminded that energy costs money, and in the worst cases being berated to reduce such expenditure, may be counter-productive.

Consequence: Instead, other forms of “motivation” might be sought, including the various norming behaviours that relate to other desirable outcomes such as recycling and the wearing of seatbelts.



6. Nobody is an island

Although an increasing number of people live alone, most of us share our homes with family, friends, or other people. Wherever two or more people share a single “energy environment”, there will often be differences of opinion about energy use.

This is most obviously manifest in the difference between the person (usually an individual) who notionally “pays the bill”, and everyone else in the house who merely “consume the energy”. But this conflict can also appear subtly everywhere that different individuals in the home might make different degrees of cost/comfort/convenience/carbon trade-off.

Consequence: Designers of energy systems should remember that their systems may constitute a form of *nexus* around which family dialogues or debates may take place (whether directly about energy, or about the other family activities such as bathing and laundry that necessarily consume it). This already happens around such mundane interaction points as light switches in children’s bedrooms and heating thermostats in halls. We should consider how new energy systems might beneficially “mediate” these very human dialogues.



7. Humans always create exceptions

Technology has a tendency to bring automation, either because (like the fighter jet that's too unstable to fly manually) it is fundamentally necessary, or because (like the boiler controls that can drive the boiler more efficiently) it's considered as a benefit of technology. Indeed in the context of the "smart home", the terms "technology" and "automation" are sometimes used almost interchangeably. However, almost no matter how sophisticated the attempt to understand and automate their requirements, humans are very effective at wanting something slightly different.

This is a permanent and on-going dilemma for product designers in fields unrelated to energy: whether to build a simpler product that pleases most of the people most of the time, or to build a more capable product that delivers greater coverage at the price of greater complexity. The temptation is always to include more and more "switches and options" to account for each exception as it arises, and therein lies the path to complexity.

Consequence: Whenever this issue arises, we should consider whether and how the problem might be recast to partition more effectively those parts of the problem that are uncontroversially automatable from those parts that should fully be left in the human domain.

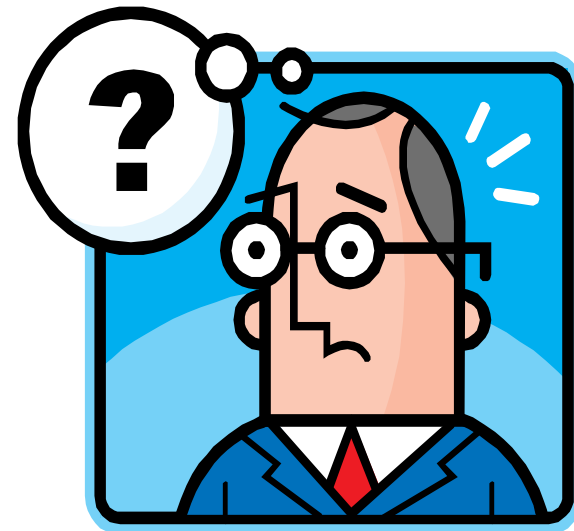


8. Users want to know *Why*?

Despite feigning a lack of interest in energy (see, *Consumers aren't interested in energy*), people may not easily give up control of things they're used to managing manually.

Systems that try to automate the turning on and off of lights, the control of central heating, or almost anything else for that matter, will often provoke questions from some users along the lines of “*why is it doing that now?*” [If you don't believe this, ask yourself whether you have ever stood in front of a photocopier, a vending machine, or any other piece of technology and exasperatedly asked yourself “*what on earth is it doing?*”]

Consequence: This pushback may be the result of trying to automate something that shouldn't be automated (see, *Humans create exceptions*), or it may be simply a cry from the user for explanation and justification from the system. In this case, serious consideration should be given as to how to tackle this often rather difficult task of having an automatic system explain its behaviour to ordinary users. Even if this is just a transitory phase (the user wanting re-assurance until he is confident that the system is making good decisions), it may still be a necessary step along the path of acceptance by the user of a new system, and skipping it may result in rejection.



9. Consumers aren't interested in energy

The earliest generations of some energy management services appear to assume a user behaviour in which the user actively “sits up” at an energy-management dashboard (whether on the web, on a dedicated display, or even a smart phone), explicitly interacts with it (motivated presumably by a desire to understand his energy consumption), and then makes active decisions about changes to household policy that will have beneficial effects on energy use.

It is, with the right motivation, just about possible to imagine this behaviour (but please see *The user is not you*). But we must ask ourselves, in the context of the messy, busy, convenience and leisure-driven motivations that constitute ordinary everyday life for most people, is it likely that energy will be high enough on most people's agenda to motivate this model of use as the norm? Really?

Consequence: Instead of the energy dashboard, we should again be looking to move the dialogue away from energy *per se*, and into other spaces of human life that do hold some interest for ordinary people. We should seek not to introduce a new, separate, obligation on users to “manage” their energy, but instead look to hook into existing behaviours, motivations and preferences.



10. The user is not you

It's in the nature of humans that there is always a spectrum of behaviour (rather than a single uniform characteristic). Thus, whilst the majority of users may follow a particular pattern, there will always be those who do the opposite. And indeed, a small group of energy users behave in ways almost completely opposite to the norm that we've described.

In the case of any technology, this group is often closely correlated with the people who design the products, and with those “early adopters” who buy them first. We know who we are. This difference between early adopters and the majority of the population is what gives rise to the “chasm”, the crossing of which has been so extensively discussed.

Consequence: If you work in the domain of domestic energy systems, and have become fascinated by all their manifest complications and possibilities, do not design the product that you yourself would want. Neither guess what you think “real” people might want. Instead, seek out an evidence-based understanding of those real people – ordinary people who do not have any form of “interest” in energy, and design for them.



So what?

Many of these observations are statements about what consumers are **not**. They represent a useful sanity check against making the worst sorts of mistakes when conceiving new products. However, it would be much more useful to have a comprehensive understanding of what people living at home and using energy actually **are**. In other words, what's really needed are answers to questions like:

If we want people to pay attention to, be interested in, and interact with energy in the home, what are the key existing behaviours, beliefs, and motivations onto which we could usefully latch?

Or...

What are the motivations that people already have which, if appropriately triggered, would encourage desirable interaction?

and most importantly...

If we wanted to validate (via a thought experiment) any proposed design concept, what are the key positive questions or assumptions about human behaviours, beliefs, and motivations against which we should mentally test it?

Other industries, including retail, FMCG, and the designers of “experiences” of all sorts, have successfully understood in detail the behaviours of their customers (and, crucially, their non-customers). The emerging domestic energy industry has yet to do this so fully.

This is not an unusual situation in the early market. For many years smart phones were a distinctly minority interest, full of complexity, and seemingly deliberately designed expressly and only for early adopters. The domestic energy technology market is perhaps in a similar early state of development, creating a significant opportunity for innovation, not just in the technology itself, but in the way consumer products are conceived and how they make themselves at home in the domestic environment. This, as much as technical product performance and quality, may govern the eventual success or failure of ventures in this most important sector.

Next steps...

We began by observing that a valid and comprehensive understanding of the human users of energy at home is not yet **available**. In fact though, social scientists and others have been working for many years to build up a significant body of knowledge about people, people at home, and people's interactions with energy. This theoretical knowledge is already significantly ahead of the deployed practice in product design, and the techniques for extending it are well established.

So the opportunity is there for the taking. But social science literature is extraordinarily inaccessible to most designers and implementers of consumer products. As it should for its primary purpose (academic research), it expresses ideas contingently and couched in domain-specific jargon. Unfortunately, neither of these characteristics helps drive the adoption of those ideas in the commercial world of product design.

What would be invaluable would be a form of “intermediate representation” that could carry this knowledge about humans from its originators (social science researchers and others) to its users (product creators and developers). Such a representation, if achieved, need be no more complex to understand than the “ten things” already offered here, and could lead directly to the sort of innovation that transforms the success of some products.

Many of the world's most successful products can trace their success back to as few as two or three of these sorts of crucial observations. A relatively modest investment in building such an understanding could reap huge dividends for any organization able to capitalise on it to create genuinely compelling, valuable, and interesting energy products.

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