

Introduction



Changing behaviour - harnessing the power of the consumer

Can a cultural shift be achieved in how people use energy?

*Talk for the Foundation for Science and Technology
24th November 2010*

Pilgrim Beart - Founder Director, AlertMe

Thank you Dougal. It's a privilege to be here with you tonight.

As Lord Jenkin said, my name's Pilgrim Beart and I co-founded AlertMe, a company which uses modern technology to give consumers visibility and control of their energy consumption. So a lot of what I'm going to say tonight is informed by our experience with real consumers: delivering new energy services to them and seeing what works and what doesn't.

Tonight



- Domestic consumption is a big part of the problem
- Consumer psychology
- Ways to deliver change

TONIGHT

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My messages tonight are simple:

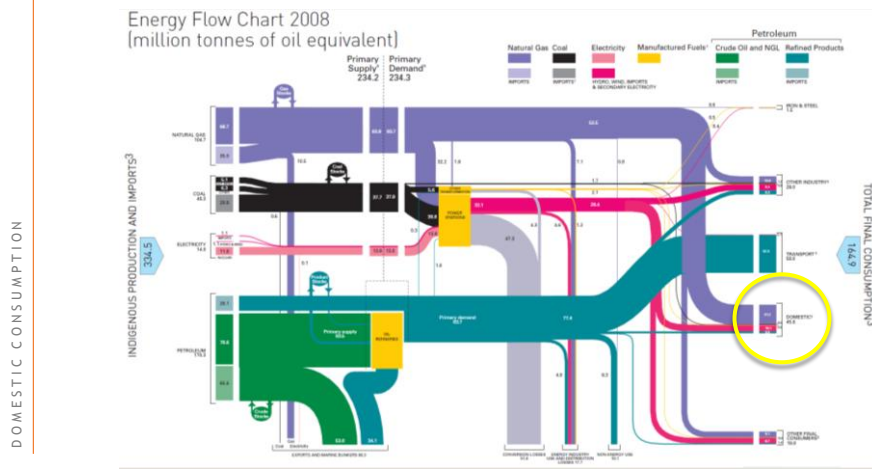
- 1) Domestic consumption is a big part of the problem. So we won't hit our climate change targets without involving consumers.
- 2) In psychological terms, consumers are motivated largely by money, but it's vital to also match motivation with empowerment
- 3) There are several very different ways to deliver change

Domestic consumption is a big part of the problem

Domestic consumption



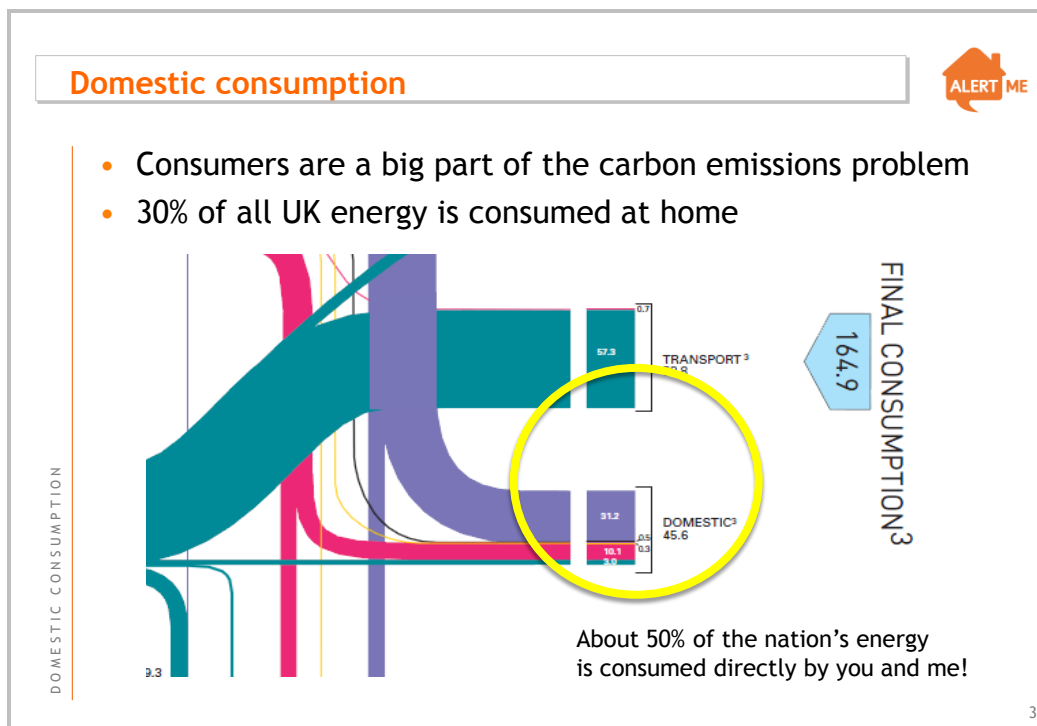
- Consumers are a big part of the carbon emissions problem
- 30% of all UK energy is consumed at home



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As David's book so vividly shows, we face a huge challenge in making our densely-populated island sustainable. The power required to run our nation – heating, lighting, petrol, everything – is about 300GW on average, or 5kW per capita.

And as this DECC slide shows, 30% of all of this is consumed in our homes.



Added to the 17% consumed in our cars, this means that nearly half of all UK energy is consumed personally by you and me.

So each of us have our hands directly on big levers of consumption.

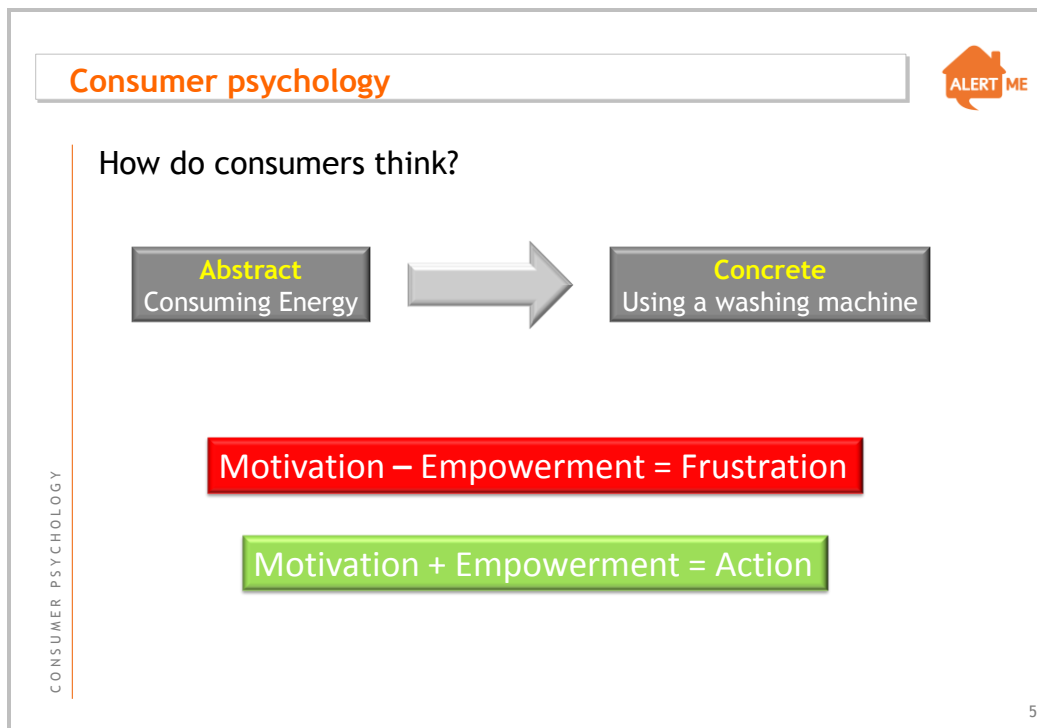
Yet – as we are bombarded daily with messages of doom – we feel powerless to make much of a difference. How can this be?

If we're a big part of the problem, can't we be a big part of the solution too?

The way we consume energy today has been compared to shopping in a supermarket without any prices on the shelves, then receiving an unitemized bill months later. It's expensive, but there's no easy way to work out why.

So as with all good science, I think the journey must start by measuring and observing, revealing actionable information to consumers, utilities and government, empowering each of us to play our significant and necessary role in transforming our society on the road towards sustainability.

Consumer psychology



So how do consumers think about energy?


In everyday life, we don't think of ourselves as “consuming energy”, we are task-focussed, we use our appliances.

We all constantly make choices which affect our home energy consumption, whether we know it or not. Daily choices include how much water we boil in the kettle, whether we use the tumble drier, whether we have a bath or shower, and whether we turn off the TV when we're not watching it. Bigger, less frequent choices include buying new appliances, changing how our heating is set, and deciding whether to invest in insulation.

The media loves to use the phrase “carrot and stick”, but this refers only to motivation (positive or negative). While motivation is important, if we fail to match it with the means to act, then the result is just frustrated inaction. We must make it possible to reach the carrot - or avoid the stick - we must empower consumers as well as motivating them.

What motivates consumers?

Consumer psychology



Motivation: Money!

- Energy bills \approx 9% of disposable income
- 90% of householders concerned about bills
- Standing charge exactly the wrong model
- Rule of thumb: 1W = £1/year

CONSUMER PSYCHOLOGY

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So, let's talk about motivation first, then move onto empowerment.

Money is a strong motivator

Consumers don't think daily about energy, but they do think daily about money – and the evidence is that money is by far the strongest motivator in reducing consumption. This leads to a broad conclusion that, whatever the policy details, the price of home energy should rise, or at least stay high, perhaps reflecting the true value – and cost – of using-up our society's natural capital.

For reference, energy bills hover at about 9% of disposable income today, and according to our market research, around 90% of householders are concerned about them.

We certainly need to get away from today's tiered pricing model which actually encourages profligate use, as energy becomes cheaper the more you use.

And we need to help people with some simple rules of thumb which translate energy into money. For example that each Watt of consumption costs £1/year if it is left permanently on.

We are social animals

Consumer psychology



We are social animals

- Motivated by Competition and Collaboration



CONSUMER PSYCHOLOGY

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Two other strong psychological motivators are that, as social animals, we all love both to Compete and to Collaborate. We love to compete to be better than others and even with ourselves, and we love to collaborate as part of a team, perhaps competing against other teams. The “team” might be literally a sports team, or it might be your family, your town, your school, your nation. How can we use these drives to motivate energy reduction behaviour?

Here are just some ideas: Is your home consuming more than your neighbour’s? Is your town doing better than the other town? Down the pub, do you feel stupid not to be “in” on this new phenomenon? Peer pressure is powerful.

What empowers consumers?

Consumer psychology



What empowers consumers?

- Householders today feel un-empowered
- They view energy bill as outside their control
 - Like mortgage or rent
- Bring energy costs into the here-and-now
- Per-use
- Associate cost with use

CONSUMER PSYCHOLOGY

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So once consumers are motivated, what empowers us? Most consumers today view their energy bills as something outside of their control, a cost of living, like the mortgage or rent. We must change this perception, otherwise consumers will just suffer energy price rises as passive victims. Instead we want them to be spurred into action by a belief that they can reduce their consumption.


Associate the action with the cost

To empower consumers, we need to bring consumption information right into the “here & now”, ideally giving consumers immediate feedback on the cost per-use of their appliances, including heating, at the time that they take the action which commits to each energy expenditure. Some examples of this kind of timely advice are:


- “Running this wash at 60C instead of 40C costs you another 20p”, or
- “Raising your thermostat by one degree costs an extra 50p/day”

Displays

Consumer psychology



Make energy visible




CONSUMER PSYCHOLOGY

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Above all, make energy visible.

In-home displays are now doing that in millions of homes. But these displays are just the first step.

Consumer psychology



Power vs. Energy (and Cost)




CONSUMER PSYCHOLOGY

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Although an in-home display gives you a live view on how much power you are drawing right now – KW – your bill relates to your total energy consumption – KWH. Boiling your

kettle takes a lot of power while its happening, but your fridge is always on so it consumes more energy than the kettle overall.

Consumer psychology



Analytics - beyond kW and kWh


- from Data into Information

Kettle

8p on 9th May 2010

£30.30
87kg of CO₂ per year

2 minutes
1.2p average per use
650ml


By boiling only enough water for a single cup each time, you could save around £16 per year

Kettle was turned on 7 times


- 07:18 - 07:20 (1000 ml)
- 10:38 - 10:41 (1100 ml)
- 10:55 - 10:55 (100 ml)
- 19:38 - 19:41 (1000 ml)
- 20:16 - 20:17 (200 ml)
- 20:56 - 20:57 (200 ml)
- 22:03 - 22:05 (900 ml)


Fridge

27p per day

£100.01
287kg of CO₂ per year

Your fridge is operating in Energy Efficiency Class
F




If you replaced your fridge with an A++ rated one, you could save around £85 per year.

Washing Machine


35p on 9th May 2010

£128.12
367kg of CO₂ per year

70 minutes
17.6p average per use

Washing machine was turned on twice on 9th May 2010:

- 10:12 - 11:16 (confidence: 100%)
40°
- 11:04 - 12:12 (confidence: 100%)
60°


Washing your clothes at 40° instead of at 60° could save you around £69 per year

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Luckily technology advances fast. We can now automatically “disaggregate” household consumption, breaking it down by major appliance, showing consumers the cost of each use of the washing machine or kettle, and the contribution of each appliance to their total annual energy bill.

Now our supermarket shelves can have prices on them.

Everyone is different (there is no single right answer)

Consumer psychology



Segmentation

*"He who would do good to another, must do it in Minute Particulars.
General Good is the plea of the scoundrel, hypocrite and flatterer"*
Blake

- There are challenges for every segment
 - Affluent - cost not an issue, but reputation is
 - Sociable middle class - community peer pressure
 - Children and young adults - education and online
 - Social housing - local government
 - Home Workers - as extension to CRC
- Some offer a particular challenges:
 - Elderly - ensure they don't economise, help insulate
 - Illiterate/Innumerate - need non-numerical visual representation
 - Less well off - help with false economies, help to budget

CONSUMER PSYCHOLOGY

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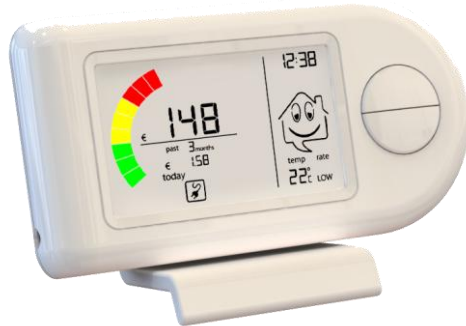
When considering how to motivate and empower consumers, the huge diversity of households and lifestyles means there is no single right answer. As William Blake said:

*"He who would do good to another, must do it in Minute Particulars.
General Good is the plea of the scoundrel, hypocrite and flatterer".*

So we need to consider the Minute Particulars of different houses and lifestyles, and not just design for some mythical average case.

To help with this, how can we "segment" the market? Who are the "early adopters" who will help us "cross the chasm" to majority adoption? Will the middle-classes lead - or just talk about it? Some segments are harder than others to empower, so here are just a few ideas:

If you can't understand numbers...



Coloured speedometer

Ambient light



At Home



Tumble Drier



Away/Night

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- Nearly seven million people in the UK are functionally innumerate. They can't easily understand numerical displays, but a speedometer or coloured lamp makes power easy to understand: Green normally when you're at home, Red when you're tumble-drying something, and Blue when you're out, or in bed. Unless it's Blue, you've left something on. And we end-up with something that works nicely for everyone, because it acts subliminally, making you aware of energy without claiming too much attention.

Reveal false economies



- If you buy, A class £1000 cheaper over 10 years
- If you rent, A class immediately cheaper

*Assumptions:
5 washes/week
electricity at 13p/kWh*

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- For the less well-off:
 - We need to make false economies more obvious. Here's a pair of washing machines I saw in a shop recently. The rental cost of the more efficient A class machine on the left is about twice as high as the C class machine on the right. But in practice, renting the A class machine is actually cheaper overall because of its lower running costs. Energy labels are a great start, but we need to go much further in spelling-out why it matters and translating into money.

Helping budget




CONSUMER PSYCHOLOGY

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- Speaking of which, another way to help the less well-off is by helping people to budget. Many pay for energy on prepay meters, and the consequence of poor budgeting is to get temporarily cut-off. By helping track consumption through a day, week or month, we can help people take early action to get their consumption back on track while there is still time to make ends meet.

Lessons from successful sustainability initiatives

Consumer psychology



Sustainability lessons learned

- Consumers do embrace sustainability
 - CFL's, Recycling
- Lessons:
 - Visibility
 - Convenience
 - Communicate, before exhorting or compelling
 - Call-to-action, e.g. bill shock

CONSUMER PSYCHOLOGY

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In some areas of our lives, consumers have already embraced sustainability, even to their short-term inconvenience or cost, and two obvious recent examples are:


- Energy-saving lightbulbs – cutting per-bulb consumption to $\frac{1}{4}$
- Recycling – cutting consumer landfill dramatically in some areas

So what are the lessons from these successes which might be applicable more generally to home energy reduction?

- Visibility we've talked about: You can see a light bulb. You can see recycling. But you can't see Heat escaping through the roof or gas & electricity being burned.
- Convenience: Many people will contribute to the public good if it's convenient enough. But anything that is disruptive or requires deep engagement is easier just to put off. The consumer aspects of the planned Green Bank seem rightly focussed on convenience.
- Communication: It's vital to communicate well, explaining before exhorting or compelling. Especially since energy-saving happens inside the home: an Englishman's home is his castle, and "the government stops at the front door".
- Calls to action: The drip drip drip of energy waste is like boiling a frog: there's no sudden call to action to overcome inertia. The new Annual Energy Statements, showing everyone their total annual cost of energy – £1200 on average – should provide not just clarity, but also stimulating "bill shock".

Several different ways to deliver change

Delivering change



DELIVERING CHANGE

What options do we have to stimulate change?

- A. “Force”: Tax energy, rollout Smart Meters without consultation, forcibly insulate homes, enforce personal carbon rationing
- B. “Business”: Utility-led change. Against their interests?
- C. “Consumer-led”: Encouraged but not enabled.

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The third topic I want to briefly explore tonight is how we can deliver this change.

Who leads?

The main players are government, business and the consumer. So we can consider 3 approaches, each driven by just one of them:


- 1) A government-only approach could be characterised as “forcing it through”: Taxing energy to the skies, rolling out smart meters without consultation, forcing people to insulate their homes, perhaps even enforcing personal carbon rationing. This is probably not a vote-winner. It’s interesting that smart meter rollout in Holland has been stopped in its tracks by consumer concerns over privacy.
- 2) Or it can be left to business, including of course the Utilities who deliver the energy. But Utilities make their money selling energy don’t they? Utilities will be the ones actually rolling-out smart meters, but lessons from early deployments such as Bakersfield California, and Victoria in Australia, are that deployments planned by utilities for the benefit of utilities run into strong resistance from consumers.
- 3) And leaving the consumer to just make the right choices is unlikely to work either, as Consumers can only make choices if they are offered them, so there wouldn’t be sufficient empowerment.

It’s interesting that the consumer can be a big obstacle in both the first two scenarios. So surely we need to flip this on its head, make sure this doesn’t happen by putting the consumer at the very heart of everything we do, but recognise that the consumer requires government and business to co-operate in delivering the choices.

In other words, it's going to be a dance, with the consumer as equal partner.




Roles in the transition

Delivering change



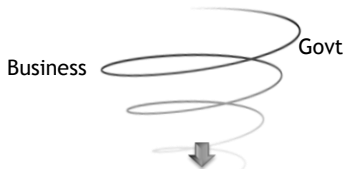
Roles in the transition

- **Government**
 - Enable before Enforce
- **Utilities**
 - Already started transition to Energy Services
 - Will roll out Smart Meters
 - Vital to put consumers first & offer them a benefit
 - UK has golden chance to get it right
- **Consumer “pull”**
 - Empowered by service providers
 - ...driven by competition
- **Enable → Socialise → Enforce**



Consumer

Business Govt



DELIVERING CHANGE

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Government's role is to help us avoid the tragedy of the commons, by establishing and sharing the facts and making key decisions, with a focus on empowering all the players. I hope it successfully retains its current role of enabler rather than enforcer.

An important element of this is outreach to consumers. In the 1980's I well remember the BBC's Computer Programme encouraging a generation to engage in the computer revolution of the time. Perhaps we could have an Energy equivalent, timed around the Smart Meter rollout, to help create a cultural zeitgeist for the energy revolution?

Utilities: Pushed by Government, pulled by Consumers, enlightened utilities are already transitioning from low-margin Energy Retail to high-margin Energy Services. If we view Smart Meters as a question, then what's the answer? I think we have to give consumers tools to take advantage of Smart Meters, so they actively want them.


Consumers: Many transformations of our society have been hugely accelerated by “consumer pull” – e.g. mobile phones. Consumer service companies such as telecommunications providers, electronics companies and, yes, even utilities, are increasingly looking for differentiation, so expect a revolution in energy services from all of these. Which will in turn empower the consumer to achieve greater savings. Our deregulated market could make the UK a leader in free-market innovation in consumer energy.

Past successful sustainability initiatives such as low-energy lightbulbs have gone through a 3 stage process: “enable it, socialise it, enforce it”. Business made the bulbs available, Consumers got used to them, Government outlawed filament bulbs. Longer transitions such

as recycling and home energy reduction require several iterations of this 3-way “ratchet”: business, government and consumers each advancing in turn, each enabling the other, each requiring the other to move a little forwards before they can take the next actions.

New models of engagement


Delivering change



DELIVERING CHANGE

New models of engagement

- House-by-house expert advice, standing by their estimates
- Demand Response (Comverge)
- The trend from products to services
 - ESCO, selling temperature not energy
 - Rent-a-roof
 - Everything as a service
- Personal carbon targets?
 - myemissionsexchange.com
- Capped demand (Eigg)
- C2C



5kW max

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Let's consider some new ways to engage with home energy.

House-by-house experts

We could have teams of experts, that go house-by-house, not just pushing a one-size-fits-all solution, but going in and measuring, doing a proper audit, estimating the savings, and maybe even standing by them.

Demand Response

US company Comverge successfully helped utilities avoid building new power stations with its demand-response program, adjusting millions of consumer thermostats remotely during peak grid demand. Something like this will happen here, although I hope the UK will adopt a less-prescriptive, more price-driven model. Paying consumers to make their consumption more adaptable is worth doing.

Services and ESCOs

An important consumer trend is towards selling services rather than just products. Services outsource the management responsibility, and can lead to savings because they push the operational costs onto the service provider, who's then strongly motivated to minimise them - and able to. Service industries have a great track record of doing more with less: according to BERR over the past few decades the service industry has reduced its energy consumption per unit of output by 40%.

In some factories, rather than pay for energy, they pay their utility for a temperature on the shop floor. This is an example of an ESCO – an Energy Services COmpany. Can we translate this to the consumer realm? Take care of me for a fixed fee, and if you make it more efficient, you can share the benefits? The “rent a roof” solar schemes are rather like this. This isn’t a new model by the way, it’s what Edison did: he sold light, not energy.

Personal Carbon targets

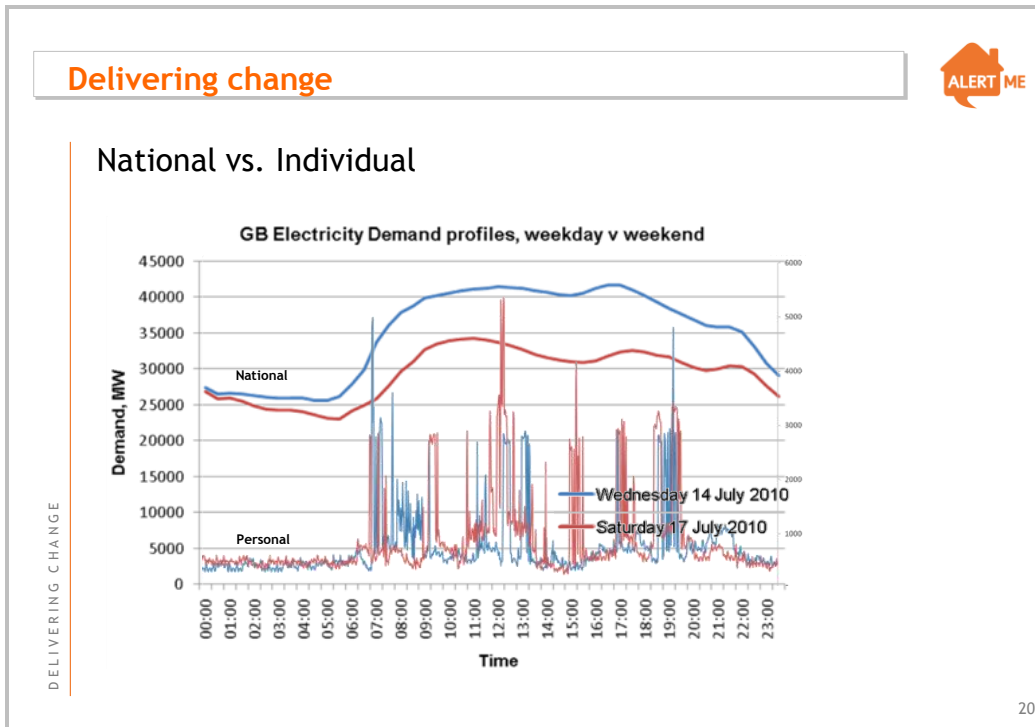
Are we moving towards having personal carbon targets? You can already participate in personal carbon trading at myemissionsexchange.com.

Capped Demand

The Isle of Eigg recently worked-out that capping per-home demand to 5kW would halve their need for renewables. That’s how Italy works already, using only 3kW or 6kW connections compared to the UK’s effectively unlimited 18kW.

C2C

And finally, since there are massive benefits to the grid if we desynchronise our consumption, in other words if I minimise my consumption while yours is maximised, maybe there are interesting consumer-to-consumer models, where consumer's homes co-operate via the internet, co-ordinating their energy-use as a collective, and thereby obtaining better rates for their energy.



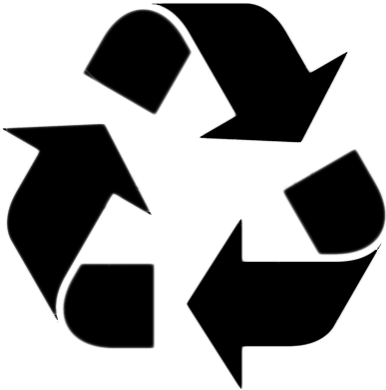
To illustrate, here's a DECC graph of national electricity demand on 2 particular days. And here's my personal consumption on those same days. Clearly by moving the spikes about on millions of consumers like me, we could change the overall demand shape dramatically.

The transition from a consumer perspective

Delivering change

ALERT ME

3 steps, and repeat



Reveal
Reduce
Renew

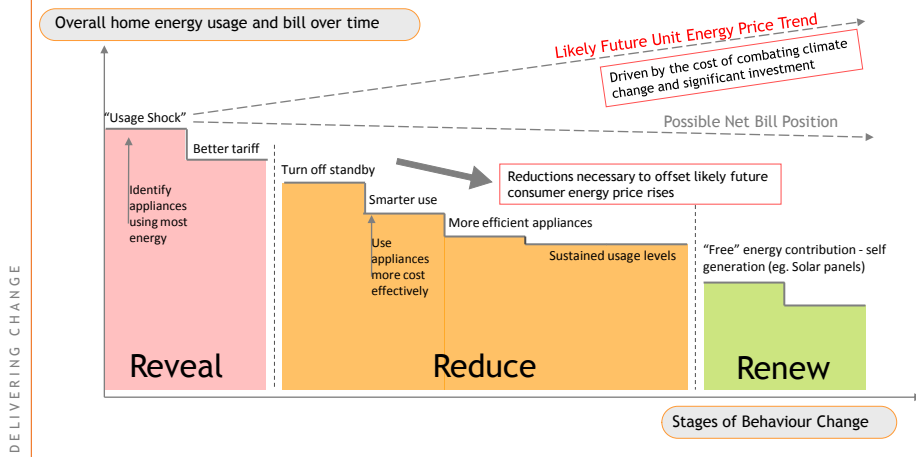
DELIVERING CHANGE

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So what is the transition likely to look like from a consumer perspective?

In recycling, we have the mantra of Reduce, Renew, Recycle. What are the equivalent transitions for home energy? Perhaps it's Reveal, Reduce, Renew. Make the problem visible, reduce consumption, move to renewable generation.

Consumer behaviour through the transition



In more detail...

In the Reveal stage, in-home displays make consumption visible, and annual bills provide bill shock to overcome inertia. An early response is to switch providers, but as the benefits of this become marginal due to competition, suppliers will increasingly need to really differentiate, and one way they'll do it is by offering added-value energy services.


The Reduce stage is then a series of behavioural changes and purchasing decisions which actually drive down consumption. This requires a process of continual engagement on several fronts.

And we reach the Renew stage once we've scrubbed off much of the waste - so for some this is at 10% savings, for others at 30% - when we must turn to local renewables for the next big win.

All of this could result in energy bills falling, even against a backdrop of energy prices rising.

Summary

Conclusion



CONCLUSION

- Consumers present a big part of the problem
 - We won't hit our targets without them

- Consumer psychology
 - Money is top motivator
 - Explain appliance cost of ownership up front
 - Bring per-use costs into the "here & now"
 - Make Smart Meters open to the future
 - Everyone is different
 - Major outreach programme around Smart Meters
 - Our deregulated market empowers consumers

- Several ways to deliver change
 - But the consumer is at the heart of them all

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So in conclusion:

- 1) Consumers are a big part of the problem. We won't hit our targets without involving them.
- 2) Consumer psychology revolves largely around money, but it's vital to match motivation with empowerment.
 - a. We need to explain the running costs of appliances. We need to bring energy costs into the here & now, with in-home displays and a whole roadmap of innovations around Smart Meters. And Smart Meter rollout itself designed around consumers.
 - b. Everyone is different, so we must pursue diverse approaches.
 - c. Perhaps we should consider some sort of outreach in the style of the Computer Programme.
 - d. Our deregulated market can actively help to empower consumers.
- 3) And finally, there are several very different ways to deliver change, but consumer engagement is vital to make any of them work.

David's book makes clear that – even with the best political will – physics places severe limits on how much sustainable energy we can generate in the UK. But our consumption today is incredibly wasteful and operates very far from the physical limits of how little energy we could use to do the same job, especially in our homes. Generation and Consumption are going to have to meet somewhere in the middle.

US energy guru Amory Lovins once coined the term “negawatt” to capture the idea that the cheapest Watt is the one you don’t have to generate in the first place. Reducing demand can be cheaper and quicker than building the equivalent renewable supply. Of course we still desperately need to accelerate our building of renewables, but reducing consumption is essential to reduce the capacity we have to build.

There is no silver bullet, so we need “silver buckshot” – a set of well-designed solutions, bearing down on every worthwhile saving. There is huge potential to reduce energy consumption by unleashing frustrated consumer engagement. Without affecting our quality of life. And it can be fast.

Actions we take now could deliver significant, measurable difference within this Parliament.

Thank you.

[live demo of my home consumption]

Refs

- “UK primary consumption averages about 300GW which is about 5kW/person”
 - UK 2001 total primary annual energy consumption was ~240 million tonnes of oil equivalent (toe): P8 of <http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/files/file11250.pdf>
 - 1 toe is 11.6MWh, so annual energy consumption is 2784000 GWh/year, an average power consumption of 317GW
 - UK pop. is ~61m (World Bank), so per-capita primary power consumption is ~5kW.
- UK Energy use per capita according to the World Bank (1kg of oil equates to about 12 kWh): http://www.google.com/publicdata?ds=wb-wdi&met=eg_use_pcap_kg_oe&idim=country:GBR&dl=en&hl=en&q=energy+consumption+in+the+united+kingdom
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- David MacKay’s book Sustainable Energy without the Hot Air: <http://www.withouthotair.com/>
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- Sustainable Blacon – a community with DECC-funding, exploring how to create a sustainable urban community <http://www.sustainableblacon.org.uk/>
- Total UK electricity consumption 14th & 17th July 2010. DECC publication “Energy Trends September 2010” (p50)
<http://www.decc.gov.uk/assets/decc/Statistics/publications/trends/558-trendssep10.pdf>
- Negawatts <http://www.ccnr.org/amory.html>
- “Great Expectations, the cost of offshore wind”, UKERC,
http://www.ukerc.ac.uk/support/tiki-read_article.php?articleId=613
- “Sizewell B cost ~£2.2m/MW”
<http://webarchive.nationalarchives.gov.uk/tna/+http://www.dti.gov.uk/files/file31938.pdf/>
- The Rise of Home Working: <http://www.guardian.co.uk/money/2010/aug/03/rise-working-from-home>
- Origins of the term “Consumer”: <http://dictionary.reference.com/browse/consumer>
- Capped Demand: Juliet Davenport, of Good Energy, talks about Eigg’s 5KW limit
 - (watch from 18’30”) <http://www.schumacher.org.uk/?q=node/39>
 - Blog post at <http://good-energy.typepad.com/greenenergyrepublic/2010/03/isle-of-eigg-a-model-community-for-the-renewable-era.html>
- “Almost seven million functionally innumerate.”
http://www.bis.gov.uk/assets/biscore/corporate/migratedD/ec_group/116-08-FO_b