



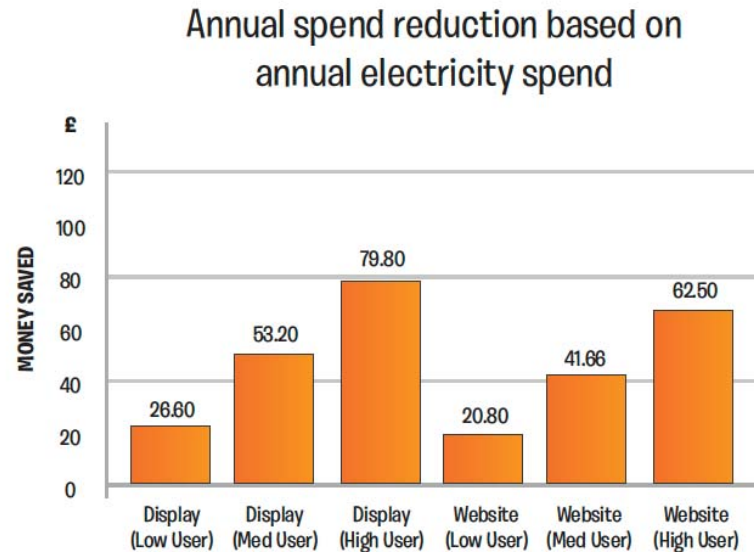
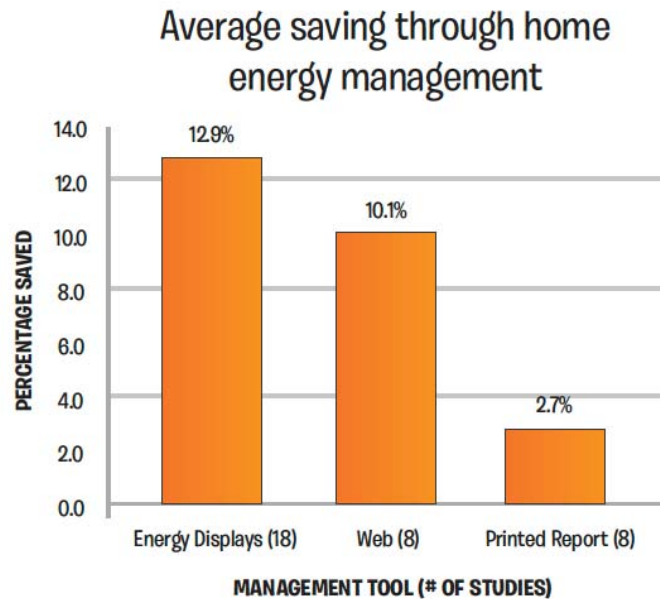
Smart Metering
The First 50 Billion Data Points

Nick Hunn
Development Director

Our Experience of:

~ 100 billion customer readings

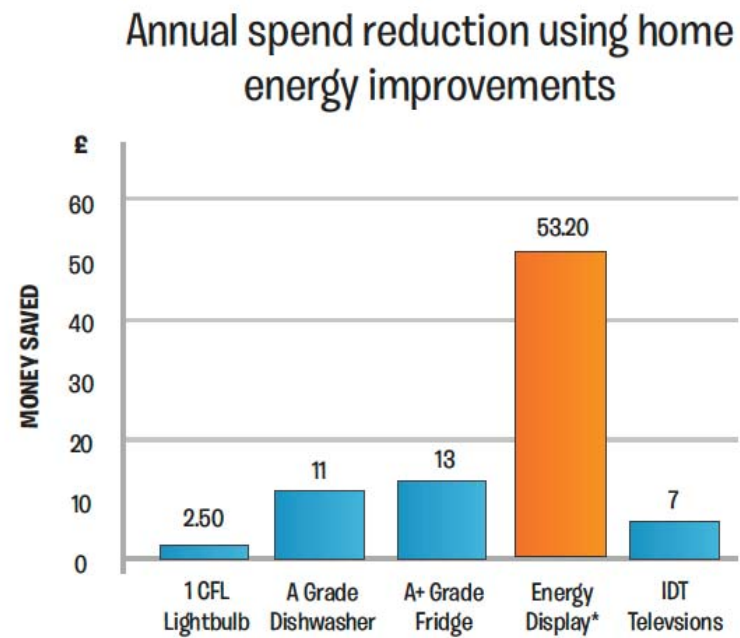
Engaging Users – What it's all about...



Low, Medium & High users based on average consumption of 1650kWh, 3,300 kWh and 4,950kWh respectively. All based on single rate electricity at 12.50p per unit, without additional charge. Percentage reduction based on recorded IHD savings of 12.9%, and Website savings of 10.1%.

From a comprehensive survey of 34 published studies of efficacy in home energy management by Jessica Diniz (2010).

In praise of IHDs



Based on average consumption of 3,300 kWh for single rate electricity at 12.50p per unit, without additional charge. Percentage saving based on recorded IHD savings of 12.9%.
Appliance cost based on Energy Saving Assumptions 2011 by the Energy Saving Trust.

Onzo's Smart Energy Kit

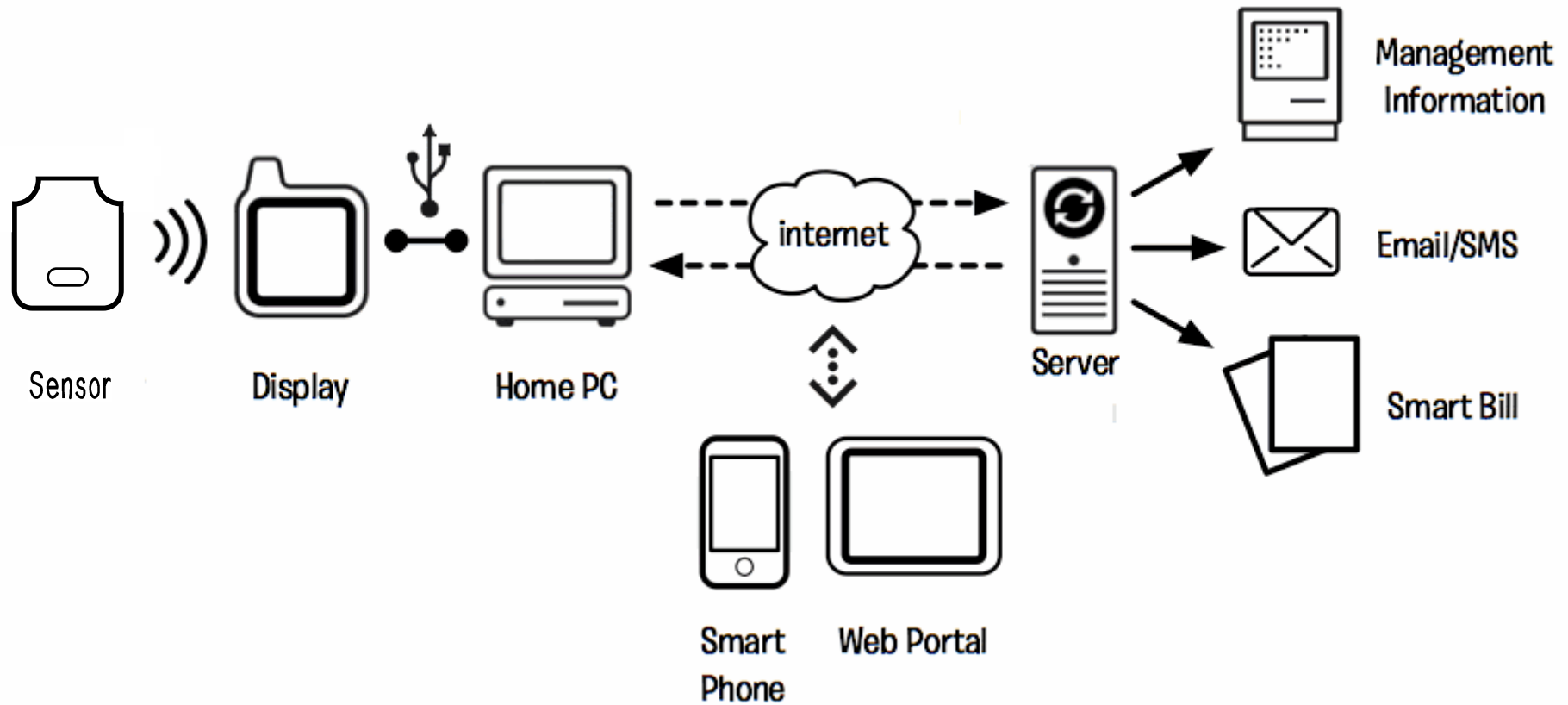


An energy harvesting, self-installed, high accuracy clamp.



An easy to read display with energy tools to help behaviour change.

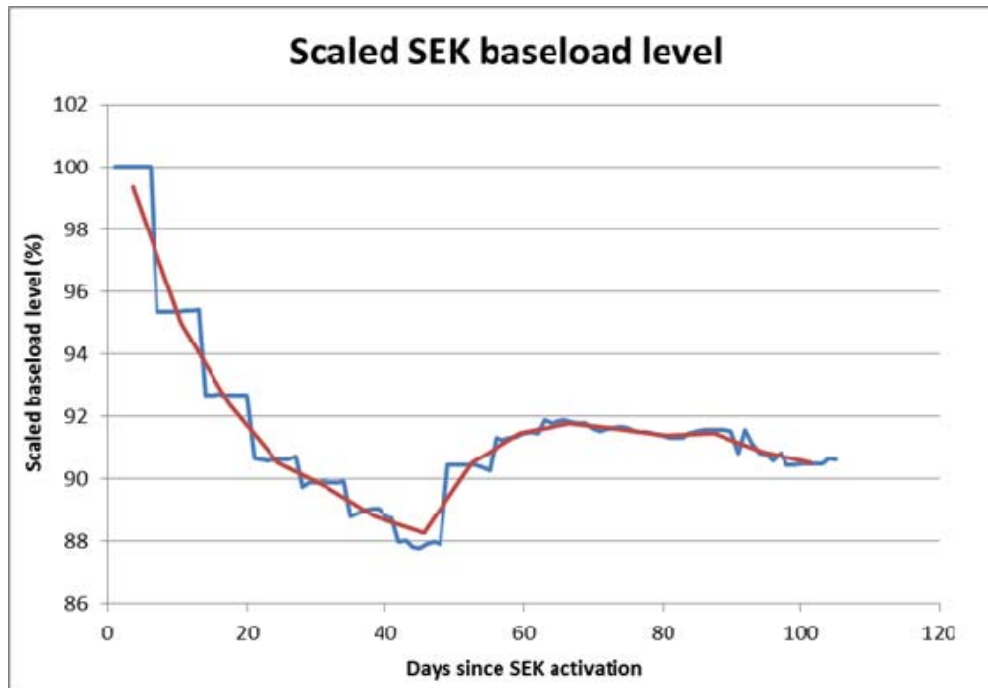
The end to end system



Baseload – the first consumer experience

Most users have no idea how much energy is being used by devices. Particularly permanently plugged-in devices.

52% of users turn devices on and off as their first activity.

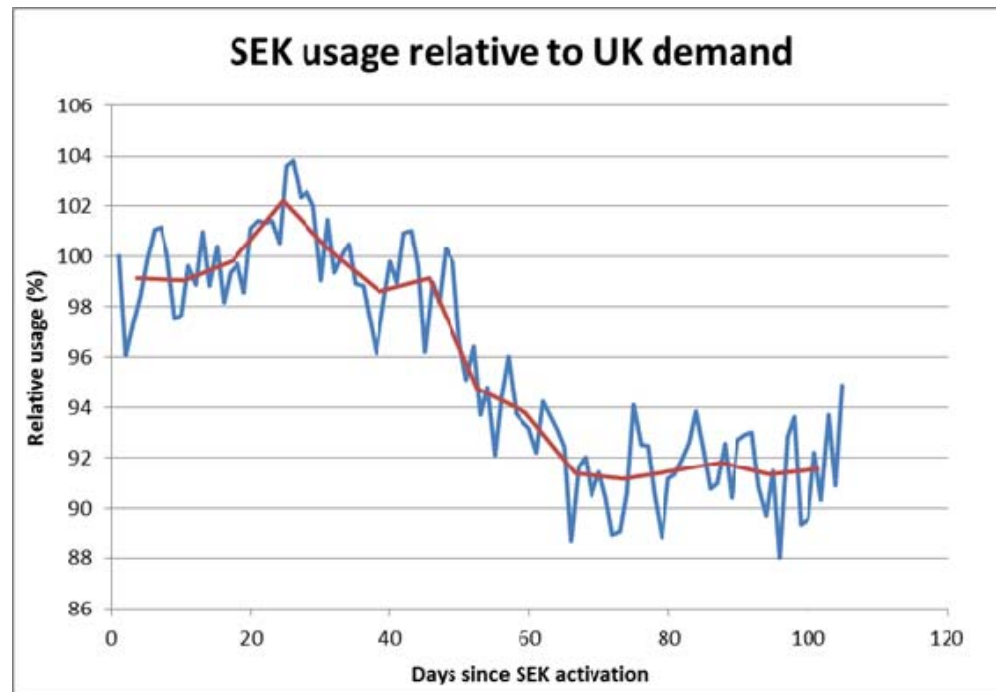


Once they've learnt, they seem to remember it, as long as they're prompted by a clear display.

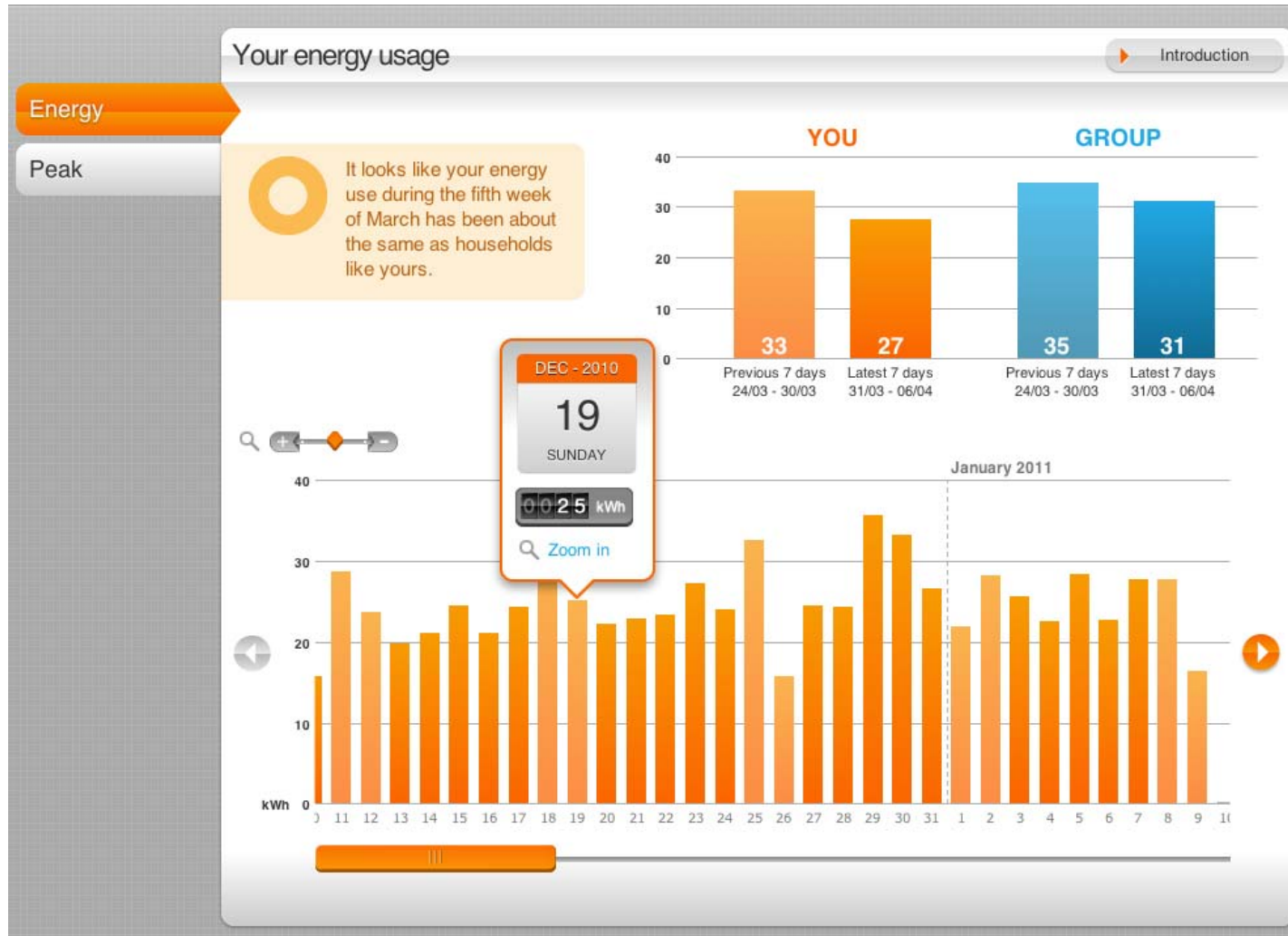
Continued Savings

65% of users claim to refer to the display on a daily basis

80% say they refer to it “at a glance”.

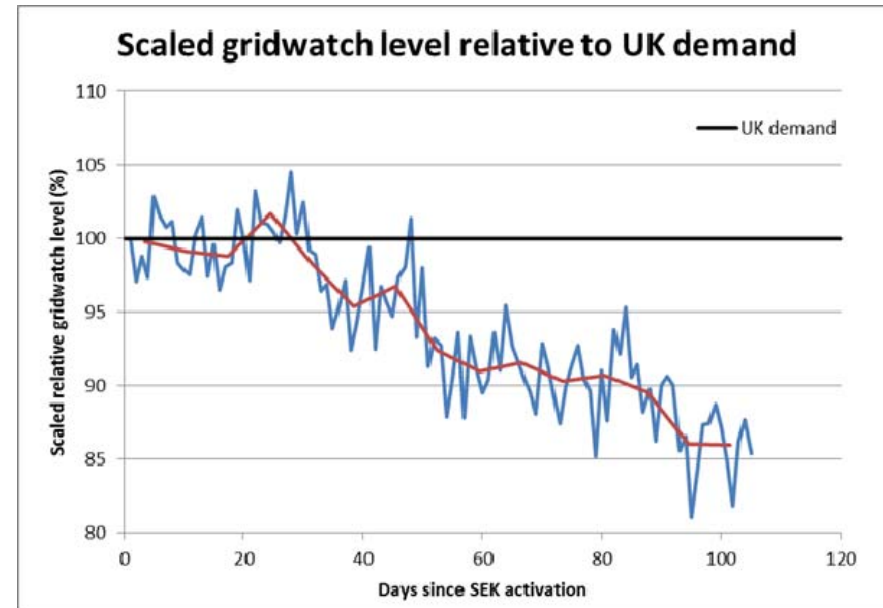
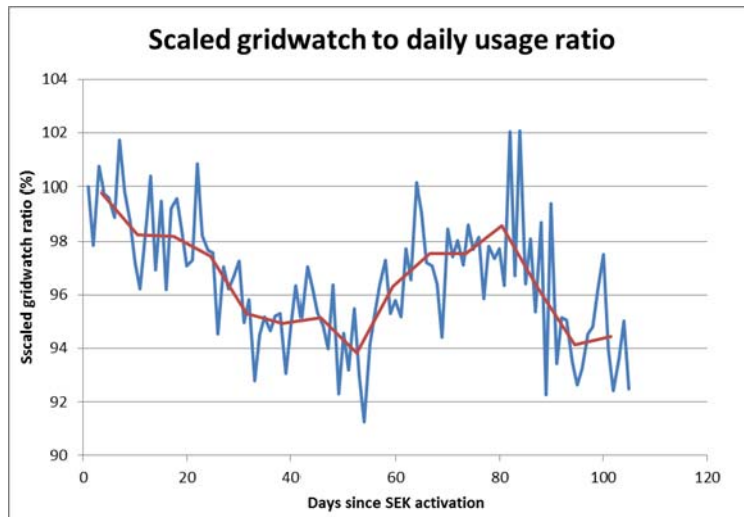


Almost half stay engaged via the web



Shifting Demand

They also use the gridwatch tool to shift their demand, even though there is no financial incentive for them to do so.



Comparing usage across the day, shows this is a real adjustment in behaviour.

Users find interesting ways to engage

“If the number goes above the target, I yell at the kids to turn something off.”

“It sits on the dining room table, so the whole family can see what’s going on.”

“All four children are slowly starting to understand how they are impacting on the planet. I think it helped that the money saved was shared equally amongst them”

And they may know best

“All four children are slowly starting to understand how they are impacting on the planet. I think it helped that the money saved was shared equally amongst them”

This is **not** a money saving approach,
It's an **energy saving** approach.

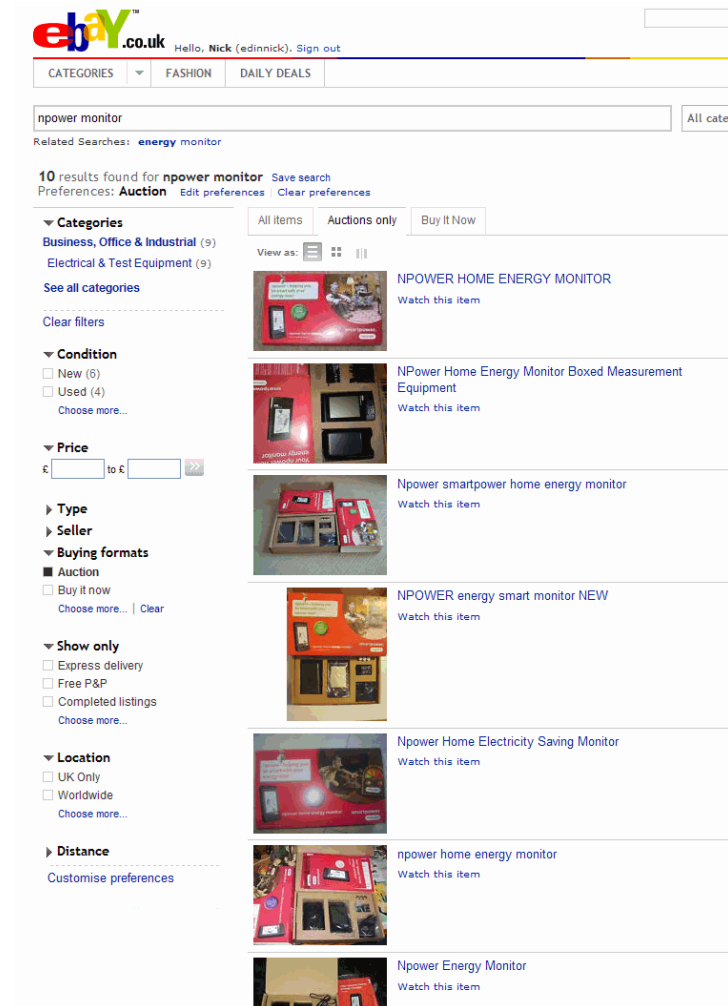
We didn't think of it, not did any working group or Government body. Given the right tools, customers will come up with better ideas than any of us.

Which is important. Otherwise...

They stop using their display.

Or put it in a drawer.

Or sell it.

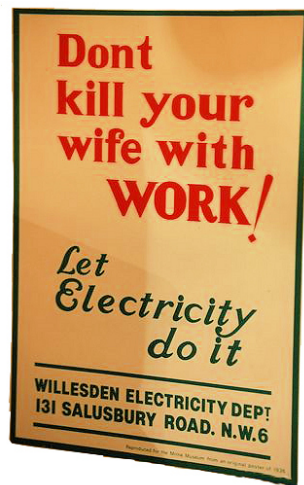


The Value of Data

How we know this and what else we can learn

Customer loyalty

Why can't a utility be more like a retailer?



The evolution of metering - Analogue



Today Energy Retailers interact with their customers through a quarterly bill.

They have no real understanding of the consumer's home, or any ability to extend their service offering efficiently based on this level of knowledge.

Customer services is reactive.

The evolution of metering - Smart



Energy Retailers are now starting to deploy smart meters. These provide data readings every few minutes, but beyond allowing estimated billing and a crude knowledge of power usage they provide remarkably little additional information.

The data is too coarse to do much beyond improving current business processes.

It is questionable whether it will change customer behaviour.

The evolution of metering - Intelligent



Real intelligence only comes when you have the granularity of data to detect how energy is being used:

- By which appliance?
- When? And...
- For how long?



With that knowledge, it becomes possible to open up a knowledge economy for energy retailers and other businesses.

The growth of data

The transitions through this data path are massive. Each step increases the volume of data that needs to be captured and processed by a factor of thousands. For the UK population, that's:

Analogue world – 30 million readings / year

Smart metering – 500 billion readings / year

Smart living – 900 trillion readings / year

It needs a special levels of expertise to capture, store and analyse this quantity of data in a cost effective way.

And end-to-end approach to “big data”



Analysing the data



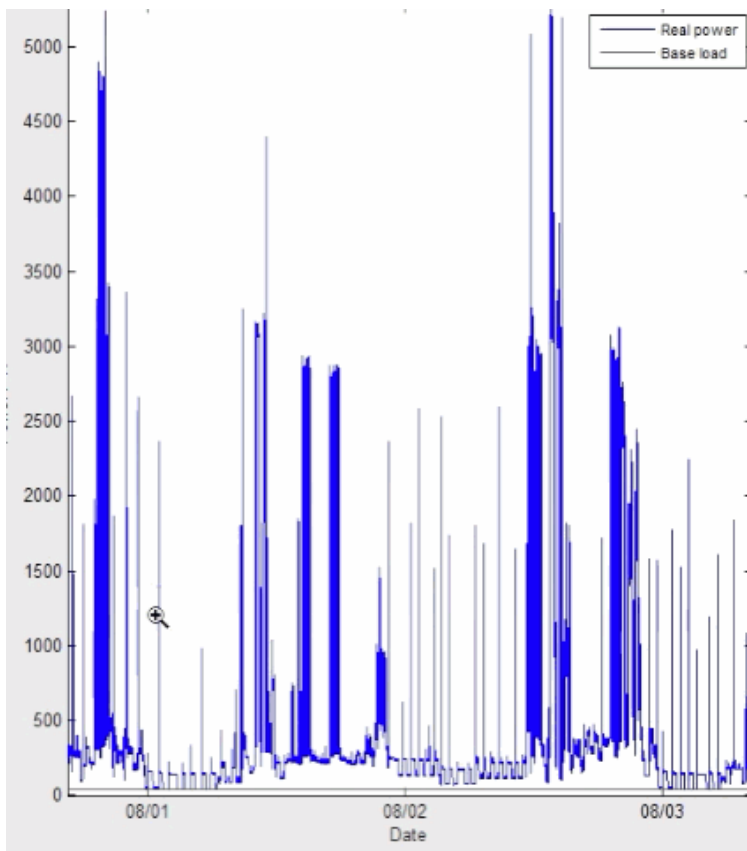
Hundreds of Terabytes of data requires special handling.

Onzo has developed their Cortex Server Architecture to efficiently provide massive time series data storage and analysis.

The architecture runs Onzo analysis routines across multiple data streams to provide the insight into how energy is being used within a home and how it can be better managed, including:

- Which appliances are being used,
- When they are being used,
- What power they are consuming, their efficiency and even how they are being used.

Appliance Inference – Applying intelligence

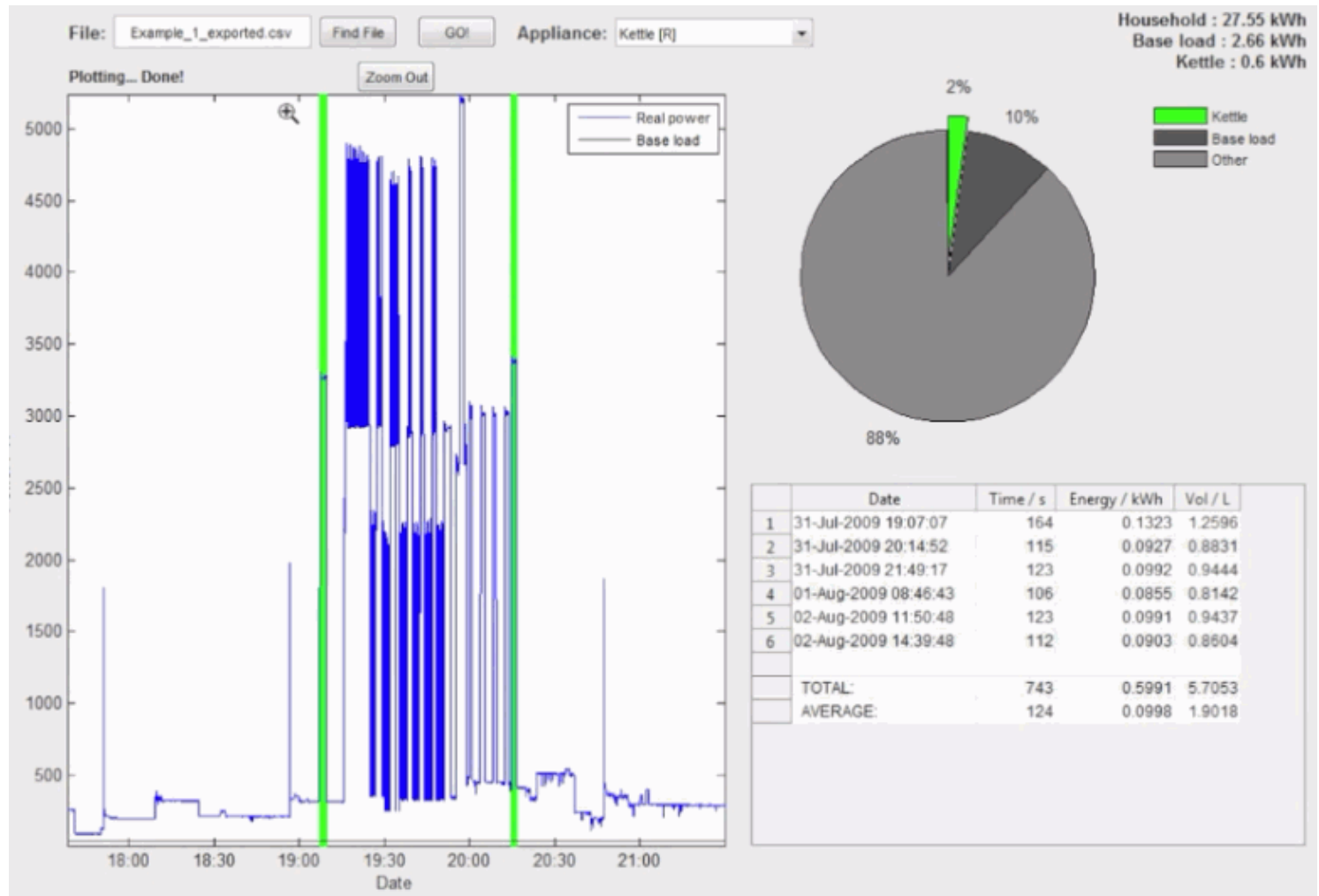


We read real and reactive power every second from a single feed from our sensor.

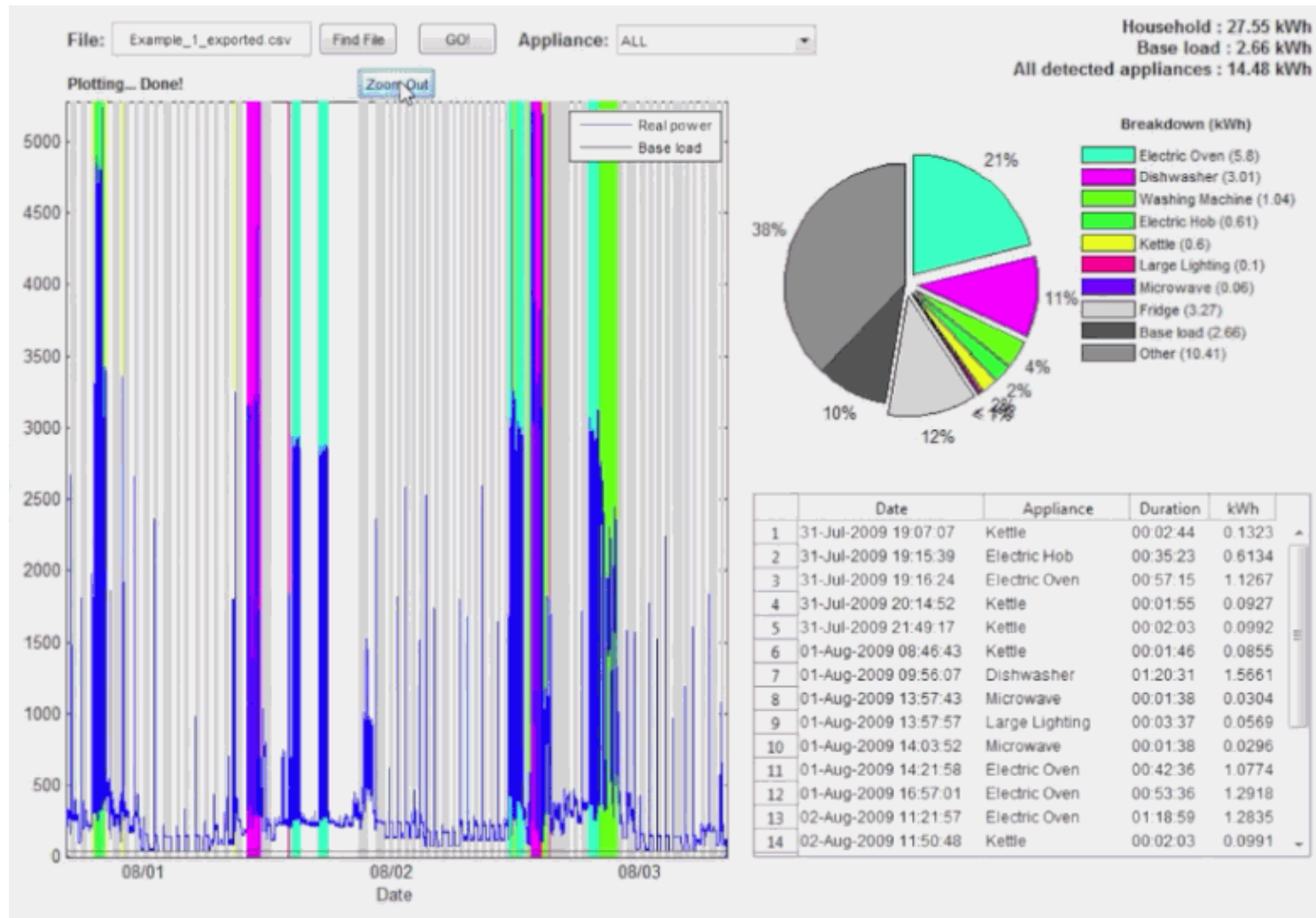
The data is compressed using wavelet compression to reduce the data flow by a factor of around 20:1.

We have amassed a database of 1600 household devices to perform blind detection of appliances.

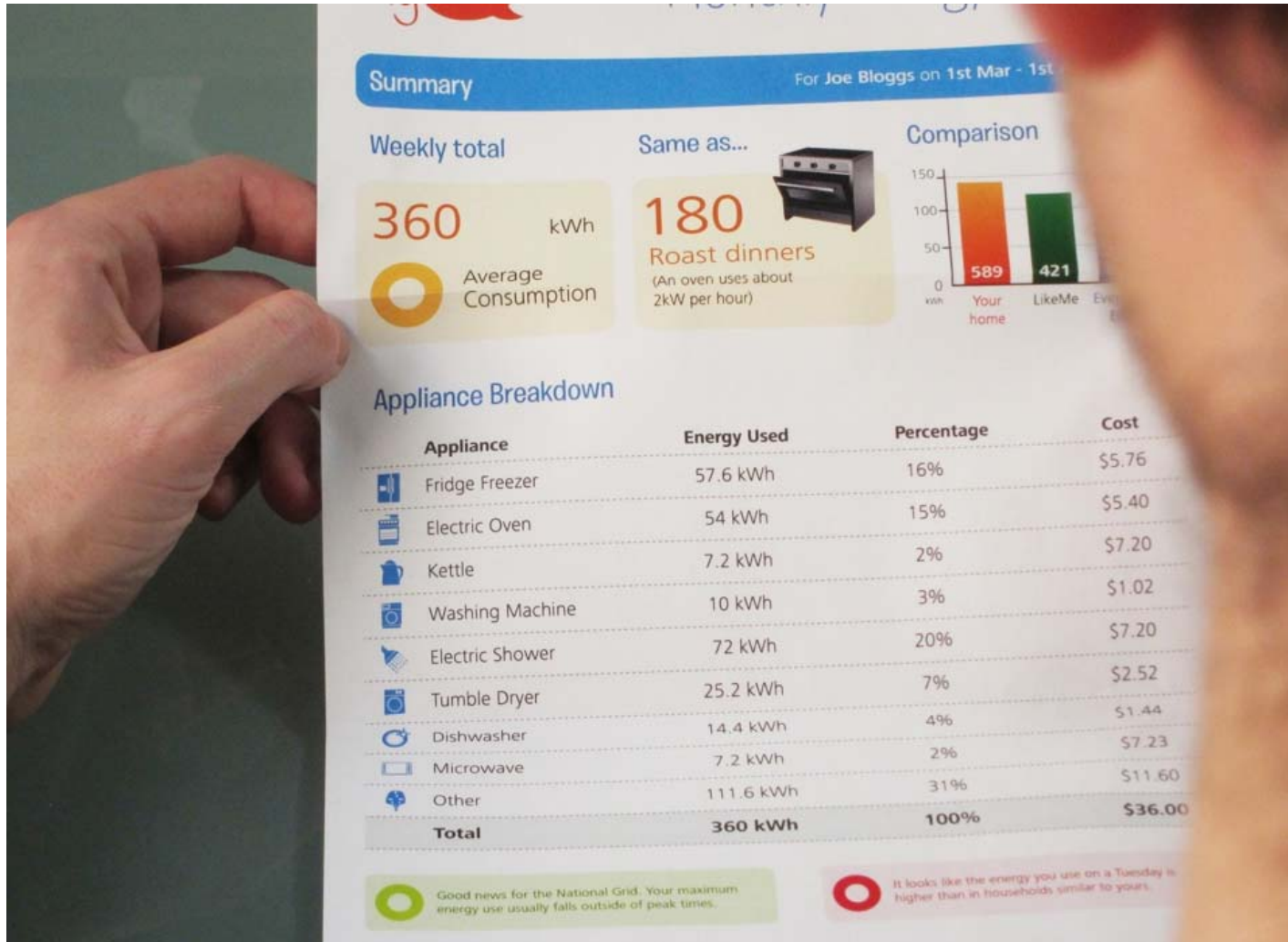
From kettles...



To multiple appliances

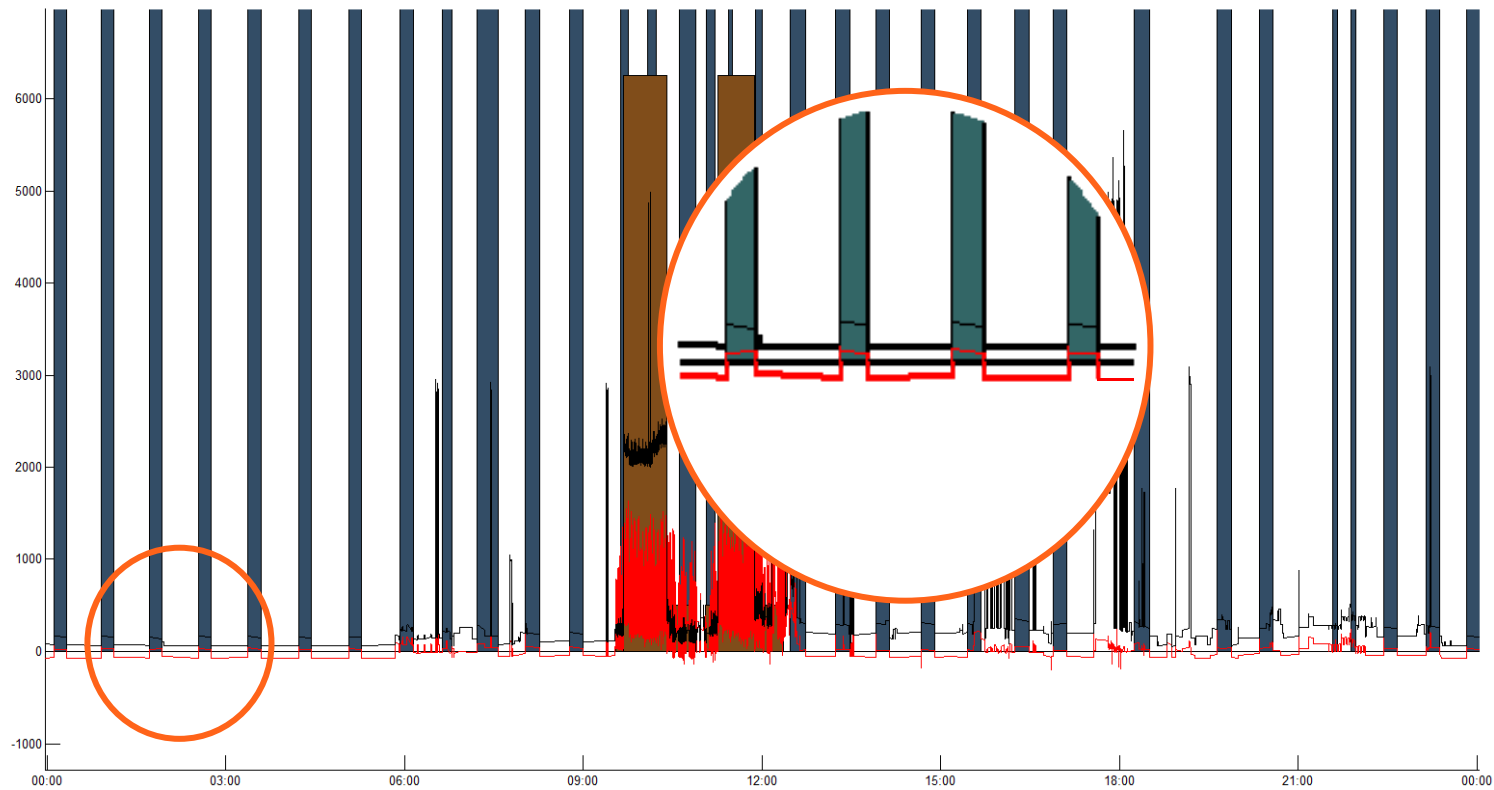


Which makes itemised smart bills possible



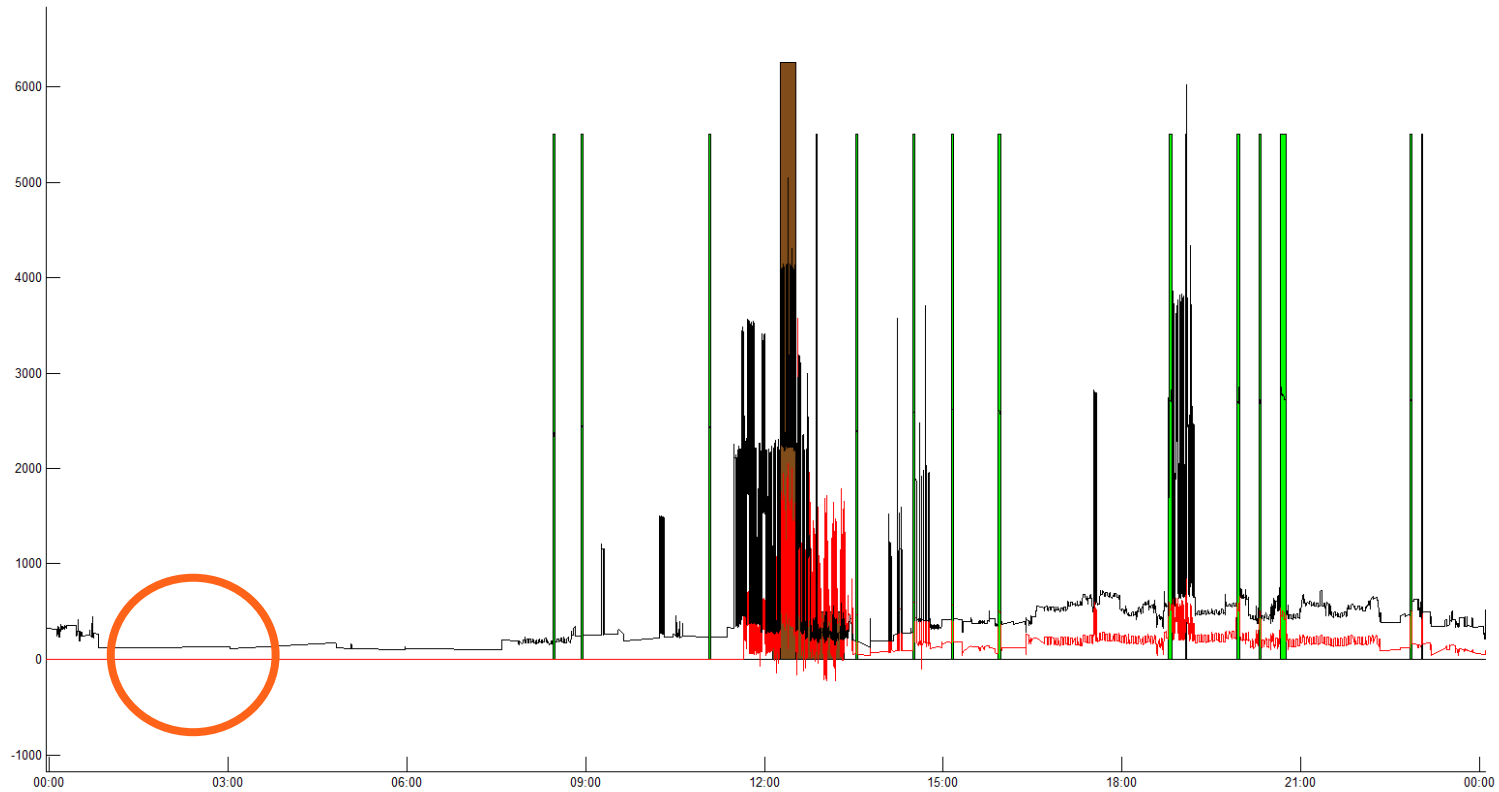
Appliance Condition

We know what a fridge looks like when it's working:



Appliance Condition

We know when it is about to fail. Here the compressor is not cycling.



So we can warn the consumer



Customer engagement



Data can be presented in multiple ways, to engage customers, or to provide intelligence for a business process.

Onzo provides information in a multiplicity of formats, from white label websites, to In Home Displays.

Data can be accessed by any web enabled device, or sent through traditional channels such as SMS, email or letters.

Our firmware experience also allows us to embed data analytics within consumer devices. We have already done this with an integrated intelligent HVAC controller.

Generating insight

This ability does not just improve existing business models, it allows completely new ones, as well as new business opportunities.

Customer Support	Knowing which appliances are being used and when? Alerting customers to change in usage when new appliances are detected. Knowing when it is the right time to call.
“Nudge Tariffing”	Determining which customers have the capacity to change their usage patterns by analysing current usage. This is far more effective than the blunt stick of dynamic pricing.
HVAC	Providing smart climate control that uses appliance detection and derived occupancy to adjust the HVAC to optimise performance and comfort levels.
Smart Maintenance	Detecting appliances in use and their condition to allow intelligent preventative service plans to be offered.
Assisted Living & Sheltered Housing	Monitoring usage patterns to support independent living.
EV Charging	Determining the household use patterns that can gauge when and how much to charge an electric vehicle.
Virtual Power Operators	Providing the usage information to allow Virtual Power Operators to tailor tariffs to individual users on a daily basis.

Speeding up the UK deployment

Onzo has a solution that exceeds expectations for changing the energy usage behaviour of UK residents.

We can deploy it to fulfil the customer behavioural change requirements of UK mandate now. And complete the deployment by 2014 for a fraction of the cost of smart meters.

And, unlike a smart meter, it can be delivered through a letterbox.



Thank you for listening.

Questions?

The ONZO logo is displayed in a bold, orange, sans-serif font.

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