

Home Energy Management in Europe

Lots of solutions, but what's the problem?

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Home Energy Management in Europe: *Lots of solutions, but what's the problem?*

The revolution in 'Smart Homes' and home energy management (HEM) is sparking serious interest in the European retail energy market – with over 100 HEM systems already being deployed. But what these systems should look like and be capable of is far from clear. The functionality of products today is already diverse – ranging from basic energy usage displays at one end of the spectrum, to devices offering home automation and enabling utility control of appliances at the other.

Product developers, utility energy suppliers, telecoms companies and media providers are attempting to identify the value proposition for customers – and key to this is delivering a product that engages and excites consumers.

Delta is a leading European consultancy focusing solely on markets for energy technologies on the 'customer side of the meter', including microgeneration, heat pumps and cogeneration. HEMs have a key role to play in this space and are a core focus for Delta's ongoing research (visit www.delta-ee.com for more information). In this White Paper, the first of a series on the HEMs market, we give examples of the range of products being deployed in order to identify key trends in technology and which products look set to dominate.

HEMs are evolving in complexity and capability, but huge uncertainty remains around what the customer wants, and who should deliver this

Our key observations and conclusions:

- ▶ **We see a sharply accelerating trend towards more intelligent and sophisticated HEM products.**
- ▶ **How fast to the kitchen drawer? In-home displays could be an 'evolutionary dead end'.**
- ▶ **The utility role in product deployment is critical today, but may be short lived.**

Home Energy Management – over 100 systems

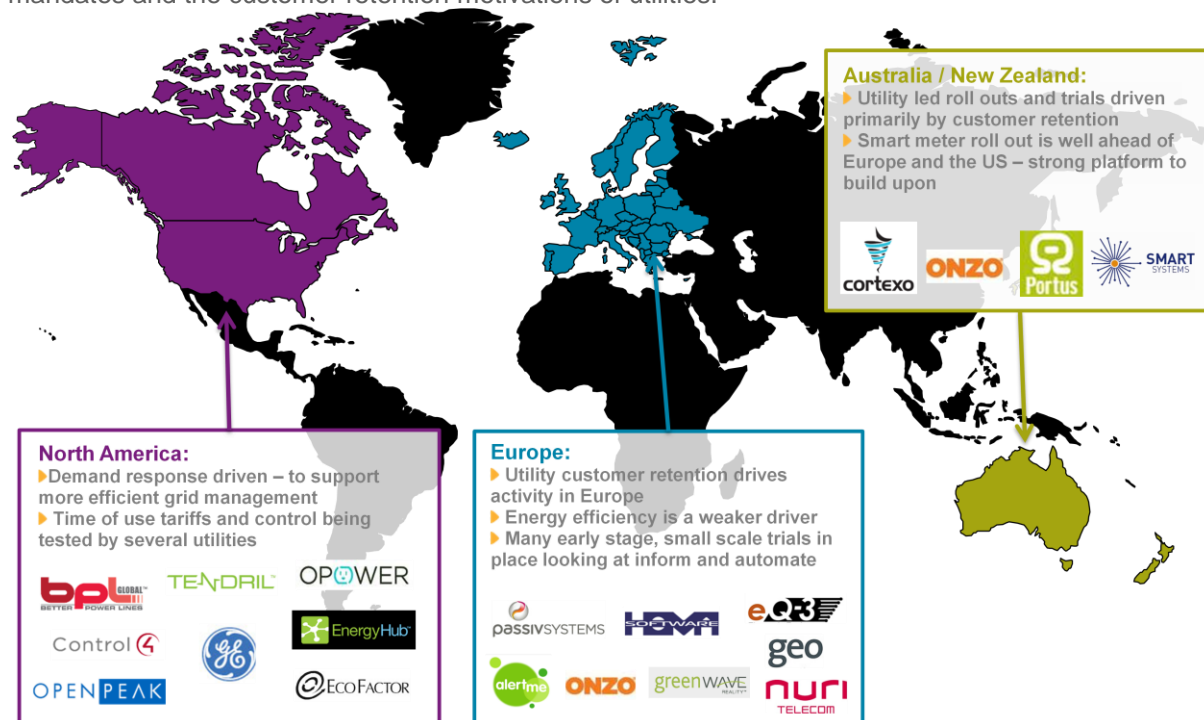
HEMs mean different things to different stakeholders, and are being deployed around the world for a range of different purposes. Delta defines HEMs as in-home tools which offer one or more of the following functionalities:

- ▶ **Inform** – a one-way flow of information, displaying energy usage data to end users.
- ▶ **Automate** – the two-way flow of information between a ‘hub’ and appliances, enabling customers to ‘set and forget’ the operation of household appliances and microgeneration.
- ▶ **Control** – as above, plus enables third party control of household appliances via pricing or other remote signals.

We are seeing a surge in the number of HEMs coming to the market and have identified over 100 systems that are available (a selection is shown in **Figure 1**) or are being deployed in trials.

FIGURE 1. DIVERSE GLOBAL DRIVERS OF HEM DEPLOYMENT

The US has led in HEMs deployment due largely to the need for more efficient management of its aging power infrastructure, and the benefit it stands to gain from better managing supply and demand. In Europe and Australia, HEMs deployment is now rapidly gaining momentum – driven by smart meter mandates and the customer retention motivations of utilities.




Source: Delta Energy and Environment, 2011

A HEMs snapshot

Table 1 on the next page summarises a handful of the many systems now being deployed in various parts of the world – and others that may soon be introduced.

TABLE 1: HEMS – A HIGHLY DYNAMIC PRODUCT SECTOR

Over 100 HEM products and systems are currently being deployed commercially and in trials around the world, primarily by utility energy suppliers - while other products and software solutions are about to enter the market. Here is a small selection (this is not intended to a comprehensive review).

	Product / manufacturer	Customer interface	What is offered?	What does it do?	In a nutshell
Inform only		<ul style="list-style-type: none"> IHD Web 	<ul style="list-style-type: none"> Free IHD via a utility – customer must join a tariff. Currently (Oct 2011) unavailable to buy – but has been, from Amazon. 	<ul style="list-style-type: none"> Displays energy demand, energy cost and time-of-use data. Historical data displayed online. Alerts consumer of performance against targets, and when grid is constrained. Rate change alerts (for ToU tariffs). 	<ul style="list-style-type: none"> Strong sales growth Expanding international trial experience.
		<ul style="list-style-type: none"> Web Email Smart phone 	<ul style="list-style-type: none"> A utility proposition with no physical in-home device for consumers. Home Energy Reports and text messaging service is provided free to customers. Interactive online portal enables customer engagement for utilities. 	<ul style="list-style-type: none"> Home Energy Reports display historical gas and electricity consumption, and analysis on usage compared to neighbours in the local area. Online portal displays historical energy use, energy use by appliance, energy costs and tariff options. 	<ul style="list-style-type: none"> Rapidly expanding firm with 10s of utility partners in the US, and expanding into Europe.
Inform and automate		<ul style="list-style-type: none"> IHD Web Smart phone 	<ul style="list-style-type: none"> Smart Energy Kit costs around €55 – with a free display. Smart Monitoring package including key fobs and other sensors costs around €170. Smart plugs available separately. Online heating offering is currently being introduced to the UK and US. 	<ul style="list-style-type: none"> Displays energy consumption, energy cost, time of use information and predicts monthly energy bills. Online portal shows historical energy consumption and offers energy saving tips. Automation of appliances via smart plugs (Smart Monitoring package). Automation of heating system via Wattbox acquisition. 	<ul style="list-style-type: none"> Already selling product, securing early revenue to fund next generation development. Partnerships with British Gas and Deutsche Telekom give it a good platform for growth. Strong customer proposition.
		<ul style="list-style-type: none"> IHD Web Smart phone 	<ul style="list-style-type: none"> Various IHDs with different levels of functionality – mainly inform and automate. Solo - a PV system monitor is available. Available via utilities and retailers. 	<ul style="list-style-type: none"> Displays energy cost, historical energy usage and carbon emissions. Indicates when energy usage is high compared to 'normal' consumption. An online portal illustrates and analyses historical energy consumption. Automation of several appliances is possible. 	<ul style="list-style-type: none"> Several utility partnerships and trial involvement across Europe gives GEO a good route to market, and customer insight.
		<ul style="list-style-type: none"> IHD Web Smart phone 	<ul style="list-style-type: none"> IHD, home hub and sensors are focused on energy savings on the heating side. Solar PV monitoring is available. Purchase and installation direct from supplier. 	<ul style="list-style-type: none"> Displays temperature of home, energy consumption and boiler / thermostat settings. Enables remote control and automation of boiler and hot water programme. Online portal shows historical temperature, energy use and offers energy saving tips. 	<ul style="list-style-type: none"> Interesting approach of focusing on energy savings on heating gives Passiv's product the opportunity to save more money – an interesting selling point and customer proposition.

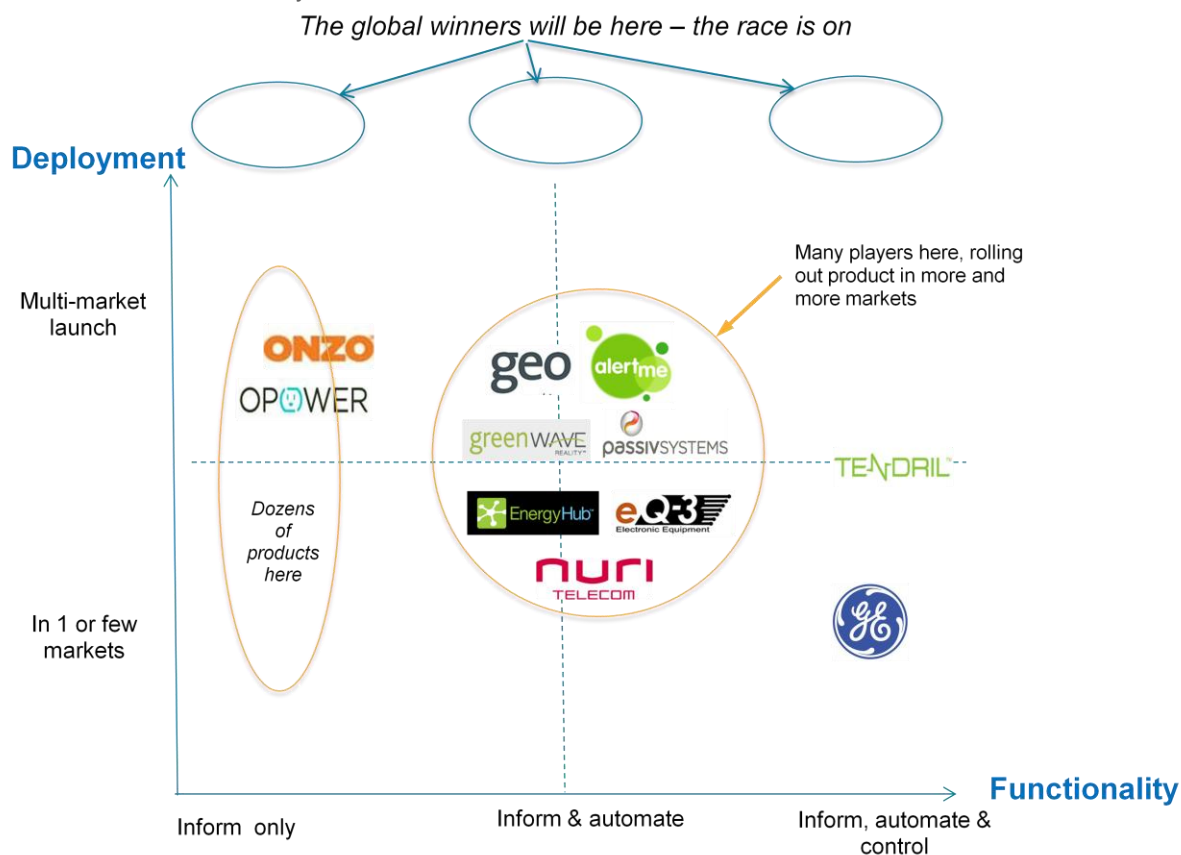
Inform and automate		<ul style="list-style-type: none"> IHD Smart phone Web 	<ul style="list-style-type: none"> Package includes energy usage monitor. The starter package includes two radiator thermostats, an adapter and a wall transmitter, a central control unit and override switch. Package costs around €370. 	<ul style="list-style-type: none"> Displays consumption data (and cost / carbon emissions) direct from the meter and from appliances. Total consumption data is stored for 1 year. EQ-3 MAX enables remote heating control and electricity management. 	<ul style="list-style-type: none"> EQ-3 has been in the home controls business for many years with a track record for quality. Its Connected Home & RWE Smarthome involvement are a major step forward.
		<ul style="list-style-type: none"> IHD Smart phone 	<ul style="list-style-type: none"> IHD and a range of smart plugs. Smart lighting control and LED lighting is available. 	<ul style="list-style-type: none"> Displays power consumption in real time. Enables automation of appliances via smart plugs, and to customise occupancy profiles. Automation and control of lighting is available. 	<ul style="list-style-type: none"> Partnerships with utilities and trial involvement across Europe, Asia and Australia offer a platform for growth.
		<ul style="list-style-type: none"> IHD 	<ul style="list-style-type: none"> IHD, home metering unit and smart plugs are available. Available via utility partners. 	<ul style="list-style-type: none"> Displays carbon emissions, energy usage and energy cost information – total and per 'smart' appliance. Automation of smart appliances is possible, and via smart plugs. 	<ul style="list-style-type: none"> High functionality product, limited deployment via utility partnerships to date. Future products will enable demand response utility control.
		<ul style="list-style-type: none"> IHD Web Smart phone 	<ul style="list-style-type: none"> A display and a range of smart plug devices are available to purchase online. Wireless thermostat is also available. Up to around €300 for a package including socket and strip (6 appliances). 	<ul style="list-style-type: none"> Current and projected future energy & cost demand from connected appliances. Connects to wireless thermostat controlling heating & cooling. 'At home', 'away' and 'night' modes. Remote control through iPhone and Android apps. 	<ul style="list-style-type: none"> A hardware producer with plans to move into software.
		<ul style="list-style-type: none"> Web Smart phone 	<ul style="list-style-type: none"> Nucleus is a communication and data device that plugs into an electricity outlet. Smart phone app is in development. Available to utilities and consumers in 2011. 	<ul style="list-style-type: none"> Displays near real time energy usage, tariff pricing, and historical energy use. Automates appliances as consumer wishes, and in response to ToU tariffs. 	<ul style="list-style-type: none"> Product is well suited to the US market where demand response is critical. Plans to monitor gas, water and renewable technologies in the future would help set it apart from competitors.
Inform, automate & control		<ul style="list-style-type: none"> Web Smart phone Home reports 	<ul style="list-style-type: none"> Tendrill Connect is a cloud-based open platform for a range of utility and customer based applications and devices. Open standards-based approach. Mobile device capability. 	<ul style="list-style-type: none"> It captures monthly usage data, 'day-behind' meter data, real-time 15-minute interval data, and displays consumption charts and bill projections. HAN-based device control for thermostats and appliances, utility demand response event management. Microgen & EV charging management. 	<ul style="list-style-type: none"> Its progress outside of N America will be an acid test for the sector.

Source: Delta Energy and Environment, 2011

All-in-all, the HEMs area is becoming a highly dynamic sector with new systems emerging week-by-week. Some will win, many will lose. The 11 products summarised in the preceding table are compared on the chart below.

FIGURE 2. AN ILLUSTRATIVE VIEW OF HEM DEPLOYMENT AND FUNCTIONALITY: WHERE DOES YOUR SYSTEM SIT?

While the number of products available today in the ‘Inform & Automate’ space is increasing, there remain only a small number of products offering full control functionality. Some of these are shown below in an illustrative way.



Source: Delta Energy and Environment, 2011

Based on our research of this rapidly emerging sector, we have identified some clear trends:

- ▶ **We see a rapidly accelerating trend towards more intelligent and sophisticated HEM offerings.** Delta sees a role for products requiring passive and active customer engagement spanning the spectrum of functionality: *inform; automate; control*. However, this greater sophistication comes at an added cost, and there is some uncertainty around the business case for such solutions. Understanding what different customer segments want from HEMs is still a significant gap in market insight.
- ▶ **Are in-home displays an evolutionary dead end?** “How fast to the kitchen drawer?” could be one parameter for classifying basic IHD HEMs. Most developers today offer an in-home display, while others rely only on smart phones and web-based portals as the primary customer interface. Nearly all developers offer a web portal and are developing a smart phone app – leaving questions around the need for, and expense of, IHDs. Where the roll out

of IHDs is being mandated, such as in the UK, there may be a future for developers of IHDs. Where not, the future is much less certain.

- ▶ **The utility role in product deployment is critical today, but may be short lived.** Several European utilities are delivering IHDs to energy customers – which today have no or limited functionality beyond displaying information – as a means of differentiation, and to support customer retention. In the US, demand response is the main driver for utility engagement, with HEMs often deployed alongside ToU tariffs. However, there are alternative routes to market. A few developers are already selling products directly, with mixed success, while some aim to deploy their solutions alongside microgeneration. And telcos and media providers – with a wealth of experience in services provision – are also breaking into this space. *Delta's next White Paper will explore the business case options for HEM deployment.*

Future research from Delta

With the diverse range of HEM products entering the market, and the various trials currently underway, it looks likely that – one day – smart home energy management will be a mass market and mainstream residential service. But the roadmap for this journey, and its duration, are highly uncertain.

Most product developers are involved in trials of some shape or form. Each trial is different, but the primary objectives of these trials cluster around:

- ▶ Testing product.
- ▶ Trialling business models.
- ▶ Influencing customer behaviour.
- ▶ Understanding what customers want, and how best to engage with them.

A snapshot of three interesting European trials, centred on these bullets, is given below. In our forthcoming research, Delta will explore these trials (and others) in greater depth, and in particular focus on the *business models* being tested and the *customer response to technology*.

Model City of Mannheim, Germany

A €20 million trial being led by electric utility MVV – focusing on delivering energy efficiency and *intelligent grid management*. 3,000 Energy Butler devices have been deployed to trial *real time pricing and home automation* to match demand with increasing renewable generation. Half the budget has come from the E-Energy Technology competition, with the remaining partners, including IBM and PowerPlus Communications, fronting the remaining cost.



Passiv Energy 12-month Field Trial, UK

YouGov

Completed in 2011, this trial focused on understanding the *behavioural response of customers* to HEMs, how best to *engage customers*, and on quantifying and *proving the actual energy savings* that HEMs can deliver.

E-Flex Project, Denmark

DONG energy

Greenwave Reality and DONG Energy is running a trial in Copenhagen exploring *demand response opportunities* and the readiness and *motivations of household customers to participate in flexible energy*. This kicked off in 2011, and will initially involve 155 households.

Delta webinar – Who should be in control?

[Available for download now](#)

This 40 minute webinar explored one of the key battlefields in the HEM industry. Should the approach be to inform the customer and allow them to decide? Or is it better to have the intelligence in the kit, so the customer does not need to take action?

A recording of this webinar is available for a limited time. For further details, please contact Stephen Harkin, stephen.harkin@delta-ee.com, +44 131 625 1005.

Delta upcoming webinar – Capturing the value of HEM

October 26, 2011

In the next Delta HEM webinar we review the latest product and technology trends and explore the emerging business models being deployed to capture value in this embryonic market. We also offer a view as to how this market will evolve in the next 2 – 3 years and which technologies look set to succeed.

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