

28 October 2010

CONSULTATION ON SMART METERING FOR ELECTRICITY AND GAS

Response from Onzo Ltd

Onzo refers readers to its response dated 28 September 2010 where Onzo responded to Prospectus questions 3, 6, 7, 16, 17, 18 and 19. In this response Onzo has prioritised answers to questions where it can add most value to the consultation exercise:

- Prospectus - questions 1, 2, 14 and 15
- Consumer protection - question 15
- In-home display - questions 1 to 7
- Communications Business Model – questions 4, 5 and 6
- Data Privacy and Security – questions 1, 2 and 5
- Regulatory and Commercial Framework - questions 1, 5, 6, 8, and 11

Executive Summary

The UK Government must ensure that reductions in consumers' energy bills and CO2 emissions are the outcome of the implementation of smart metering.

Onzo observes that the proposed smart meter design and rollout process appears to be driven more by political pressure and early movers attempting to gain market advantage than by focussing on consumer benefit, energy retailer return on investment (ROI) and appropriate security engineering.

(i) Consumer benefit and energy retailer ROI:

- To provide a proper return on investment the UK smart meter system must be designed to accommodate services beyond just electricity and gas billing. Communications flexibility and interoperability along with scalability are therefore important considerations.
- Ofgem should promote competition around data provision (including in-home displays), and value-added services to maximise consumer and utility benefit from smart metering.

To create the conditions for competition and innovation Onzo proposes enhancements to the proposed architecture that (i) allows competition in the communications supply, (ii) does not require non-utility services to be dependent on utility infrastructure, (iii) does not mix data unnecessarily across service providers and (iv) supports a wide range of technology solutions:

- There should be a separation between the communications infrastructure provider and the DCC. The communications provider should provide the Wide Area Network (WAN) module to the DCC. The communications provider routes data from home to DCC. Other brokerage entities can then exist for non-energy data, supplying data to energy suppliers and other authorised parties to enable value-added services.
- DCC should be simply an energy data brokerage service for energy suppliers, distribution network operators and other authorised parties. The DCC should only handle consumption information per meter asset. Slimming back the scope of the DCC has the added benefit of reducing the time to expedite its creation. The DCC would best be formed as a consortium of energy retailers rather than put out to tender. This would best align security and privacy responsibility with the consumer brands that stand to lose most from design or operational security and privacy errors.

(ii) Appropriate security engineering:

- Good security engineering should not be compromised by pressure for an early rollout. The Privacy and Security Advisory Group should deliver an upfront specification to the Smart Meter Design Group and Data and Communications Group. The team must then strike an appropriate balance between security and maximising the opportunity for benefit to the consumer, and a market for value-added services.
- Security and privacy failures should be the responsibility of the DCC as it will be responsible for commissioning and operating the system. The rollout of smart meters should not start before the DCC is fully operational.

Onzo believes it could offer the programme assistance in the form of expertise through input to the Smart Meter Design Group, Data and Communications Group and consumer and rollout workshops, specifically Onzo can help with consumer engagement; WAN and HAN communications hardware and data protocols; Physical and logical (software / firmware) meter design; in home display; value added services; security engineering.

Response to Consultation Questions

Prospectus

Question 1: Do you have any comments on the proposed minimum functional requirements and arrangements for provision of the in-home display device?

Onzo's core argument is that minimum functional requirements should be very limited. The key points in support of this are:

- The purpose of the in-home display (IHD) should be defined as 'real-time information for real-time decision making'. The IHD should be considered in the context of other information provided through other channels (web/mobile device, bill/energy report, email/SMS, etc.), and functionality judged against the purpose traded off with cost/benefit.
- There is a need to ensure balance between Government objectives (greenhouse gas emission reduction targets), consumer objectives (reduce bills and sometimes environmental), and energy suppliers' commercial imperatives. The danger is that a IHD with lots of functional requirements to achieve energy use reduction is expensive and destroys suppliers' core revenue stream (threatening smart meter rollout and other key investment plans including generation and transmission and distribution) so that vigorous opposition is likely and an inevitable outcome is 'satisficing', i.e. the meeting of mandated requirements at lowest cost without regard for quality, thus undermining the objective of the display.
- £15.00 buys very little in the consumer electronics world therefore minimum functional requirements must be realistic. Onzo notes the £15.00 price-point is not explicit, except in the Impact Assessment.

Ofgem should set minimum functional requirements low to make it possible for suppliers to meet these at the lowest possible cost, and to encourage competition in the provision of information; the higher the requirements the higher the cost and the bigger an issue it creates for energy suppliers.

Minimum functional requirements of IHD to achieve a 'real-time information for real-time decision making' purpose are:

- Price level signals, i.e. time of use
- Current usage updating <5 seconds. Display of pounds and pence on the IHD is not crucial because other communication channels can be used more effectively. Presenting cost on IHD is often meaningless and the calculation has practical challenges e.g. standing charges.
- Electricity only because gas is not as susceptible to real-time decision making

Ofgem's proposal for the display of local time, instantaneous gas consumption, historical information and display of pounds and pence are unnecessary as part of a minimum functional requirement. These features represent valuable up-sell opportunities for energy suppliers to offer premium IHD designs for a smaller subset of consumers.

Onzo supports the view expressed that kWh is an important measure for long term comparisons. Furthermore we feel that a key role of the IHD is to help users 'learn the language' of energy, namely Watts and kWh.

Question 2: Do you have any comments on our overall approach to data privacy?

Data privacy 'best practice' prescribes ensuring that individual consumers have control over whether they are to part with privacy-sensitive data (informed consent). Providing consumers with incentives early in the smart meter programme whereby they can see benefit from the use of personally identifiable information will help increase acceptance. Any perceived loss of privacy is therefore outweighed by the benefits of the incentive. Examples of incentives are: consumption information that allows the consumer to take meaningful action, itemized energy bills, HVAC control etc.

The presumption should be that privacy-sensitive data beyond the minimum required for billing purposes should not be available for processing by the DCC or energy retailer, but should be shared only with the entity that the consumer has agreed may access it. This could be achieved by encrypting that data with a different key and sending it directly to the trusted entity, for instance.

Question 14: Have we identified all the wider impacts of smart metering on the energy sector?

No. The positive impact of 'value-added services' such as control of heating (space and water), ventilation and air-conditioning (HVAC) has not been included. Nor does it appear that adequate consideration has been given to what is required to support micro-generation and electric vehicles.

It is essential that the system that is deployed is able to support these additional services, and services that will come in the future. This will require HAN and WAN communications that can readily be expanded to support new messages and applications.

Question 15: Is there anything further we need to be doing in terms of our ensuring the security of the smart metering system?

Data Privacy and Security are serious concerns and must be thoroughly addressed. The programme must be open with its Data Privacy and Security deliberations and encourage contributions from all with an interest and expertise in this area.

The consequences of inadequate security are potentially catastrophic, as is the danger of a flawed implementation of accepted security protocols. Dangers are aggravated by the proposed remote

disconnect capability. It would be good practice, and time-saving, to reuse security technology that has already been developed, tested and qualified. The financial services, mobile phone and pay TV industries have considerable experience with protecting valuable assets, and the requirements of these industries are similar to those of the smart meter programme. Onzo recommends that Ofgem explores the reuse of their mature technologies, which include secure microcontroller (e.g. smart card), GlobalPlatform and Java Card technologies and standards.

Onzo is leading the Project Hydra consortium (<http://projecthydra.info>) that is using these technologies to securely deploy value-added services on the smart meter infrastructure. We would be pleased to share our work with Ofgem and other stakeholders.

We note that the Prospectus charges parties (such as the DCC) with minimising their costs. This is a potentially dangerous mandate.

Security economics theory states that you will get better security if the entity that is responsible for developing and maintaining the security measures is also the entity that stands to suffer losses from any flaws in security. The DCC must be given responsibility for end-to-end security, and liability for security breaches must rest with the DCC. That provides the right motivation. The DCC should be formed by a consortium of energy suppliers (or perhaps network operators) with the financial resources to deal with potential security flaws.

Finally, the DCC must not be landed with a security system designed by the Expert Groups which have disbanded before it comes into existence. That is, smart meters must not be deployed until the DCC is operational and is able to make the security decisions.

Consumer Protection

Question 15: Have we identified the full range of consumer protection issues associated with the capability to conduct remote disconnection or switching from credit to prepayment terms? If not, please identify any additional such issues.

Ofgem has identified a number of practical issues relating to remote disconnection and switching from credit to prepayment. By and large Onzo feels that the suggestions for addressing these are reasonable. But it is clear that the smart meter system is considerably more complex than existing arrangements, and it is inevitable that other issues will only come to light as equipment is deployed in the field and experience is gained. This is likely to be aggravated by the fact that, to a large degree, disconnection decisions will be made remotely by computers rather than locally by human beings.

This suggests to us that sizeable trial deployments would be prudent before full-scale rollout began. It also suggests that Ofgem will need to keep a close watch on practical issues and be prepared to act quickly to correct anomalies.

Of course, the ultimate 'Consumer Protection' problem is unauthorised disconnection by a cyber attacker of some kind – something which can easily be imagined and will be very difficult to prevent completely. The paper "Who controls the off switch?" by Ross Anderson and Shailendra Fuloria of the Cambridge University Computer Laboratory addresses the vulnerabilities of a smart meter system with remote disconnect capability, and is required reading for everyone involved with the UK smart meter programme. It is Onzo's judgment that the state of the art of smart meter security is not sufficiently advanced to deploy smart meters with a remote disconnect capability.

In-home display

Question 1. We welcome views on the level of accuracy which can be achieved and which customers would expect, in particular in relation to consumption in pounds and pence.

Customers will expect correlation between their in-home display and smart meter and bill. The smart meter must have the appropriate tariff data for accurate communication to the in-home display to allow an accurate "spend" figure to be generated at any given point (billing date, standing charge, discounts, block tariffs etc).

Onzo believes that the display of price and account balance data should not be mandated as it will add to the cost and complexity of the IHD. Support for these should be left to market competition. That said, if mandated, there is no technical difficulty in providing a completely accurate display for all customers, all of the time.

There is a suggestion (in 2.20) that prepayment customers should be given accurate account balance information in near real-time but that credit customers need no more than monthly accurate balances (presumably estimated the rest of the time). Ofgem also seems to assume that the accurate account balance information will be transmitted from the DCC to the IHD (see also the Design Requirements document "credit balance update" service, p96). There is no need to restrict credit customers to an accurate balance only monthly, nor for the transmission of credit balance information from the DCC, as is explained next.

Credit meters will need to deduct credit instantaneously and accurately based on a local calculation. Since all meters can be credit or prepay, then credit meters will also be able to calculate the credit balance accurately and locally. The calculation is complicated somewhat by the need to account for VAT and standing charges (2.15), but these could be added into a billing calculation program that runs in the smart meter system in the home, for both credit and pre-pay customers.

There is no need for any communications to and from the DCC to perform these calculations, other than downloading tariff information infrequently.

Question 2. We welcome evidence on whether information on carbon dioxide emissions is a useful indicator in encouraging behaviour change, and if so, how it might be best represented to consumers.

Onzo has not yet found evidence of any notable consumer interest in carbon and finding an accurate and meaningful way of calculating it is difficult.

Question 3. We welcome views on the issues with establishing the settings for ambient feedback.

Ofgem should simply enable competition around IHDs by setting a very limited minimum functional requirement to ensure consumer benefit is maximised through a competitive market. Please refer to Onzo's answer to Prospectus Question 1.

Question 4. Do you think that there is a case for a supply license obligation around the need for appropriately designed IHDs to be provided to customers with special requirements, and/or for best practice to be identified and shared once suppliers start to roll out IHDs?

Ofgem should simply enable competition around IHDs by setting a very limited minimum functional requirement to ensure consumer benefit is maximised through a competitive market. Please refer to Onzo's answer to Prospectus Question 1.

Question 5. We welcome evidence on whether portability of IHDs has a significant impact on consumer behavioural change.

Portability can benefit behaviour change, particularly assisting closer investigation of individual locations in the home and appliances. However, portability depends on whether there are batteries and battery life depends on battery capacity and technology. At worst estimate IHDs could be responsible for 130 million batteries per year (22.5 million homes * 3 batteries * 2 sets per year).

Question 6. Do you agree with the proposed minimum functional requirements for the IHD?

Ofgem should simply enable competition around IHDs by setting a very limited minimum functional requirement to ensure consumer benefit is maximised through a competitive market. Please refer to Onzo's answer to Prospectus Question 1.

Question 7. Do you have any views or evidence relating to whether innovation could be hampered by requiring all displays to be capable of displaying the minimum information set for both fuels?

Ofgem should simply enable competition around IHDs by setting a very limited minimum functional requirement to ensure consumer benefit is maximised through a competitive market. Please refer to Onzo's answer to Prospectus Question 1.

Communications Business Model

Question 4: Do any measures need to be put in place to facilitate rollout in the period before DCC service availability and the transition to provision of services by DCC, for example requiring DCC to take on communications contracts meeting certain pre-defined criteria?

Onzo believes the rollout of smart meters should not start before the DCC is operational.

Ofgem proposes (paragraph 2.58) that the "DCC will undertake the design, specification, accreditation and security compliance of components such as the WAN communications module..." yet in the same paragraph notes that "specification for the WAN communications module will... be developed by... two Expert Groups, to enable the roll out of smart meters prior to DCC commencing its operation". It is impossible for both of these requirements to hold simultaneously.

Onzo believes that the DCC will be unable to discharge its responsibilities for ensuring secure communications if it is obliged to use equipment and specifications that have been imposed upon it by an ad-hoc committee, disbanded before it comes into existence. At minimum, considerations of liability dictate that the DCC must select the communications and security technologies.

See also our answer to the Regulatory and Commercial Framework Question 11.

Question 5: Do you agree that the licensable activity for DCC should cover procurement and management of contracts for the provision of central services for the communication and management of smart metering data?

This seems reasonable.

However, Onzo believes that it is necessary to be clear about where responsibility for data privacy and security lies. There are references to the DCC's role including "secure communications network and access control" (2.40), "security monitoring and assurance" (2.42, 2.8) and "accreditation and security compliance of components such as the WAN communications module" and "security management"

(2.58). We feel this falls considerably short of “complete responsibility for end-to-end data privacy and security”. If this is what Ofgem expect then they should say so. If it is not then Ofgem must be clear how these responsibilities will be allocated.

We discuss this further in our answer to Regulatory and Commercial Framework Question 11.

Question 6: Do you consider that DCC should be an independent company from energy suppliers and/or other users of its services and, if so, how should this be defined?

We believe that the DCC should be formed as a consortium of network operators, or possibly of energy suppliers. That way the liabilities for failures on the part of the DCC, including system design failures, will fall on the network operators (or energy suppliers) – which in turn will motivate them to implement a robust system. Consideration of this shows that the phased rollout cannot take place as the DCC must be operational in order to select the communications and security technologies.

A DNO street-by-street rollout approach is probably the most efficient form of deployment. The industry structure should change so that metering belongs with distribution. Everyone agrees that the current structure is illogical and this is made even more obvious by smart meter rollout. It is not too late to address this. Then issues of stranded assets and interoperability disappear.

Data Privacy and Security

Question 1: Do you have any comments on our overall approach to data privacy?

Please refer to Onzo’s answer to Prospectus Question 2.

Question 2: We seek views from stakeholders on what level of data aggregation and frequency of access to smart metering data is necessary in order for industry to fulfill regulated duties.

Galileo – the Father of Modern Science – said wisely 400 years ago “Measure what can be measured”. min interval data is limited in its usefulness beyond the single application of time of use billing. Consumers, DNO’s and electricity retailers would greatly benefit from granular 1 second power data. 30 The potential applications and usefulness of granular 1 second power data is unlimited. Onzo licenses a patent protected lossy compression algorithm to makes the data packet size small enough for efficient transportation over AMI.

Question 5: Do you agree with our approach for ensuring the end-to-end smart metering system is appropriately secure?

Onzo feels that the approach adopted in Section 4 of the data Privacy and Security document is on the right track, but we have some comments.

Some of our comments are within our answer to Prospectus Question 15. In summary these include the need to involve industry and academic experts; the benefits of reusing smart card, secure microcontroller, GlobalPlatform and Java Card technologies and standards that are in used in the banking industry; to ensure that good security is not compromised by pressure to cut costs or to rush for early deployment; and to conduct a security economics analysis to ensure that the liability for security vulnerabilities rests with those responsible for implementing the security measures.

We observe that security activity to date appears to have been confined to Government experts, and it appears that the initial security risk assessment is not public. Ofgem must extend consideration of security matters to a much wider group so as to take advantage of wider body of experience.

We agree that data privacy and security principles must feed into the technical specifications process, and that the security requirements in the Statement of Design Requirements are generally sound. However Ofgem needs to be steadfast in ensuring that these principles are rigorously implemented; there will be many with commercial motivations to roll out solutions that they have already developed, which could be at the expense of good security. Ofgem must not hesitate to reject specifications, standards or implementations that could compromise security.

If DCC security controls are breached an attacker could potentially have control over all data and all meter functionality – including the remote disconnect facility. Onzo wonders whether security and privacy would be improved if data and services were partitioned between stakeholders, with each set of messaging protected by different cryptographic keys. Thus an electricity supplier could access electricity-billing information (only), a network operator could access voltage quality information (only), and a value-added service provider could access the HAN device providing that service (only). This is consistent with the GlobalPlatform concept of Secure Communications Channels, and is being explored by Project Hydra, a consortium being led by Onzo that is exploring how to deploy value-added services on smart meters. Onzo would be pleased to discuss these ideas with Ofgem and stakeholders.

The list of parties in the Sector Responsibilities section of the Data Privacy and Security document (4.14) excludes network operators. It is they who will bear many of the losses by theft or poor security and they should have a role.

Ofgem should perform a security economics analysis of the smart meter system to ensure that those who implement the security measures are properly motivated to ensure that they are sound. We elaborate on this in our answer to Regulatory and Commercial Framework Question 11.

Finally, our last point concerns the national security question of the remote disconnection facility.

As an engineering company, Onzo is aware of the technical difficulties of providing flawless security throughout a system of considerable complexity. The worst case cyber-security scenarios are of the same scale as nuclear war: the disconnection of energy supplies to every home in the country. The paper "Who controls the off switch?" by Ross Anderson and Shailendra Fuloria of the Cambridge University Computer Laboratory addresses the vulnerabilities of a smart meter system with remote disconnect capability, and is required reading for everyone involved with the UK smart meter programme.

Protecting the remote disconnect switches from determined and capable adversaries is likely to be impossible in the long term, so remote disconnect should be prohibited on national security grounds, if not an ethical one. Onzo supports remote switch to pre-pay.

Regulatory and Commercial Framework

Question 1. Have we identified all of the key elements that you would expect to see as part of the Smart Metering Regulatory Regime?

Onzo is concerned about the added complexity of the phased rollout. It seems to us that two separate sets of regulations and contracts will need to be created: one set to operate prior to the creation of the

DCC and another set to operate when the DCC is in existence. We do not see that Ofgem has identified the regulatory complexity involved.

Onzo is also concerned that Ofgem has not properly considered where liability for failures will lie in an extremely complex system involving many parties. We have more to say about this in our answer to Question 11.

Question 5: Do you agree with the proposals concerning the roles and obligations of suppliers in relation to the WAN communications module?

There is a significant flaw in the discussion of the design and provision of the WAN Module.

Paragraph 4.8 says "DCC will provide the specification for the WAN communications module as it must communicate with DCC's network." However this is inconsistent with the plan for a phased rollout.

The phased rollout timetable means that the specifications will have been set by the Expert Groups before the DCC comes into being, or the comms suppliers selected. The technology choices will be set by the Expert Groups (Communications Business Model document 2.58). The Expert Groups will be disbanded and accountable to no one after establishing these specs.

Design flaws in the WAN Module specification could introduce data privacy and security losses.

The DCC should take on the responsibility for specifying the WAN module, as this is (or should be) the entity that will take on the consequences of these decisions.

Question 6: We welcome views as to which other additional data items should be included in the mandated HAN data set beyond the list for the IHD.

Onzo strongly supports the ability of consumers to access their consumption data securely. We believe that market forces will result in a rich set of services available to consumers to help them reduce their bills and reduce their energy consumption. Onzo feels that this data should mainly be provided through means other than the IHD, and that the IHD specification should be very limited. Our answer to the Prospectus Question 1 provides the background to this.

Question 8: Are there additional measures that should be put in place to reduce the risks to the programme generated by early movers?

There is a tension between early movers, proving technology, agreeing standards and rollout timetable. Either the Government needs to take a firm line – early movers installations will have to be ripped out if they don't conform with what is later agreed; or accept that it has lost the battle and there will be a lot of things that don't interoperate.

Onzo is concerned that the Prospectus documents contain evidence that the smart meter programme planning is already being distorted to accommodate the announced British Gas early-mover smart meter deployment.

For example, there is the proposal that "to help with 'future proofing'... the WAN communications module should not be integral to the meter, so that if necessary it can be replaced without changing the meter" (5.8). This effectively says that the British Gas meters will be allowed to remain, that future WAN Communications Modules must be compatible with them, and that therefore the British Gas meter specification is the specification that the other supplies must adopt.

And the In-House Display document proposes (3.7 – 3.11) that early movers won't need to provide an IHD unless requested and implies that the British Gas meters may remain installed. This either results in islands of incompatible (British Gas) equipment, or it means that the rest of the programme will be obliged to adopt the British Gas specifications.

It is difficult to see how customers could switch from British Gas to another supplier without the other supplier having to change the meter system from the proprietary (BG) system to the standard system. Since customers will be reluctant to have their new BG system replaced, British Gas are effectively erecting barriers around their existing customer base.

Onzo concludes that Ofgem must perform its regulatory duties. It must stop attempting to accommodate early movers and either exclude British Gas and its suppliers from the Expert Groups or stop the British Gas smart meter deployment.

Question 11: Are there any other regulatory and commercial issues that the programme should be addressing?

We do not think that Ofgem has properly considered issues of liability in the smart meter program. Ofgem is proposing a system that is very complex, both in commercial and technical terms, and which involves many parties. In the extreme case a serious cyber-security breach could result in disablement of energy supplies to millions of homes. In the case of a serious system failure, where will the liability lie?

- The Government or the ad-hoc Expert Groups that Ofgem has established to design the system?
- Distribution companies or energy retailers?
- DCC or Telcoms operators?
- WAN module or meter or IHD manufacturers?
- Meter asset owning companies?

We feel that Ofgem must explicitly address the issue of liability. Security economics theory dictates that the responsibility for implementing security must lie with the entity that will incur the cost of failures.

Two further interesting questions should be considered. (1) What would it cost each of the parties to obtain liability insurance? (2) What would the liability clauses in supply contracts look like, and would the counter-parties be prepared to accept these?

Onzo Ltd profile

Onzo provides utilities globally with customer intelligence solutions. Onzo uses energy data to create value both for customers and for utilities before, with, after, or instead of smart metering through analytics software packaged in mass-market consumer-friendly solutions.

Those solutions enable utilities to achieve their business objectives and meet regulatory requirements: attracting and retaining customers, shifting usage off peak, improving energy efficiency, improving customer satisfaction, reducing the cost to serve, and increasing non-core revenue.

Onzo's solutions include hardware and software that can increase the amount of data gathered, process and analyse it to maximise its value to the utility, and increase the number and enhance the effectiveness of the utility's customer touch points. Onzo's hardware and software solutions can work separately but are most effective in combination.

For further information please visit www.onzo.com.