



GE Response to DECC/Ofgem Smart Metering Implementation Programme - Prospectus September 2010

Introduction

General Electric (GE) is pleased to submit a response to the Department of Energy & Climate Change's (DECC) Smart Metering Implementation Programme "Prospectus".

General Electric is a global infrastructure, finance and media company. GE is made-up of five primary business units, each with its own divisions. Its primary business units include: GE Energy, GE Technology Infrastructure, GE Capital, GE Home & Business Solutions, and NBC Universal.

GE is one of the world's leading suppliers of power generation and energy delivery technologies. In the UK, our installed equipment provides 18% of energy needs and we are also a smart grid solutions partner to the electrical distribution industry. We supply grid intelligence solutions to 80% Distribution Network Operators (DNOs) within Great Britain and also offer broader expertise in associated technologies such as consumer and industrial appliances and smart meter technology - in which we hope to develop a significant UK presence in the future.

We are proud of our presence in the UK since the 1930s and currently employ over 19,000 people. Since 2002, we have invested over £10 billion in our UK-based businesses. Our operations in Britain – which include energy, aviation and healthcare diagnostics - are at the cutting edge of low carbon, high tech, engineering, manufacturing and design, and offer pragmatic solutions to many of the challenges facing the UK today.

To reflect this commitment, GE last year opened the UK's first Smart Grid Demonstration Centre, based at our office in Bracknell. This is designed to show how smart grid technology is available today and is already helping utilities and consumers work together to meet the energy and environmental challenges facing the UK.

In Europe we have established an important centre of innovation, research and development with our Global Research Centre located in Munich, Germany. Here GE has more than 36,000 employees working in research and development, engineering and manufacturing, turning imagination into products. In total GE invests €4billion per year on R&D as part of our Ecomagination programme.

Summary

GE supports the overall objectives of the UK's Smart Metering Implementation Programme including the Government's commitment to the rollout of electricity and gas smart meters to all homes in Great Britain and to a broad framework that aims to bring forward that rollout.

The Prospectus is of great interest to GE as we have developed significant smart meters business in the United States where we are a manufacturer and supplier of metering products with over 5 million smart meters deployed.



Within the scope of smart meters GE is a provider of:

- control system technologies and transmission / distribution management solutions
- geo-spatial software solutions
- smart metering systems
- smart appliances and home automation systems

Smart meter rollout will require a fundamental and an integrated approach needed to meet the challenges of the next decade. In order to allow further investment in smart metering the industry needs urgent action to agree common standards for design specification and functionality in order to allow manufacturers, such as GE, to gear-up for delivery. By making some early-informed technology decisions, technology suppliers can then advance the development of these technologies.

As such GE has limited our overall comments and specific answers to the following areas:

- the proposed functional requirements catalogue and the approach for developing technical specifications for smart metering equipment
- in-home displays (IHDs), the design specification requirements and data security
- the proposed implementation strategy, including the proposal for a staged approach to implementation, the timeline for agreement of the technical specifications and whether there are any other ways we can bring the rollout forward

GE finds many very positive elements in the Prospectus and makes the following observations:

- 1) we broadly support a proposal contained in the Prospectus for a technical consultation, however we would like Ofgem to take a more pro-active role to ensure a level playing-field for technology providers
- 2) we would like to see minimum standards ring-fenced for in-home displays (IHDs) in order to allow scope for innovation. The Smart Energy Profile (SEP 2.0) due for release in 2011, provides a good example of how a global standard can be communications protocol agnostic by supporting IP infrastructure (e.g. smart home, consumer appliances and metering etc)
- 3) a programme should be funded to test and verify the capabilities and reliability of different technologies . Decision-making should reflect the results of this exercise rather than be influenced by committee.
- 4) the Prospectus should aim to choose Wide Area Network (WAN) technology that is fit-for-purpose and does not inhibit real-time data flow requirements for communications with the Distribution Network Operator (DNO).
- 5) GE continues to recommend an inclusive process for participation in Ofgem Smart Meters Programme that de-couples innovation and deployment from traditional routes exclusively tied to energy suppliers and allows a wider role for suppliers and manufacturers.



Responses to Questions

Area: The proposed functional requirements catalogue and the approach for developing technical specifications for smart metering equipment. We are also seeking responses to the more detailed questions set out in our Statement of Design Requirements supporting document.

Q. Do you see any issues with the proposed approach to developing technical specifications for the smart metering system?

GE is pleased to see the clear statements on technical specifications in the consultation documentation, and fully supports the need to agree common standards as quickly as possible via the technical consultation.

We actively support the use of open standards and interfaces that provides a secure way to share data with home automation systems and that allows consumers to 'opt-in' to allow load management of their home appliances in cases where there is a generation shortfall or during critical peak pricing. This approach offers the implementation programme significant advantages over existing or legacy technologies.

Interoperability should be a key principle underpinning smart metering and we should take this opportunity to reiterate the need to define: metering system functionality; *Wide Area Network (WAN)*, *Home Area Network (HAN)* and human interfaces; and the service levels associated with those interfaces. The agreed platforms need to be included in a Central Metering Code to ensure that they are adhered to and interoperability is protected. The commercial arrangements between parties must also support interoperability and there are some key issues to resolve as part of the central programme (e.g. meter asset provision arrangements at change of supplier).

GE openly promotes the overall ability to support future expansion into improved network services via smart grid technologies. GE advocates systems that provide long-term expansion capabilities to support functionalities such as demand-side management, peak load management and micro generation.

Utility data, such as gas and electricity readings, should be secure in order to avoid tamper. However, it should also be possible for the consumer to use and integrate their own devices with the system.

Any device could subscribe to data coming from the meters on a read-only basis so long as it is certified to an open standard and approved by the utility that operates the HAN network. ZigBee 2.4GHz HAN (wireless) and Homeplug AV (using power lines) would offer support for the industry standard *Smart Energy Profile protocol (SEP)*. SEP 1.0 is currently in use in many pilots and rollouts across the world. SEP 2.0 is due for release next year and will feature additional support for pre-payment and interoperability with Homeplug.

**Summary of Response to Questions – Statement of Design Requirements**

Question 1: Should the HAN hardware be exchangeable without the need to exchange the meter?	GE believes it should be possible to 'hot-swap' or upgrade physical communications modules (HAN or WAN) without changing the meter or interrupting supply. The preferred model is to have HAN capability on the meter and have sufficient processing headroom to allow for future upgrade to revisions of the standards (such as Smart Energy Profile). This can be achieved via a sufficiently advanced meter to have an applications processor separate to the radio module.
Question 2: Are suitable HAN technologies available that meet the functional requirements?	GE's Smart Energy Profile (SEP) provides a foundation for HAN interoperability and is a widely supported standard. This is currently available on ZigBee 2.4GHz but in future will move to Homeplug and other IP based wired/wireless protocols.
Question 3: How can the costs of switching between different mobile networks be minimised particularly in relation to the use of SIM cards and avoiding the need change out SIMs?	Use of roaming chip SIMs will allow the device to be independent and remotely configurable logic can determine the network preference. The issue then becomes a commercial discussion between the communications providers and the Data Communications Company (DCC).
Question 4: Do you believe that the Catalogue is complete and at the required level of detail to develop the technical specification?	Yes.
Question 5: Do you agree that the additional functionalities beyond the high-level list of functional requirements are justified on a cost benefit basis?	Yes.
Question 6: Is there additional or new evidence that should cause those functional requirements that have been included or omitted to be further considered?	No.
Question 7: Do you agree that the proposed approach to developing technical specifications will deliver the necessary technical certainty and interoperability?	Yes. Governance must ensure a level playing field for all prospective participants and stakeholders. In parallel Ofgem and suppliers should conduct independent tests to ensure the technologies chosen are appropriate and fit for purpose at the right cost.
Question 8: Do you agree it is necessary for the programme to facilitate and provide leadership through the specification development process? Is there a need for an obligation on suppliers to co-operate with this process?	Yes. Suppliers are a key stakeholder and have a large financial stake in the success of any technology or standard chosen.



Question 9: Are there any particular technical issues (e.g. associated with the HAN) that could add delay to the timescales?	<p>There are a number of possible standards for WAN and HAN. For WAN communications, adoption of IP communications provides better flexibility for passing different protocols and data between the WAN module and the communications network.</p> <p>As long as the communications technology chosen supports IP communications it should provide for a common architecture which is common on most computer systems. Some WAN technologies are limited either by bandwidth or cannot support multiple data retrieval (some PLC and RF technologies) and can limit the capabilities of getting real-time data from multiple meters in a specific area, slowing data retrieval and limiting real time alarms for smart grid purposes. Communications technologies are likely to develop substantially in the next 10-15 years and provision needs to be made for this.</p> <p>For HAN technologies, the first priority is to chose a widely adopted open global standard such as <i>Smart Energy Profile</i> which can then be developed to go over</p>
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Area: In Home Displays (IHDs)

Q. Do you have any comments on the functional requirements for the smart metering system we have set out in the Functional Requirements Catalogue?

The IHD is central to consumer's understanding of energy consumption. Data presented to the consumer should include (but not be restricted to) instantaneous power, previous day, week and month usage and costs. Provision should also be made to display the instantaneous energy at that moment in time and the consumer should also be aware when entering a peak period.

Key functional specifications can be summarised as follows:

- Provision of consumption information
- Two way communications
- Home area network
- Support for Time of Use Tariffs
- Load management capability
- Remote disablement and enablement of supply
- Exported electricity measurement.
- Communicate with microgeneration.

Data should be made available to the consumer by the web as a default option for those customers wanting to register for it. In addition each meter should contain the capability of



a Home Area Network (HAN) connection where devices using a secure open standard can subscribe the data from the meter (IHD/ home automation systems, etc).

Any information should be as accurate as possible therefore the consumer is looking at consistent bill. It should be clear if this includes or excludes VAT and standing charges. If this needs to be included then there needs to be a method of calculating a unit value. This is a firmware issue and needs to be securely managed via the meter and not handled on the display.

The electricity smart meter/communications module should act as a data-collection hub to support gas meters via a Home Area Network (HAN). This offers a more secure solution and is more cost effective from an installation perspective. Gas support would be via open standards such as ZigBee interface utilising Smart Energy Profile. Bridging technology for hard to read areas is also a possibility if the gas meter is out of range.

Two-way IHD communications will be required to support pre-payment services, which also provides a route to communicate with customers for other services. GE promotes a 'ZigBee' interface that offers support for the industry standard *Smart Energy Profile* protocol. This is also being adopted by Homeplug association to allow interoperability between wired and wireless devices.

Summary of responses to questions – 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.	Provision of information should be as accurate as possible. For example, it should be clear to the consumer if this includes or excludes VAT and standing charges. If this needs to be included then there needs to be a method of calculating a unit value. This is a firmware issue and needs to be securely managed via the meter and not handled on the display.
Question 2: We welcome evidence on whether information on carbon dioxide emissions is a useful indicator in encouraging behavior change, and if so, how it might be best represented to consumers.	A basic calculation of CO2 should be possible in the display based on the KWH value. The meters should not have to store CO2 information historically.
Question 3: We welcome views on the issues with establishing the settings for ambient feedback.	<p>In order to give the user valuable feedback on consumption to drive ambient feedback it is important to consider the identification of larger loads to avoid alarming vulnerable customers. It will be difficult for the display to discern heating load purely from usage data. To this end emerging technologies such as cognitive metering or demand profiling may provide insights into when certain appliances are being used and the demand they use.</p> <p>Cognitive metering will require more advanced processing on the meter and a larger storage capacity. Another technology that can aid the selective management of devices is the Smart Energy Profile open standard that facilitates the</p>



	sharing of appliance-level consumption information as well as the ability to defer or manage the demand. The ZigBee and Homeplug enabled devices would be able to help inform the user of demand during peak pricing in a time of use tariff and perhaps delay load until cheaper times.
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?	Yes
Question 5: We welcome evidence on whether portability of IHDs has a significant impact on consumer behavioral change.	Portable devices will allow the user to identify load/demand within the home as well as supporting the enablement of re-energisation in pre-payment situations where the meter is not accessible by the consumer.
Question 6: Do you agree with the proposed minimum functional requirements for the IHD?	Yes. It is important that a national interoperability standard is established quickly which allows manufacturers to develop products
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?	No strong views on this.
Question 8: Do you agree with the proposals covering the roles of and obligations on suppliers in relation to the IHD?	Yes. This should include an obligation in the first year of having a smart meter and an obligation if pre-payment.

Area: System Security

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

The proposal ring fences the data required for regulatory purposes. This needs to include not just basic settlement data but smart grid data requirements as defined by the ENA for use by the DNO.

More broadly, the Smart Meter Implementation Programme should seek to achieve the same levels of security as achieved in the banking industry. Regardless of the communications protocol, the same technologies should be chosen to support high levels of security. Physical security would be easier to manage if the meter has a detachable module rather than separately mounted and powered device.



Area: The proposed implementation strategy, including our proposal for a staged approach to implementation, the timeline for agreement of the technical specifications and whether there are any other ways we can bring the rollout forward. We are also seeking responses to the more detailed questions set out in our Implementation Strategy supporting document.

Q. Do you have any comments on our implementation strategy? In particular, do you have any comments on the staged approach, with rollout starting before DCC services are available?

GE agrees that the DataCommsCo (DCC) will have a key role in managing communications and remote access to smart meters within homes in the longer term and in delivering benefits from improvements to industry processes. As noted earlier, the Government is determined to accelerate the rollout of smart meters ahead of previously published plans and it is hoped that the staged implementation approach will advance the start of the mandated rollout compared to the alternative approach while maintaining the business case for the programme.

Under a staged implementation approach, GE recognises that there are potential risks for the domestic sector that will need to be managed. These include a scenario whereby smart meters could be rolled-out ahead of the establishment of DCC, manufacturers are unable to procure communications services of sufficient quality flexibility or in an efficient and economic manner; and existing supplier contracts with communication service providers hinders implementation of DCC. GE agrees that such risks can be managed through appropriate commercial arrangements and licence obligations.

Q. Do you have any other suggestions on how the rollout could be brought forward? If so, do you have any evidence on how such measures would impact on the time, cost and risk associated with the programme?

The fastest way to expedite the rollout of smart meters is to agree common standards for communication protocols and meter specifications. Any delay to do so will undermine efforts by industry to gear up for rollout and risk missing energy efficiency targets.

Interoperability rules (both technical and commercial) are an essential element of the solution for smart metering and it is important that Government does not under-estimate their importance for smart metering regardless of the market sector, or the time needed to reach agreement. The concept of smart ready metering will require a solid architecture to allow installed smart meters to be upgraded in a way that avoids the issue of stranded assets. These will also future platforms and 4th Generation protocols to be deployed without the need for future rounds of meter replacement.

Furthermore removing the need to exchange meters unnecessarily is one of the key benefits of smart metering. Smart meters should be a like for like replacement in the majority of locations. The smart metering system shall support in-situ exchange of WAN communication technology (without removal of meter). Modular design should be encouraged to minimise the costs associated with meter-exchange.

Unless there is true interoperability, this practice will continue and the associated benefits for both customers and Suppliers from preventing this practice will be lost. It is therefore



GE's view that it is vital that strict interoperability rules are defined as quickly as possible and that the DCC retains responsibility for the interoperability rules that industry participants must adhere to.

Q. The proposed timeline set out for agreement of the technical specifications is very dependent on industry expertise. Do you think that the technical specifications can be agreed more quickly than the plan currently assumes and, if so, how?

The new shape of innovation requires a multi-disciplinary approach and arises from the intersection of new relationships, fields and spheres of activity. To maintain the UK's competitiveness in the energy supply sector while at the same time create a climate for innovation, GE recommends an inclusive process for participation in Ofgem Smart Meters Programme that de-couples innovation and deployment from traditional routes exclusively tied to energy suppliers.

At the same time it is important to stress that traditional relationships continue to work well, however this approach will reinforce risk-taking and longer-term investment by the third parties.

Question 1: Do you have any comments on our proposed governance and management principles or on how they can best be delivered in the context of this programme?	<p>GE supports most aspects of the governance principles. Greater emphasis should be placed to ensure a level playing field that provides all parties with equal input and access to data.</p> <p>Ofgem should also take independent input from an external body to ensure the solutions; protocols and technologies are appropriate and fit-for-purpose. This should propose the best way to tackle technology requirements and not simply the most popular solution.</p>
Question 2: Are there other cross-cutting activities that the programme should undertake and, if so, why?	Throughout the program there needs to be careful management of the technical requirements and specifications ensuring that a sensible 'change control' and 'update path' be established to and revisions to standards (as new features and functions are added) or new technology adopted. Ofgem should own this structure once decided.
Question 3: Do you agree with our proposal for a staged approach to implementation, with the mandated rollout of smart meters starting before the mandated use of DCC for the domestic sector?	Yes. This will enable the development of technology and business process to provide useful input to the main program rollout. It is also useful to gain early-adopter feedback from consumers. With suppliers responsible for the data collection prior to the DCC, provision can be made to transition the data collection over to the DCC at a later date.
Question 4: Do you have any comments on the risks we have identified for staged implementation and our proposals on how these could best be managed?	No comments



Question 5: Do you have any other suggestions as to how the rollout could be brought forward, including the work to define technical specifications, which relies on industry input?	<p>By making some early-informed technology decisions such as protocols, HAN and WAN standards, technology suppliers can then advance the development of these technologies that allows the fine detail to be progressed regarding interoperability and messaging flows.</p> <p>Ofgem should lead this with consultation from industry groups. An objective assessment should be undertaken by Ofgem or by an independent body which analyses the features and benefits of the different available standards, technologies and protocols (such as ZigBee / DLMS / MBUS / OMS / etc). This would avoid a 'battle of the standards' and provide an even playing field and solid decision for companies to base their products on.</p>
Question 6: Do you agree with our planning assumption that a period of six months will be needed between the date when supply license obligations mandating rollout are implemented and the date when they take effect?	No comments
Question 7: Do you have any comments on the activities, assumptions, timings and dependencies presented in the high-level implementation plan?	Technology providers will need sufficient time to develop and certify the products ready for the rollout to begin following the mandate of the requirements. Early agreement on UK or EU interoperability standards is key. There then needs to be a streamlined way of certifying products to the standards (like MID) as a number of products will be coming to the market at the same time.
Question 8: Do you have any comments on the outputs identified for each of the phases of the programme?	No comments

**Area: Customer Experience**

Q. Do you have any comments on the proposed approach to ensuring that customers have a positive experience of the smart meter roll out (including required code of practice on installation and preventing unwelcome sales activity and upfront charging)

We acknowledge the need for a focus on technology within the Prospectus, however there is a growing sense in GE's experience around the world that the willing participation of consumers has to some extent been overlooked.

The mass deployment of smart meters is a key element in the overall strategy for smart grid development in the UK. Connected and knowledgeable consumers will enable a more rapid implementation of key enabling functionalities e.g. such as Demand Response in real time. Without a widespread educational awareness raising national programme then the planned pace of (accelerated) roll out will be unlikely to be achieved.

In addition it should be recognised that the consumer group is not a homogenous entity. There are a number of discrete groups who may struggle with the technology change e.g. the fuel poverty or other priority groups. GE has already committed to support scientific university-led research to understand how the problems faced by vulnerable customers might be managed through educational and mentoring activities and would welcome the opportunity to share these findings with Ofgem if that was considered appropriate.

Conclusion

GE welcomes the publication of the Smart Meter Implementation Programme and broadly supports the next steps as proposed in the consultation document. There are many industry parties that need the appropriate certainty as they prepare for the imminent smart metering rollout.

It is vitally important that momentum is not lost to ensure as many elements associated with the rollout of smart metering as is possible are defined at the earliest opportunity. It is essential that Ofgem leads in this area to provide a level playing field.

We also urge Government to consider the longer-term strategic objectives for smart metering. In carrying out its own smart grid vision, GE has identified some key issues that will need to be resolved; many of these are not necessarily new issues but have been identified as part of longer-term considerations for smart grid technologies.

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