

Ref:S871b/hmf

Margaret Coaster  
Smart Metering Team  
Ofgem E-Serve  
9 Millbank  
London  
SW1P 3GE

28 October 2010

Dear Ms Coaster,

**SMART METERING IMPLEMENTATION PROGRAMME PROSPECTUS (2<sup>nd</sup> Submission)**

This is the second submission on the Smart Metering Prospectus from the IET and covers the issues in the questions due by 28 October. The focus of the IET's comments in this submission is on data protection, end to end system security and the establishment of the central Data and Communications Company (DCC).

The IET is one of the world's leading professional bodies for the engineering and technology community and, as a charity, is technically informed but independent of network company, equipment supplier or service provider interests. It has a key role in smart metering and smart grids policy formation as the principal professional body to which chartered engineers working in the electricity sector belong. It is also unique in having in its membership engineers from all three disciplines needed to make the programme a success.

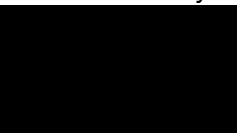
The IET's response to the issues due by 28 October is attached.

This submission has been prepared on behalf of the Board of Trustees by a joint team drawn from the IET's Energy Policy Panel, IT Policy Panel and Communications Policy Panel and takes into account input from the wider IET membership received in response to a call for comment.

The IET is liaising closely with the Royal Academy of Engineering on smart metering implementation, with significant joint membership of our senior policy panels.

The IET is committed to working with DECC and Ofgem to address the issues raised.

Yours sincerely



The Institution of Engineering and Technology



# SMART METERING PROSPECTUS

2<sup>nd</sup> SUBMISSION BY THE INSTITUTION OF ENGINEERING AND TECHNOLOGY (IET)  
28 October 2010

## OVERVIEW

### System architecture and the scale of the engineering challenge

The proposal to run this programme as a **centralised** project makes it a much bigger engineering exercise than Ministers, DECC or Ofgem seem to appreciate. An analogy is an iceberg: the top level policy makers see the visible tip of the iceberg but are unaware of the scale of what lies below and the potential threats it poses. However, in the absence of an agreed overall system definition, architecture and design, the programme is at high risk of cost escalation, delay, functional degradation and failure. Alternative **decentralised** market driven approaches around a solid architectural framework, system specification and defined standards for interoperability may present more effective ways to manage this risk.

### Role of the DataCommsCo (DCC)

Without some form of appropriate communications, the meters will bring no benefit other than the in-home display, which could be provided at a fraction of the cost. The essential prerequisite feature of a “Smart” utility network is a bi-directional communication network. The system as a whole will only become “Smart” when it is complete. The role, responsibilities and capabilities of the DCC are thus pivotal to the whole scheme. It is vital to engineer the DCC/communications capabilities from the outset or the programme will have great difficulty in achieving its objectives.

### Programme Management Resource

The IET is concerned not to find any mention of a “technically competent design authority” in the proposals. We do not consider that the establishment of separate stakeholder expert groups is an adequate substitute for a technically competent design authority. The two roles are different and both are required.

DECC will need to build up a significant programme management and design management function to deliver the programme comprising a central team of qualified engineers with support staff, and the significant resources needed to maintain dialogue with the extensive stakeholder and specialist groups. To this will need to be added the services of legal, contracts and other people.

## RECOMMENDATIONS

The IET recommends that:

1. The roll-out of smart meters **should not be accelerated** unless it is demonstrable that a methodology can be developed that gives assurance of systems level functionality and scalability. In the IET’s opinion this is currently not the case.
2. DECC should consider alternative **decentralised** market driven approaches around a solid architectural framework, system specification and defined standards for interoperability as they may present more effective ways of managing the Programme risk.

3. The **DataCommsCo capabilities** at the heart of this Smart Meter/Smart Grid initiative should be in place early in the programme to ensure the integrity of an end to end system design and to avoid unnecessary upgrades to meter and WAN software.
4. A technically competent and impartial<sup>1</sup> “**design authority**” is required to take overall technical responsibility for the entire system including the architecture and interoperability standards and end to end system level security.
5. Much greater attention must be paid to **cyber security** through immediate incorporation of strong security policies within the system architecture and design process. The IET would be pleased to propose a **suitably experienced, impartial and internationally recognised expert** to serve on the Privacy and Security Advisory Group.
6. It is **not sound** in principle for the choice of technology of the WAN to be left to the DCC since the largest capital cost item of the entire WAN (by far) will be the 20 million communications modules **that the energy companies will own and not the DCC**. It is essential for there to be a national specification for the smart meter communications interface that takes into account the ownership interests of the parties on each side of the common interface. DECC is the only neutral authority that can come behind a common standard but it will need a small and impartial expert technical group to advise them. The IET would be willing to offer an **experienced, impartial and internationally recognised senior engineer in technical standards** to take part in such a group.
7. The Smart Metering Programme should be seen in the context of the government’s recently announced **National Infrastructure Plan**.
8. A key step for progress in regard to addressing smart grid architectures is the delivery by DECC/Ofgem of a **mandate for smart grids to be developed**. Without this the network companies and other stakeholders have no binding requirement to invest the necessary effort to progress towards a solution in a timely way.

---

<sup>1</sup> (impartial meaning not the DCC itself who could move their costs onto the meters/suppliers)

## IET RESPONSE TO DECC ON SMART METERING PROSPECTUS

### Questions for answer by 28th October

#### CUSTOMER EXPERIENCE

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

We think there will be a lot of learning from early adopters on what works and what doesn't for the IHD – there is a need to avoid being over prescriptive to allow this to evolve during the rollout.

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

Though there has been considerable progress, there are fundamental issues still to be addressed. Checks and balances have been added but their implications for the end to end system design need further consideration. The approach indicates that the Programme plans to comply with the Data Protection Act but how this will be achieved while also achieving the programme objectives has not yet been thought through from a practical perspective.

The IET is concerned that by saying the consumer can choose what data gets given to whom, the Prospectus has avoided the need to address how the intended benefits will be achieved while complying with the Act. In reality, the consumer is unlikely to have sufficient interest or capability to make an informed decision on which of the authorised parties will have access to their data.

The approach will be very dependent on the definition of what data is required for statutory purposes, and this has not yet been defined as far as the IET is aware.

DECC and Ofgem correctly lay great emphasis on the agreement by all stakeholders to adopt the principles of Privacy by Design and Security by Design. Yet, self-evidently, the programme is so far only paying lip-service to these principles. Examples include:

- (a) The (political?) desire to speed up the specification process, while the end to end system design remains incomplete is at odds with the principles of privacy by design and security by design.
- (b) The Prospectus says that DECC will carry out a Privacy Impact Assessment (PIA), and refers to the Information Commissioner's Office (ICO) website. The ICO's recommendations include:  
 "Where business cases for new systems are presented without a supporting PIA, they should be rejected. This is a logical and beneficial step, since a PIA may reveal a need for additional controls or even a fundamentally different approach, with consequential costs for the project. In the public sector, this approach could be mandated for all systems."

The ICO is saying here that the Privacy Impact Assessment must *precede* the approval of the business case and overall approach *must not be agreed ahead of completing the PIA*. So far as the IET is aware, DECC have not published timescales for completing the PIA, nor any detail of how it will be reviewed.

- (c) Clearly, the PIA must be at the system level. But it is not clear who is defining the system that will be assessed or when this design will be available for functional review before PIA assessment.
- (d) The ICO recommendations state that systems should incorporate appropriate privacy enhancing technologies (PETs) based upon a rigorous privacy impact assessment. How can the meter specification incorporate "appropriate PETs" before a system-level PIA has been carried out, published, reviewed, revised and agreed?

The approach thus indicates that the Programme plans to comply with the Data Protection Act but how this will be achieved while also achieving the wide-ranging programme objectives has not yet been resolved.

In parallel with getting the data protection issues right, dialogue with the public will be very important to increase understanding of the reasons why changing attitudes to energy use will be beneficial. Shifting use of white goods to non-peak times (or, in future to days when there is plenty of wind power) will have a major beneficial impact both on carbon emissions and reduce the price of electricity for all.

## INDUSTRY ROLES AND EXPERIENCE

**Question 8 Customer premises equipment: Do you have any comments on the proposals that energy suppliers should be responsible for purchasing, installing and, where appropriate, maintaining all customer premises equipment?**

Distribution Network Owner (DNO's) also have a role in the safe installation and maintenance of the customer premises supply, of which the meter will form a part. The IET Wiring Regulations team is collaborating with other stakeholders to address this issue.

**Question 9 Scope of activities: Do you have any comments on the proposal that the scope of activities of the central data and communications function (DCC) should be limited initially to those functions that are essential for the effective transfer of smart metering data, such as data access and scheduled data retrieval?**

The upgrade path to smart grids and the need to manage small smart grids locally (such as those funded under the Low Carbon Network Fund) are both going to be important within the life of the DCC. The IET cautions strongly against an approach that 'comes back to some aspects later'. There is a considerable risk that if attention is focussed on smart metering data, there will be insufficient attention given to ensuring that a workable system is implemented that will be capable of delivering smart grid functionality when needed in addition to smart meter functionality.

Consideration should be given to extending the scope of the DCC to include remote monitoring for end to end fault detection, maintenance and resilience.

**Question 10 Do you have any comments on the proposal to establish DCC as a procurement and contract management entity that will procure communications and data services competitively?**

The functions of the DCC need to be strongly linked with end to end security of the entire smart metering system. Therefore it will be essential for DCC to have high level technical competence in-house in order to perform the procurement and contract management functions proposed. This needs to be adequately costed into the proposals.

**Question 13 Smart metering regulatory regime: Do you agree with the proposal for a Smart Energy Code to govern the operation of smart metering?**

This could be a mechanism for establishing a governance process that meets the requirements for a multi-stakeholder environment; experience gained from other industry codes and their management may be helpful.

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

The relationship between electricity metering and electric vehicle charging is a known issue but does not appear to have been adequately addressed.

It is essential that the wider impact of smart metering architecture on future smart grid functionality is considered from the outset. The Prospectus text invites comments on whether the proposals on page 29 will facilitate the development of a smart grid. However, it is of concern that there is no specific question on transition to a smart grid. The implication

seems to be that these are issues for the future, but they could become significant well within the life time of the first DCC contract. It is important to ensure that the architecture selected for roll out of smart metering **does not impede** development of smart grid capability.

DNOs will soon need more real time data in some areas in response to new electricity demands on the distribution network. The introduction of Electric Vehicles (EVs) is being incentivised under other Government initiatives. Take up of EVs can be expected to be concentrated in particular neighbourhoods initially rather than at an average rate across the country. This is likely to result in 'hot spots' of network constraints requiring smart grid solutions to be developed and implemented if costly and disruptive investment in new lines and substations under the 'Business as Usual' approach is to be minimised.

It is vital that silo thinking is avoided in considering the future evolution of a smart grid. This presents considerable challenges if smart meters are planned to be rolled out before the functionality of a smart grid for the UK has been clarified. For example, there does not seem to be a long-term view of how smart metering/grids will integrate with large-scale adoption of EVs or with control of distributed renewable energy. The IET is concerned, for example, that:

- The introduction of Feed in Tariffs is leading to a step change in the take up of PV panels. Distribution Network Owners will have an increasing need for power quality information in areas of high PV take-up to allow harmonic content to be managed adequately.
- Another issue with high levels of PV is that there could be a risk that high density installed PV capacity, for example on a new housing estate where every house has a panel, could result in the possibility of a self-sustaining power "island". Also with a high take-up of EVs and plug-in hybrids in the mid-2020s, there could be a requirement to limit loading at the local, not national, level. Such issues, which appear not to have been considered, would totally change the options for systems architecture.
- The data privacy principle that will allow customers to choose who has visibility of their data appears to be at odds with effective and ubiquitous smart grid management and control.
- Smart meters represent only one aspect of the range of technologies involved in the as yet un-defined smart grid architecture. A complex mix of smart devices, (such as EV chargers, heat pumps and other systems), each with their own communications infrastructure and international standards is an extremely likely scenario – and smart meters within the UK will need to be able to integrate with these. Thus it is important for the UK to influence international standards for these devices with a view to ultimate harmonisation on best practice rather than lowest common denominator.
- We believe that a key step for progress in regard to addressing smart grid architectures is the delivery by DECC/Ofgem of a mandate for them to be developed. Without this the network companies and other stakeholders have no binding requirement to invest the necessary effort to progress towards a solution in a timely way. This mandate does not need to be technically prescriptive, rather a call to the incumbent players to deliver a suitably detailed and practical specification and implementation plan that can be duly considered by interested parties before agreeing its implementation.

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

Although work so far recognises the issue, major concerns remain over **cyber security** which has yet to be addressed in a comprehensive way.

In the future, the HAN will link many smart devices in the home as well as the smart meter. Every one of those devices becomes a potential attack point for cyber intrusion. Also, every node in the HAN and WAN networks will represent such attack points. With energy prices continuing to rise, the very powerful incentive for tampering is self evident. Software modification can be extremely difficult to detect compared with physical tampering with current meter systems. Once the "backdoors" into the smart network are discovered by

stealth the opportunity for more malicious tampering leading to perhaps major energy network failure becomes realistic.

Security is a system property and **emergent** (in other words, you cannot show that a system is secure by showing that its components are secure. This means that you cannot know what the specification of the components needs to be without the system-level security policy. It is generally very expensive or impossible to retro-fit security into a system, especially if some of the risks are critical, as they are in the Smart Grid). If the system (Smart Grid with Smart Meters) is to be secure, the system architecture and security policies need to be in place and reviewed by independent experts. It could be catastrophic to focus only on the security of individual smart meters, or the communications network, or even the whole Smart Meter network as to do so may then make it impractical to make the whole Smart Grid secure.

We note that the US National Institute of Standards and Technology (NIST) is being consulted by Ofgem and observe that NIST has recently published a three volume report on Smart Grid Cyber Security and Privacy (August 2010)<sup>2</sup> which illustrates very well the complexity of the problem.

The IET's recommendations on security are:

- Much greater attention must be paid to cyber security through immediate incorporation of strong security policies within the system architecture and design process.
- Open system standards (preferably consistent with international norms) will be required not so much for the component parts of the system but for the **interfaces** between parts of the system.
- It is essential that a full, system-wide security policy and security specification is developed and peer reviewed before design decisions are taken that might prove expensive to change.
- The Privacy by Design principles referred to under question 2 are equally important for Security by Design. Thus there is a need for a systems architect for the whole SG+SMs system **before** the SM rollout programme.
- It is not yet clear to us who the Responsible Owner is for the Smart Metering Programme as both Ofgem and DECC appear to have responsibilities in this area. We recommend that a single Senior Responsible Owner with accountability to the Office of Government Commerce Gateway Review process should be clearly identified.
- It is usual under the Treasury "Green Book" procurement guidelines to include a significant optimism bias for large projects which are dependent for their success on IT-enabled business change. In view of the security issues and the early stage of the programme, the IET believes that it is inappropriate to include the following statement in the Impact Assessment: "IT optimism bias adjustment has [ ] been revised downwards from 50% to 10% as a result of more detailed cost assessment which has allowed us to identify more clearly the nature of the costs involved in the central IT and DCC set up cost estimates".
- Smart metering **policy makers** should read "Demystifying Security and Risk Concerns in the Smart Grid Ecosystem", by Usman Sindhu, Forester, July 1, 2010. It is written to assist security professionals presenting the issues to non-technical policy makers but is just as useful to policy-makers themselves.

<https://wam.bcs.org/wam/sentinelcheck.exe/?20799/20802/21024/21025/rep>

The IET has major expertise in cyber security and wishes to offer an **independent expert** from the IET's IT Policy Panel to serve on the Privacy and Security Advisory Group.

---

<sup>2</sup> Smart Grid Cyber Security and Privacy, US National Institute of Standards and Technology (NIST), (August 2010)

<http://csrc.nist.gov/publications/PubsNISTIRs.html#NIST-IR-7628>

**IET RESPONSE TO DECC ON SMART METERING PROSPECTUS**  
**Questions for answer by 28th October**

## **Communications Business Model** Ref 94-d/10

**Question 1: Do you agree that access control to secure centrally-coordinated communications, translation services and scheduled data retrieval are essential as part of the initial scope of DCC?**

Yes.

**Question 2: Do you agree that meter registration should be included within DCC's scope and, if so, when?**

Yes. There is a supporting technical argument for this. One of the leading candidate technologies for the Wide Area Network is GSM/GPRS. There is an issue as to whether the smart meter radio module has a conventional removable SIM card or has an embedded SIM. A removable SIM has less advantages for the smart meter application. An embedded SIM is likely to be much cheaper and reduce the logistics. However, it requires the necessary relationships to be in place with the approved smart meter supplier(s) (within the necessary security framework), with whoever administers the module addresses and with the DCC. This would be an argument in favour of the meter registration being a function of the DCC to keep those lines of communication as short as possible.

It is important that DCC must maintain a register of all meters which have an authorised connection to the system. Given the other considerations listed in the prospectus (including sunsetting of MPAS and the resolution of issues connected with change of supplier) it is likely that DCC must take responsibility for the end-to-end business process of meter registration.

More importantly it would seem from a system security perspective that DCC control over meter registration will be of the utmost importance.

**Question 3: Should data processing, aggregation and storage be included in DCC's scope and, if so, when?**

Yes, but as part of a resilience strategy where others also store their relevant data.

From a system integrity and security perspective it will be likely that DCC will maintain logs of transaction data and records of confirmed message delivery (where this is required). Transaction log retention and management might be deemed to constitute aggregation from an information security standpoint.

From a business process perspective it is likely, as mentioned in the prospectus, that the DCC will need to provide message translation services, which constitute data processing.

If the DCC role is to provide a central communications hub with associated business process capabilities, we think it unlikely that other data processing and aggregation will be needed or desirable. Once the smart grid/metering infrastructure has matured there may be advantages of scale or new business opportunities that will require a change of remit for the DCC.

**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?**



The IET believes that a decision on the WAN technology should (and can) be taken now and by DECC (rather than by DCC later).

*Why now?* This simplifies the project that already has too many decisions yet to be taken. It allows the envisaged pilots to proceed before the DCC is set up with absolute confidence of backwards compatibility. It allows the development of the smart meters to be optimised much more quickly.

*Why the DECC and not the DCC taking the decision?* The consultation document proposes leaving the choice of technology of the WAN to the DCC. This is **not** sound in principle since the largest capital cost item of the entire WAN (by far) will be the 20m communication modules **that the energy companies will own and not the DCC**. It is essential for there to be a national specification for the smart meter/WAN interface that takes into account the ownership interests of the parties on each side of the common air interface.

*Which Technology?* DECC is the only neutral authority that can come behind a common standard but it will need a small expert technical group to advise them. The IET would be willing to offer a very experienced senior engineer in technical standards to take part in such a group.

One essential thing is to have discipline on the requirement. Mission creep in terms of adding all manner of future proofing can easily add £2 billion to the project cost. Since the radio module in the meter is likely to be plug-in for maintenance reasons, this opens up the possibility of another technology being phased-in at some point in the future but this should be viewed only as a long term insurance policy. For scale economies of a commodity communications function, the balance of advantage lies overwhelmingly with full standardisation from the very outset and using what already exists.

**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?**

Yes.

**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?**

It should ideally be independent of any one energy supplier or other user. This leaves open the possibility of a jointly owned enterprise of all the energy companies or an independent company. It also has to be structured to have the freedom to expand its business activity in the future so that the wider economy can take benefit from the expertise that will be built up.

**Question 7: Do you have any comments on the steps DCC would need to take to be in a position to provide its services and the likely timescales involved?**

The most pressing item for the communications function is to define the common air interface for the radio module in the Smart Meter and this cannot await the setting up of the DCC.

There may be both issues and opportunities on the issue of addressing 20 million communications modules and this needs to receive early attention. This also need not await the setting up of the DCC but could be done by a small expert group once the common air interface standard has been agreed.

**Question 8: Do you have any comments on the proposed approach to cost recovery and incentivisation for DCC?**

The ownership and financial incentives proposals for the DCC are not matters that the IET expertise offers any unique insights on. However, it does appear to be an element of over-kill for a “commodity” function that anyway will be subject to very close regulatory over-sight.

## **Additional issue not identified in the consultation document:**

### **Controlling costs in the early years**

It may be useful in getting costs under control in the early years to separately address the requirement for non-real time data (e.g. for remote meter reading) from the requirement for near to real time data (e.g. for remote load management). It is likely that simpler remote meter reading applications will be functioning much sooner and on a bigger scale than the more complex remote load management (which nevertheless may have significant economic benefits and should not be regarded as the poor relation here). The mobile operators should be able to offer an attractive price for carrying non-real time (for example over-night) GPRS data as it has zero incremental cost to them (i.e. uses spare capacity that is otherwise lost). This could simplify the charging structure by allowing the usage element to be bundled into a low flat rate standing charge per meter per year. This would allow much lower running costs in the more expensive start up years before the scale economies start to kick-in. The nearer to real time data functions can then be added “as and where needed” since they are likely to cost more. It is however important that the latter are designed-in from the start and fully proven functionally while the systems are being thoroughly tested and commissioned.

IET

28 October 2010