The Foundation for Information Policy Research

Consultation response on

Smart Metering

The Foundation for Information Policy Research (FIPR) is an independent body that studies the interaction between information technology and society. Its goal is to identify technical developments with significant social impact, commission and undertake research into public policy alternatives, and promote public understanding and dialogue between technologists and policy-makers in the UK and Europe.

Executive summary

The Government proposes to replace Britain's 48m gas and electricity meters with smart meters to help people save energy and to improve the grid's demand response. This is a good idea in principle and is being adopted by many utilities worldwide.

But the way the UK Government proposes to go about it replicates just about every major mistake already made in major Government 'IT Projects' over the last twenty years. As a result, the smart meter project is unlikely to bring the desired benefits, and may well not work at all. A major IT procurement is being rushed through for political reasons, with no clear specification, an unrealistic timetable, inadequate financial control, and seriously defective governance; advice on costs and timescales is being ignored; and the proposed architecture ensures continued dominance of metering by energy industry incumbents whose financial interests are in selling more energy rather than less. Pilot projects have failed to show statistically significant energy savings, so even if the systems can be made to work it is quite unclear that they will achieve anything significant, beyond perhaps a rerun of the Bakersfield fiasco. Finally, the proposed industry architecture stifles innovation and thus guarantees that most of the new, high-value green jobs will go elsewhere. We set out these and other problems in detail below.

We urge ministers to kill the project and instead promote competition in domestic energy metering, as the Germans do – and as the UK already has in industrial metering. Every consumer should have the right to appoint the meter operator of their choice, which would not only provide readings to the energy retailer, and the network operator, but also help save energy. This would open up the domestic energy saving business to competition, both from innovative startups and from large IT firms such as Microsoft and Google. It would also open up the market for smart appliances. If smart metering can be used to help consumers save energy, it is in a competitive market that firms will discover how, and these firms will create the green jobs of the future.

Details

When building a system, there are two questions to ask. Are we building the right system? And, are we building it right? In the case of the smart metering project, the answer to both of these questions is no.

1. The project assumes that enabling fine-grained time-of-day pricing, particularly for electricity, will allow peak demand shaving, while making information available to consumers will help them save energy and improve demand response. But we don't know how this will work in practice. Getting people to use less energy is hard, just like getting them to consume less food or alcohol or to save adequately for retirement: most people find it hard to trade tangible and certain pleasures now for intangible and uncertain pleasures in the future. We simply don't know yet what combination of economic incentives, interaction, social pressures and other interventions will work for energy. There have been mixed results from projects worldwide; in the UK, Ofgem pilots involving over 58,000 consumers have failed to show statistically significant savings[1]. It will take time, and experimentation, to find out what (if anything) will change behaviour.

[1] Ofgem, Energy Demand Research Project, review of progress for the period March 2009 – September 2009

2. If this experimentation is to be fruitful, the companies doing it had better actually want to save energy. There are indeed many small startups working to design smart measurement systems, control systems and interfaces that will enable a householder to control energy consumption and react to price signals. But the proposed project will let the six large incumbents – the existing electricity retailers – install and control the meters. These companies maximise their profits by maximising sales volume. Although they can make some money by peak demand shaving, they have no incentive to do much beyond this, and every incentive to sabotage anything that could lead to real cuts in overall demand (such as providing standardised interfaces for smart appliances, or even making energy use more salient to consumers). Although their senior managers make noises about helping people to save energy, the reality is a move to confusion pricing. Their control of smart meters will at best delay any prospect of smart appliances or greater transparency leading to reduced demand. In fact, if the pattern seen in Japan is repeated, then increased time-of-day price variation – their most likely strategy for peak-demand shaving – will lead households to buy batteries, which will increase overall demand and thus carbon emissions.
3. In Germany, ministers have been more able to resist lobbying by the incumbent energy retailers. The need for better demand response is also more acute there, as they have much more onshore wind thanks to their generous feed-in tariffs. (Wholesale electricity prices in Germany have even gone negative, as Germans pay Swiss utilities to absorb production peaks.) So in Germany any consumer can appoint the meter operator of their choice who gets €20 per annum from the distribution network operator for this service. As well as supplying readings to the distributor and the retailer, the meter operator can provide whatever services they like to the consumer. This is the right market structure to encourage innovation; it encourages market entry. German consumers can already sign up for smart meter services that enable them to manage energy online. And the UK already has a competitive market for industrial metering and energy services, as the prospectus admits (section 3.35 p 33); the industrial sector won't even have to use DCC.
4. Ministers have talked about green jobs. However, as things stand, we expect that

the high-value green jobs will go elsewhere. It's the German firms who will find out not just how to design better smart meters, but how to integrate them into an ecology ranging from energy-management services to smart home appliances. One UK firm talked about a smart dishwasher with two start buttons: a red button for 'do it now' and a green one for 'do it later when it's cheaper'. This could well be a bonanza – but if it's Germany that gets the energy-saving ecology together first, then the smart appliance market is likely to be a bonanza for German firms such as Miele.

5. The DECC proposal is not just for control of meters by the incumbent energy companies, but for a central database, to be designed and procured by government, that will collect meter readings from all households in the UK and make the information available to retailers, distribution operators and consumers. This centralised approach to IT was favoured by the last government, and led to a number of large project failures. Some of them failed because the basic concept was wrong, and the wrong system was built. Others failed because officials set about running the development project the wrong way.
6. In addition to building the wrong system, DECC is building it wrong. We urge the new DECC ministers to review the history of failed public-sector IT projects. The report into the London Ambulance Service disaster in 1992[2] is a good starting point. After a new system collapsed, the capital was without ambulance cover for a day, leading to perhaps a dozen avoidable deaths, and the resignation of senior officials responsible. The official inquiry noted that the service's management ignored advice on cost and timescale; an optimistic view was taken of critical components, particularly data communications; the specification was inflexible but incomplete, having been drawn up without adequate consultation; the procurers were insufficiently qualified and experienced; there was no systems view; and there was confusion over who was managing it all.
7. The London Ambulance Service disaster is now used as a standard teaching example of 'how not to do it' in computing and engineering courses worldwide.

[2] SW Thames RHA, Report of the Inquiry into the London Ambulance Service, Feb 1993; at http://www.cs.ucl.ac.uk/staff/A.Finkelstein/las.html

The smart meter project repeats all its major errors, and more.

8. First, cost and timescale: officials have been told, and ministers are told hereby, that it was always an ambitious and challenging target to install 100 million boxes within the original seven-year period of 2013–20 (22m gas meters and 26m each of electricity meters, gateways and in-home displays). At the very least, we'll have to train a lot more fitters! Ministers now propose to install most of the meters by 2015. In our view, that just cannot be done. In fact, the new target is so unreasonable as to raise questions about the quality of ministers' advice.
9. The unrealistic timescale is compounded by the second problem from the London Ambulance Service disaster: data communications that can't cope. Ofgem hopes that GPRS can be used to link up 26 million gateways to a central head-end. Yet many houses are in dead spots and little thought appears to have been given to other mechanisms, nor how one or more existing GSM networks would handle the increased data volume. (The success of the iPhone forced Orange to build many new base stations; and in the USA the prospect of large extra data volumes got the FCC involved in smart meter planning.)
10. The head-end system to which meters will report readings, DCC, is supposed to be available by 2013. This is a stunningly ambitious timescale for a public-sector procurement, given that DCC will need not just a national data communications infrastructure, but also a central database capable of handling half-hourly readings from 48 million meters, and making these available selectively to energy retailers, distribution network operators, customers, regulators and others. On past form we'd expect a government IT project of this size to take seven years (with no guarantee of success). Yet DECC believes it can issue a license to DCC in late 2012, have it appoint suppliers in early 2013, and start offering service in the autumn of the same year. As with the London Ambulance Service disaster, it hopes that the real work – of system design and testing – can be shoehorned into six months, despite the fact that DCC will be much more complex. And because of the centralised architecture, the smart metering project cannot properly begin until DCC is up and running. This poses an acute problem for the Government's proposal to roll out smart meters to most homes before the next election in 2015.

Even if DCC is working by Autumn 2013, that would leave only two years for perhaps 20 million gateways, plus their associated meters, to be brought online. Officials aspire to install seven million meters between Spring 2012 and August 2013 in the hope that DCC will go live then. But the specification of DCC isn't settled, so any meters installed in advance of its completion are likely to need reprogramming or even replacement. As this will be at the suppliers' risk, they will tend to hold back – further eroding the possibility of a big roll-out by 2015. (If the Government is determined to leave metering to the incumbents, it might just forget DCC and let the energy retailers read their own meters. This would probably lead to the outcome seen in Italy – where everyone has a smart meter but they don't help save energy as they don't work with smart appliances.)

11. This brings us to the third lesson of the London Ambulance Service disaster: the need for a robust specification. The smart meter project seems to have been adopted by all political parties in the absence of any clear idea of what it's to do. A specification meeting was held by Ofgem in March, yet knowledgeable people were excluded – not just the Royal Academy of Engineering, but also the technical staff from the meter vendors. Furthermore, the published documents show confusion or at best indecision. Ofgem has said that the DCC will be only a 'thin client'; but at other places, it talks of centralising the data processing, aggregation and storage (pages 12, 14, and 18, communications business model).
12. The fourth lesson to be learned from the London Ambulance Service disaster is the need for an experienced procurement team. The Ofgem metering team appear to lack any serious engineering or large-systems experience.
13. The fifth lesson to be learned from the London Ambulance Service disaster is the need for a systems view. Yet at a conference last week, the ERA said that DCC won't be a large central database while Ofgem said that the DCC would keep all data that are necessary for a 'regulatory purpose'. So the stakeholders are still tussling over what DCC is to do – and since many players who should be stakeholders have been excluded, it's not clear that things will stabilise any time soon. Specifications that are unstable, or the subject of conflict, are an extremely common cause of large-scale systems failure.

14. The sixth lesson to be learned from the London Ambulance Service disaster is to avoid confusion over who's responsible. Yet we find this project being run by E-Serve, which is part of Ofgem, which in turn reports to DECC. We gather that the orders come from DECC, so that the Ofgem and E-Serve staff have no real discretion; so why is the project not being run by DECC directly? Industry rumours suggest that DECC wants to avoid the blame for failure, or that it wants to keep the project financing off its balance sheet. Projects whose governance makes it easy for managers to avoid blame are particularly prone to fail.

There are many other problems with the smart metering project; for example the idea of centralising fine-grained energy consumption data on all households raises grave privacy issues, and has already been found to be unlawful by a Dutch court (on the basis of the same human-rights law that, since the Human Rights Act, is law here too). For details of this and other problems we refer to, and by reference hereby include, the research paper 'On the security economics of electricity metering'[3].

Conclusion

If ministers want British firms to create highly-skilled green jobs as the world moves to renewable energy, the smart meter strategy set by the previous Secretary of State, Ed Milliband, is exactly the wrong way to do it. Attempting to speed up his centralising project will only make things worse. Without a significant change of course, the green jobs will go to Germany; and Britain will waste over £10bn on metering systems that at best won't save much energy and in the most likely case just won't work at all.

Professor Ross Anderson FRS FREng
Chair, Foundation for Information Policy Research
September 28th 2010

[3] R Anderson, S Fuloria, On the security economics of electricity metering, Workshop on the Economics of Information Security (Harvard, June 2010); at www.ross-anderson.com