

Smart Metering – Ed Milliband’s Poisoned Chalice

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Based on a study of smart metering in 11 countries, we find that Britain has taken longer to devise a more complex and expensive system than any other country. We look at:

Complexity
High cost
Flawed economics
Who pays?
Another public-sector IT disaster?

Finally we make recommendations for how government can avoid the IT disaster which appears likely and which will become apparent by 2014–15.

1. Complexity

There are three main reasons for the complexity of the British plan:

- The decision to require suppliers rather than DNOs to roll out smart meters;
- The proposal to include gas meters and an in-home display (IHD) too;
- The proposal to turn communications and data collection into a large centralized government-procured system.

2. High Cost

The inclusion of gas meters and a mandated IHD adds greatly to the cost. In a recent study for the Electricity Authority³, the New Zealand Institute of Economic Research concluded that an IHD was not economic, assessing NPV costs of a HAN and IHD as NZ\$987m (£520m) and costs at NZ\$727m (£380m) giving a net disbenefit of NZ\$260m (£140m). The report noted that “IHDs are subject to damage or loss by consumers. We assume they require replacement every 5 years.” It will be cheaper and more effective to let customers use their laptops or smartphones.

Another factor increasing cost is the decision to mandate suppliers rather than the DNOs to roll out the meters, while the DNOs are doing it in all other jurisdictions except New Zealand and Germany (where some meters are supplied by independent meter service providers). The consequences are:

- increased cost of capital – from a DNO rate of about 6% real to the 10% used in the IA – hence an increase in cash cost of £[2-300⁴]m p.a. to be recovered⁵;
- increased cost of deployment (Baringa pointed out that DNO deployment gave an efficient street-by-street dual-fuel installation strategy);
- decreased consumer trust – as Which pointed out⁶, suppliers are widely distrusted;
- the comparison assumed a centralized communications and data processing system rather than the cheaper backhaul by (mainly) power line carrier undertaken by a DNO.

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³ Cost-benefit analysis of additional smart meter functionality: Home area networks and in-home devices. Report to the Electricity Commission, NZIER, Dec 2009, <http://www.ea.govt.nz/document/8915/download/industry/market/metering/advanced-metering/>.

⁴ Because of the difficulty of getting programme costs from the Impact Assessment we were not able to calculate an accurate figure.

⁵ Baringa analysed the DNO model and concluded that the net benefit (£5.8bn) was virtually the same as the centralized comms approach (£6.0bn), but the analysis was flawed as it ignored the lower cost of capital for DNOs.

⁶ The smart metering programme: a consumer review, Simon Roberts and Zoe Redgrave, Centre for Sustainable Energy, Nov 2011.

Finally such consensus as has been achieved has come at the cost of ever-increasing complexity.

3. How Ed Miliband Cooked the Books

The first three economic assessments of residential smart metering found that it wouldn't pay for itself.

1. The Carbon Trust smart meter trial in 2004 found net disbenefit to smaller SMEs, and by implication to most residential customers.
2. In April 2007 Mott Macdonald for BERR reported that smart metering is "heavily burdened by the high costs associated with replacing legacy meters and developing the comms infrastructure. Therefore it is not favoured in terms of overall NPVs". Their figures showed a net benefit of -£700m for BEAMA minimum spec over 40 years.
3. The April 2008 Impact Assessment (IA) Option 2a, for a mandated 10 year roll-out with in-home displays, estimated the net benefit at -£4.3bn.

So the previous Government's ministers kept on trying until they got a positive result.

- The May 2009 IA Policy Option 2, for a mandated roll-out by the end of 2020 under centralized communications model, predicted a net benefit of £3.6bn.
- Assessments in March 2011 followed by August 2011 were still more favourable with the latter predicting a net benefit of £4.9bn.

The successive reworkings involved a reduction in costs, an increase in benefits, and stretch credulity given some of the assumptions. Yet deployment over the next few years will make the truth clear enough. As Warren Buffett remarked, "When the tide goes out, you see who was swimming naked."

To achieve 'profitability' the previous government stretched the assumptions shamelessly:

- the electricity price forecasts used to evaluate savings⁷ increase in real terms over 15 years by 41% (2.3% p.a.);
- there were major changes in "Optimism Bias" (the allowance made for uncertainty);
- significant optimism was introduced about both costs and benefits;
- the discount rate used became the Treasury's socio-economic figure of 3.5% real compared with the 5% used in France and the 8% in New Zealand.

Although a discount rate of 3.5% may be appropriate for a long-life public infrastructure project, it is not suitable for smart meters because:

1. consumers do not use such a low discount rate;
2. the IA assumes suppliers will charge 10% real;
3. the meters will be replaced every 10–15 years while the rest will be replaced even more often. IT systems cannot be given an accounting life of over 10 years.

Next, the main claimed customer benefit of £4.6bn, which represents nearly 30% the total benefit of the project, comes from an anticipated reduction in electricity consumption by 2.8%. Yet the key conclusion of the Energy Demand Research Project was that a smart meter per se did not have any effect on reducing consumption, but a smart meter with a real time display resulted in a reduction of about 3%, which is used to justify the IHD. Yet the sample of customers was self-selected and probably more interested in the trial than average. Furthermore there has been no effective effort to make energy data available to the customer's laptop or smartphone. Furthermore, many years of research have suggested that the price

⁷ Not included in the IA but in "Valuation of energy use and greenhouse gas emissions for appraisal and evaluation," DECC, June 2010.

elasticity of demand for residential electricity is about 0.3 in the short run and 0.8 in the long run⁸. Thus if the assumption of a 2.3% p.a. real-terms price increase is remotely on target, the anticipated reduction would be more than achieved without any technology investment whatsoever.

The government of Victoria mandated a roll-out of 2.7m smart meters over the period 2009-2013. A new government elected in December 2010 withdrew the mandate and reviewed the roll-out. **Deloitte undertook a cost-benefit analysis⁹ whose key conclusions were:-**

- “Over 2008-28, the Victorian AMI Program will result in net costs to customers of \$319 million (NPV at 2008). This reflects a significant change from previous cost benefit analyses undertaken... This change is driven by the fact that costs have significantly increased since the previous forecasts, benefits have been reduced and barriers to the early provision of AMI services have further slowed benefit realisation
- Half of the AMI Program costs will be sunk or incurred by distributors by the end of 2011, yet most benefits are yet to be realized.”

The Government of Victoria continued the programme, but only because so much had already been spent including developing the IT systems.

4. Who Pays?

The customer benefit of £4.6bn in the August IA is slightly less than the total net benefit of £4.9bn. These figures (which we do not accept) imply that once we subtract the benefits to network companies (which may or may not be recovered through regulation) and those to “UK from carbon savings” which (if they exist¹⁰) are dispersed among the populace, then the costs to suppliers exceed the benefits by nearly £2bn. There are no prizes for guessing who will pick up these extra costs, given the declining competition in the UK retail electricity market.

In Denmark where there is no mandated roll out, but where DNOs have rolled out about half of the meters they are not allowed any increase in regulated revenue. In New Zealand, where there is also no mandate but where suppliers have also rolled out about half of the meters anyway, they do not increase prices. In Spain the DNOs can only increase their meter charge by €0.27/month (which is somewhat below cost) and in Italy by €2 p.a. for a smart meter.

In her evidence to the PAC (Q61) Ms. Moira Wallace, Permanent Secretary at DECC, claimed that “In terms of the actual £11bn, £2bn of that is an allowance for cost escalation so there is quite a margin in there...and then there is a very substantial cushion of customer benefits.” We remain skeptical.

5. Another Public-sector IT Disaster

Britain is the only country mandating a centralized communications system feeding a centralised database. All others except New Zealand and Germany rely on the DNOs to collect, validate, aggregate and distribute usage data.

Britain has a long history of public-sector IT disasters and the smart meter project displays all the classic signs of imminent failure. There is a quite unrealistic timescale; no stable specification; no clear technical leadership; an insufficiently experienced and accountable procurement team; an over-optimistic view of critical components, such as data communications and standards; the omission of other critical components, such as a means to communicate with the HAN; an inappropriate architecture; and a lack of a systems view.

⁸ James A Espey and Molly Espey, “Turning on the Lights: A Meta-analysis of Residential Electricity Demand Elasticities”, Journal of Agricultural and Applied Economics v 61 no 1 (Apr 2004) pp 65-81

⁹ Advanced Metering Infrastructure Cost Benefit Analysis, http://www.dpi.vic.gov.au/__data/assets/pdf_file/0003/138927/Deloitte-Final-CBA-2-August.pdf

¹⁰ How do we account for global public goods, if the UK contribution is vastly outweighed by the policies of the USA and China?

These are spelled out in submissions made to DECC during consultations¹¹ and virtually ignored. The only material change made to the DECC plan following consultation was to increase the period of time budgeted for the design and construction of DCC from 6 months to 18. Yet according to John Suffolk, former government CIO, a national-scale public-sector system typically takes seven years (two for contract negotiations, two for specification and coding, and three for roll-out). The prospect of DCC being ready by September 2014 is as good as zero. The industry is aware of this, so suppliers who do not want to roll out smart meters right now are saying that they'll start once DCC is up and running.

The key to fixing the problem is standards. Attempting to construct DCC without stable standards for a meter to communicate with DCC invites the well-known public-sector IT failure cycle of a changing specification leading to conflict and more change, while driving costs out of control and causing deadlines to slip. However, given an open metering standard, one utility's meters will interoperate with another utility's head-end. (The PRIME Alliance developed by Iberdrola and now tested in practice with half a dozen meter manufacturers and 0.4 million meters installed; it is an ITU standard¹² and will shortly be approved by CENELEC.) Without such a standard, DCC cannot in practice be built; with an open standard, it's not needed.

A final point is that openness is needed for innovation. If I invent a new washing machine with a red button for 'wash it now' and a green button for 'wash it later when it's cheaper', how so I get my machine to talk to the customer's meter, to his smartphone, and to listen to price notifications? Do I have to lobby for DCC's programmers to change their system? We need an open platform on which firms can innovate to come up with energy-saving technologies and services. There are various options for this, including the CEER recommendation of an Open Home Controller or Gateway.

Conclusions and Recommendations

It appears that the DCC project avoided the Cabinet Office quality control procedures that are mandatory for all public-sector IT procurements in excess of £100m. We recommend that the procurement be halted. DECC should follow the example of Victoria, stop the mandated roll-out and review the situation ab initio, without assuming that the Milliband strategy of a central system plus a mandated roll-out is the only possible way forward. At least the following three options must be seriously considered.

1. The first option is to rework the impact assessment using realistic inputs. If the net benefit is negative, the EU should be informed by the September deadline that there will be no mandated roll-out; instead the UK will follow New Zealand and Denmark in letting the market sort it out.
2. The second option is to follow Spain by mandating open standards, and perhaps adopting the Spanish standards with the minimum necessary change. The nature of the mandate on retailers needs to be studied; perhaps a tax of £6 per noncompliant meter point after 2022. Open standards must include access for innovation even where this isn't in the incumbent's interests.
3. The third option is to follow the majority of EU Member States and transfer ownership of the meters to the DNOs, who can then roll out meters more efficiently street-by-street and pass on data as needed. Open standards are needed in this case too.

In short, we recommend that Britain stop trying to invent the wheel and just use one that already works. The three models that immediately suggest themselves are the Dutch, Spanish and New Zealand; any would be much cheaper than the current proposals and would largely remove the technological risk of a systems disaster that would become apparent just in time for the next election in 2015. DCC is not necessary; no other country is attempting to build such a system; and there are good reasons for expecting a very poor outcome if we try. What is necessary is an open platform for innovation rather than a system that, if it works, will serve mostly to preserve and enhance the lock-in of the incumbent suppliers. DECC needs to start thinking seriously about whether and how the smart meter architecture could enable innovation.

¹¹ R Anderson, FIPR Consultation Response on Smart Metering, Sep 28 2010, at <http://www.fipr.org>

¹² [http://www.itu.int/pressoffice/press_releases/2011/CM16.aspx](http://www.itu.int/net/pressoffice/press_releases/2011/CM16.aspx).