Evidence to House of Commons Science and Technology Committee

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Smart Meters

1. Introduction

1.1. AECB responds here to the House of Commons Science and Technology Committee's (STC's) call for evidence on smart meters. In particular:

- How smart meters can be expected to affect consumer behaviour, in terms of reducing energy consumption and buying more energy-efficient products
- How levels of engagement with In-Home Displays change over time
- The extent to which Time of Use Tariffs can be expected to alter patterns of energy usage during the day
- Evidence on the expected net savings for the consumer over time, including in the context of the longevity and technical capability of the smart meter technology being rolled out, and whether similar savings could be achieved by other means
- Evidence of how data from smart meters can be used to optimise national energy generation and storage
- Evidence on the security of smart meters, and the ability of suppliers to maintain security levels in the future

2. Background/Assumptions

2.1. We have read the last two Parliamentary reports on smart meters [1] [2]. We agree with the remarks on the 'downside' of smart meters. We think that Parliament has been too optimistic in its view that smart meters, as currently proposed, have an 'upside'.

2.2. 'Smart' is a much overused word. There are smartphones, 'smart grids' and here 'smart meters'. We have already pointed out that a smart grid is overkill. A better policy aim would be a stable grid for supplying our 'essential electricity' [3].

2.3. In quoting savings to consumers, we assume an electricity price of 14 pence per kWh.

2.4. It greatly concerns us that the SCT's call for evidence apparently confuses energy and electricity. 12% of UK delivered energy needs to be as electricity; the rest is used for portable transport fuel or heat.

2.5. Heat can be stored, especially in bulk. It makes little difference what time of ***day*** the energy is consumed.

2.6. Liquid or solid fuels are so easily stored that it makes relatively little difference what time of ***year*** the fuel is consumed [4]. We cannot devise a fit-for-purpose energy policy unless these issues are understood.

3. A Good Investment?

3.1. The government commissioned a report which stated that smart meters as planned will not be a good investment [5]. The net present value would be minus £4 billion at 2007 money values. This advice was either ignored and/or overridden.

3.2. It is hard to understand the purpose of an IT programme which makes 'UK PLC' a loss of £4 billion. Since then, the cost of installing smart meters appears to have *risen*, owing to 'mission creep'.

3.3. Germany, one of Europe's most successful economies, has since abandoned plans for universal smart meters. Should we not pay attention to this?

4. Gas *vs.* Electricity Meters

Gas

4.1. Gas can be stored. There is little point in introducing gas meters which allow time of day tariffs. The main, or only, value of 'smart' gas meters seems to be to allow utilities to a) remotely disconnect consumers who have not paid their bills b) read meters remotely.

4.2. But utilities can already obtain a court order to disconnect a supply. If consumers were not funding smart gas meters, possibly utilities' enthusiasm for them would diminish.

Electricity

4.3. Unlike gas, electricity cannot easily be stored. So there is a value in allowing time of day and time of year rates. But this plus remote meter reading could be achieved with meters costing less than £215.

4.4. Not many people know that UK domestic electricity consumption has been falling [6]. We are slowly approaching a time when a very energy-efficient household would have an electricity bill of £180-200/year [7].

4.5. If total bills for all the UK's 27 million households could be cut to £5 billion/year [8] by fitting very efficient equipment, it is hard to believe that £12 billion worth of smart meters are justified on the basis of the further energy savings. 2% of £5 billion would be worth £100 million per year [9].

5. Do Smart Meters Save Energy?

Electricity

5.1. The UK savings to date have involved moves towards more efficient lights and appliances, driven in descending order by:

- EU legislation
- advancing technology.

5.2. We cannot see why smart electric meters would influence this. A continuation of this welcome trend is best secured by other policy instruments:

- continuing legislation
- utility programmes which reward such behaviour.

5.3. The amount of electricity consumers can save via A++ and A+++ appliances is linked more to the design and manufacturing quality of that equipment [10] than patterns of use.

Claims that smart meters would effectively uprate an A-labelled device to A+ or A++ seem misleading.

Gas

5.4. We cannot see why smart gas meters would miraculously cause consumers to go out and change their condensing boiler controls or insulate their DHW tank and plumbing properly. These two would often be the 'smartest' initial moves for gas-heated households. Encouraging this needs other policy instruments.

6. Do Smart Meters Save Generating Capacity?

6.1. The other issue is peak-lopping; i.e., transferring electricity consumption from peak to off-peak times. Years ago, Economy 7 consumers were encouraged to use washing machines, clothes dryers and dishwashers at night. Smart meters would in theory assist this process, because the price to *all* electricity consumers would now be lower by night than by day.

6.2. However, using the above appliances at night; i.e., when people are sleeping, is not now recommended [11]. All one can safely do is transfer load from the 17.00-19.30 h winter peak period to the middle of the day; e.g., 9.00-16.00 h, or to later in the evening; e.g., 20.00-22.00 h [12].

6.3. There is rather more difference in winter *vs*. summer UK electricity consumption than there is between night and day consumption; Figure 1. But electricity cannot be stored from summer to winter, making smart meters irrelevant to this point.

6.4. This winter-summer difference will increase if the UK continues to promote electric heat pumps. Load levelling has questionable benefits if the UK policy is to *increase* the winter *vs*. summer difference in electricity consumption.

6.5. The main issue if this future comes about would be levelling the load on winter days and coping with the extremely high peak loads on a day like 19 December 2010. We suspect ulterior motives; para. 9.2.

6.6. Smart meters' real-time display is said to save energy. Some people live in areas with no 'smartphone' signal or have an electricity meter in a garage. This is not very compatible with a visual display linked to the meter.

6.7. If a consumer's electricity bill is £180-200/year, using best practice, and is set to drop slowly, the benefits are very debatable. If an added visual display were to consume an average five watts, this would outweigh a 2% electricity saving.

6.8. More benefit, at less cost, might accrue from automatic controls on fridges, freezers and cold stores [13]; i.e., using them as automatic frequency control. Dimmable fluorescent lighting ballasts could be linked to price signals so that lights are dimmed in an emergency and do not go out. Such measures do not need £215 smart meters. But they are at best stalled.

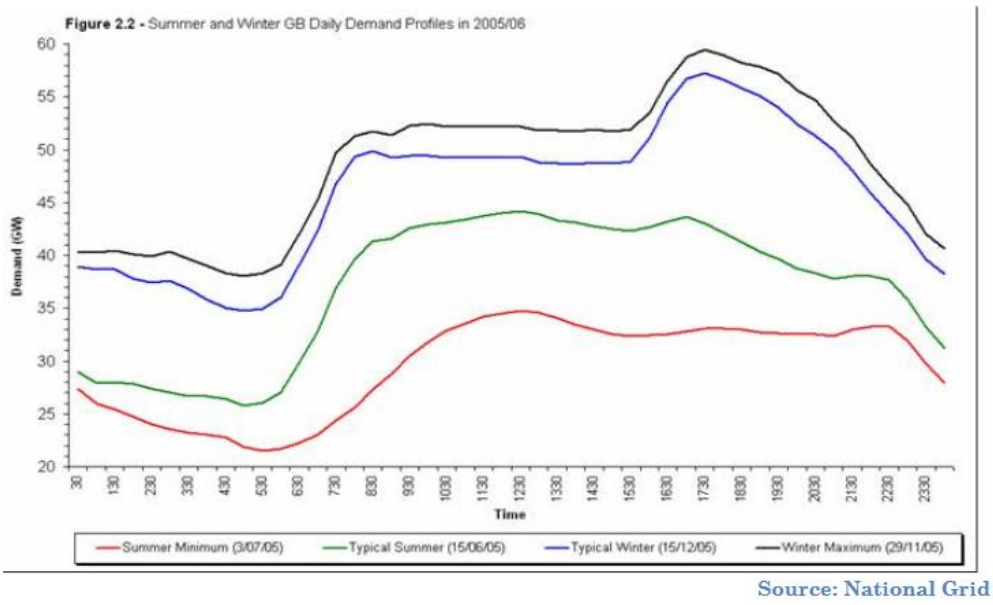

Figure 1. Summer and Winter UK Electricity Consumption over the Day.

7. IT, Privacy and Security

7.1. In 2013, an expert summed up multiple IT-type concerns [14]. Some may have been addressed but data protection/privacy/security fears remain. Are utilities liable if smart meters continue despite the various warnings and in due course consumers' personal data and/or security is compromised [15] ? We are not lawyers. But the question needs to be asked.

7.2. We cannot see a value in incurring these various disbenefits if a smart meter programme has few or low benefits. The government was told in 2007 that the smart meter programme costs more than it saves. The advice should have been acted on. There is still time; see (9).

8. Cost-Benefit Analysis

8.1. Is it more cost-effective to spend £12 billion plus on smart meters [16] *or* something else? One should always be willing to do such cost-benefit analysis. Resources are finite and we cannot do everything.

8.2. As a hypothetical example of how to spend ~£12 billion differently, here is a very rough list of possibilities for discussion, followed by a one sentence summary of the potential benefits:

- £3 billion - grants to accelerate moves to A+++ electrical appliances. **May reduce electricity consumption 50%, occasionally 85%** [17]
- £2 billion - grants to retrofit obsolete industrial and commercial lighting dating from the 1960s, 1970s and 1980s by energy-efficient T5 and LED equipment. **Can reduce electricity consumption by up to 80-90%; 50-60% would be more common** [18]
- £5 billion - heat networks to ease decarbonisation, including demonstration projects of best practice [19]. **Halves heat sector CO_2 emissions in the short term** [20]
- £1 billion - a restart of a revamped and rethought Green Deal. **We regretfully point out that we predicted five years ago that the Green Deal would fail. Work is needed to devise one which will deliver.**
- A few £100 millions over five years - related feasibility studies and a restart of the applied research on energy use in buildings which largely ceased in 2000; e.g., Partners in Technology. **In 2005 the House of Lords Science and Technology Committee condemned the ending of this work, but it has not re-started.**
- A rapid trial of new 'cold appliances' with controls to shut them off during peak periods and provide grid frequency control. **More in ref. 13.**

8.3. We do not think that consumers should fund utilities' core work of billing and debt collection. If utilities want a smart meter programme which benefits them financially, they should pay for it [21]. Privately, not all utilities want smart meters even if the hapless consumers are forced to pay for them.

9. Politics and Leadership

9.1. In seeking to move away from fossil fuels to renewables, we face the most costly energy transition in history [22]. It is set to be difficult and challenging, even if we successfully prioritise areas for expenditure and avoid severe misallocation of resources.

9.2. There may be ulterior motives behind smart electric meters. We urge the Committee to investigate further and not accept explanations at face value. The Committee may wish to consider interviewing witnesses under oath.

9.3. Large IT projects can take on a life of their own, continuing long after it is clear that they cannot deliver the promised benefits. Political leadership is needed to take an axe to the smart meter programme and spend the £ billions in more fruitful areas.

Notes and References

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[1] http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenergy/665/665.pdf

[2] http://www.publications.parliament.uk/pa/cm201415/cmselect/cmpubacc/103/103.pdf

[3] That is, so that our lights, underground trains, mobile phones, shop tills, internet, etc continue to function and the voltage and frequency are rigidly controlled.

[4] It is not unknown for rural consumers whose home is heated by oil or LPG to buy fuel at summer prices and store most of it for 6 months. This is especially easy if the building has a low heat demand.

[5] *Appraisal of Costs and Benefits of Smart Meter Roll-Out Options*. Final Report, BERR, April 2007.

[6] Perhaps despite, not because of, government policy. http://www.ukace.org/2014/04/its-official-energy-consumption-in-the-uk-is-on-the-way-down/.

[7] With exclusive use of very energy-efficient appliances; e.g., A+++ fridge-freezers. Assumes 1,250-1,300 kWh/year at 14 p/kWh. Excludes the standing charge. Assumes that heating and cooking is not electric. Set to decline to 1,100-1,200 kWh/y if continuing opportunities for energy efficiency are exploited.

[8] Unit charges only, not counting standing charges.

[9] If smart meters cut bills by the generally quoted 2%, the return on investment is 0.9% per year. The sum involved is: (0.098 x 100/12) = 0.9%/year. However, 'UK PLC' uses a real interest rate of 3.5% per year to judge if a proposed investment is in the national interest.

[10] Resources would more effectively be spent on ensuring that energy labels are truthful. Few are, according to recent surveys.

[11] Possibly due to declining manufacturing quality. There have been a number of fires.

[12] This is not possible if households go out to work. Some households might also be unenthusiastic about 'chores' disrupting their evening 'leisure' hours of 20.00-22.00 h.

[13] http://www.davidhirst.com/electricity/documents/SystemFrequencyPaperv06.pdf.

[14] http://www.claverton-energy.com/smart-metering-is-fcuked-a-disaster.html.

[15] There are already apparent precedents under the Data Protection Act, Human Rights Act Article 8 *et al*.

[16] Rather like the proposed EPR power station at Hinkley C, we could not find an agreed cost for smart meters. The figures cited cover a significant range. If experts disagree, it can mean that a specification is not finalised and there are risks of further cost inflation.

[17] Based on a fridge-freezer which consumes 125 kWh per year replacing an existing 'cold' appliance which uses up to 750 kWh/year, depending on age.

[18] If 40 year old equipment is still in use; e.g., T12 tubes, the saving from T5s would probably be 60%.

[19] The disadvantages of using average to poor practice are covered in an article in *Passive House Plus*, Issue 15, pp. 68-73 (May 2016). The advantages of using good or best practice, which seems more common in other countries, particularly Denmark, were described in *LESS IS MORE, Energy Security After Oil*, published by AECB (February 2012).

[20] Probably enough to connect around a million to 1.2 million houses or flats. Emissions drop by approximately 50% in the near term if reciprocating engine gas CHP and peaking boilers replace the urban mix of approximately 90% gas and 10% electric heating. Long term, they would fall to zero as renewables are rolled out to supply heat networks, as in Denmark.

[21] Margins widened after deregulation in 2002. This replaced a privatised but vertically-integrated and regulated situation that lasted from roughly 1989 to 2002.

[22] See *LESS IS MORE*, *op. cit*., ref. 19.