Combating Climate Change

The Case for Utility Smart metering in the UK

If one looks at the benefits list for the adoption of 100% smart metering across gas, electricity, and indeed the water sectors it is possible to identify at least 23 ways in which smart metering delivers benefits.

Utility Smart Metering – the benefits list for the UK

1. More energy efficient consumer behaviours

We don't believe, in line with many observers, that the household energy savings due to changes in consumer behaviour will be in the 1-3% (UK Govt assumptions) range. We will be very surprised if the saving is not in the 5-10% range and could be more. There are examples around the world where this has happened. You have short term and long term effects. In the short term people change behaviours - they see the cost of boiling a kettle half full versus completely full. They see the cost of switching the electric oven on. In the longer term they become more enthused to make structural changes e.g. put in more loft insulation, actually install low energy light bulbs, invest in microgen on boiler replacement. In British Gas's Green Streets initiative they were getting 9-26% savings in a year!

2. Avoiding daily electricity peaks

With smart metering we will have half hourly electricity tariffs which provide economic incentives to avoid the daily peaks. Which in turn means that we need less capacity on the system - potentially saving a power station or two.

3. Remote control

With a communications infrastructure which can connect electrical appliances and central heating systems to the external world consumers will be able to control their home through their mobile phone or PDA.

This can bring with it energy savings as people turn on the heating as they return home rather than switching it on at a pre-set time which could be heating an empty house or flat.

4. Interruptible electricity tariffs – turning the freezer off

Smart meters will also be able to communicate (Zigbee or Zwave) to appliances in the home (or rather the communications box will) this will enable (assuming the UK adopts a smart grid approach) suppliers to offer electricity tariffs which allow turn-off of appliances, or turn down of maximum power. So turn a million freezers off for half

an hour rather than bring on a coal fired power station. The consumer benefits from the interruptible tariff - society benefits from the CO2 reduction.

5. Potential benefits in gas

Smart metering also brings the possibility of half hourly gas tariffs. Currently gas is only daily profiled (and measured daily rather than half-hourly when it is measures in the I&C markets). What would be the potential savings in gas infrastructure and commodity costs if we moved to a half-hourly gas balancing regime with an incentive to reduce peaks in demand?

It is an open debate regarding whether savings are to be had through being able to reduce the amount of expensive swing gas needed to balance the system at peak demand times since line-pack (increasing the pressure of the gas in the system to put more gas into the pipes and then reversing the process during peak demand) may well be sufficient. However, it also true that some peaks are caused by the nation heating up their hot water cylinders typically twice a day – and that these could be displaced using within day pricing incentives.

There is also the interesting anomaly that the electricity coming out of a gas fired power station is given a value by the half-hour which changes significantly within day but that the gas going in has no mechanism for showing its time related value.

If we did have a market determined time related value for gas would we have a different mix of generation on line at different times which provided a lower cost solution? Would we see a flattening of demand taking the pressure of the declining gas fields in the Southern North Sea?

Certainly, if the communications infrastructure being implemented as part of the smart metering roll-out connects up suppliers & generators to domestic central heating systems we could envisage both within day and peak day demand being regulated by tariffs which allow the supplier to turn down the thermostat an agreed amount.

6. Generation optimisation

Smart meters will give electricity grid operators access to real time demand and much better informed forecasts which will enable less plant to be left spinning off-line in anticipation of potential demand.

7. Network investment

As distribution companies get a much better idea of load profiles on different parts of the network this allows investment in infrastructure to be better targeted. This then means less investment needed in grids to cope with demand. Lower distribution costs mean lower prices for consumers

8. Network fault response

Distribution grids will also get earlier warnings of outages allowing speed of repair to increase and appropriate customer management responses to be put in place earlier

9. Accurate billing

Accurate billing means 35-50% of queries into supplier call centres evaporate

overnight (Given the preponderance of estimated bill queries in call centres). Customer satisfaction ratings of energy suppliers will also improve since estimated billing is a major cause of dissatisfaction.

10. No more manual meter reads

Automated meter reading obviates the need for physical meter reads saving at least £100M per annum

11. EU Compliance

Accurate real time data on energy consumption for consumers is an EU legal requirement - so without smart meters you cannot comply.

12. Fuel Poverty alleviation

Ability to program the meter between pre-pay (UK has over 4 million pre-pay meters) and credit takes large swathes of cost out of prepayment customer cost to serve. That should feed through into consumer prices and alleviate the cost premium faced by the poorest in society. Fuel poverty (>10% of disposable income on energy) afflicts over 4 million households in the UK. If overall energy prices were to stay the same then smart metering would reduce fuel poverty.

13. New payment and budgeting options

The availability of more granular consumption information for billing allows Telco billing solutions to move into the energy market place. We could well see a much broader range of credit schemes such as usage triggered payment collection, pay as you go – possibly using mobile phone top-up cards. This will provide consumer benefits in terms of having greater visibility of energy spend and better means of managing the energy budget. The astonishing uptake of the PRI budgeting meter in Northern Ireland is a clear indicator of the public appeal of this functionality.

14. Better energy debt management

With consumer debt and debt collection costs well in excess of £2 billion for energy, better debt management is a prize worth going for. For suppliers, being able to tailor credit terms at segment level and the provision of better energy budget management features will enable the energy industry to reduce its debt mountain as well as reduce debt collection costs

15. Enabling micro-generation

Smart meters enable measurement of electricity provided to the grid as well as taken from it. Without this consumers cannot be rewarded for providing electricity to the grid through micro-generation. (CHP unit in the home) Micro-generation moves the home from 40-60 % efficiency to 95% plus from a primary input to used energy (i.e. you eliminate the energy losses in power stations and transmission and distribution)

16. Energy storage

There is a huge untapped source of energy storage in the UK. The hot water tanks in households across the land. It is estimated that 120 GWh of storage could be made available if immersion heaters could be remotely controlled to switch on when surplus intermittent power (e.g. wind) was available on the system. The electricity would be

stored as heat and would substitute for more expensive supplies at other times of the day or night which would then not be needed.

17. Enabling electric cars for storage

Electric cars are fascinating. In principle they act as a two way battery store. Yes they can be charged but they could also provide power into the grid when connected. Again this presents a means to reduce peaks which will be passed on as lower costs to consumers.

18. Reducing energy theft

Then there is energy theft - the absence of a read indicates theft. Reports indicate that this is a circa £200 million issue in the UK.

19. Hot water efficiency

Water could link into the energy communications structure to drive up water efficiency through providing data on consumption to stimulate behavioural change. (Currently only 30% of homes are metered) In the UK it is reported that 50% of the energy consumption of a home is related to water heating. If you could cut heated water use by 10% you could cut energy use by 5%.

20. Water industry efficiency

With the water industry using 3% of the UK's energy to treat and pump water round the system any reductions in water use should lead to savings in water company energy use, their costs, and their associated carbon emissions.

21. Water debt management

Thinking further ahead a shared multi-utility communications infrastructure would enable multi-utility billing. For the water industry this offers the prospect of identifying the responsible bill payer (no more bills sent to "the occupier") This combined with the new tariff and payment options envisaged for energy – but transferable to water – should offer the Water industry an opportunity for it to reduce its growing debt mountain and substantially reduce its debt collection costs.

22. Coping with water stress in the South of England

Reducing water consumption will obviate the need for either piping water from North to South (at massive investment cost) or building major desalination facilities as the South of the country becomes more and more water stressed.

23. Enabling ESCo services

ESCos (Energy Service companies) could use the data for shared saving contracts to promote energy efficiency investment in the home. This would lead to increased investment in energy efficient modifications in the home as well as to increased investments in more energy efficient appliances.

However, even with this multitude of benefits on the environmental, economic and social fronts the viability of this investment in sustainability has been, and still is hotly debated as evidenced by the various independent analyses conducted to date.

We had the Mott MacDonald report commissioned by BERR/DECC which concluded that the benefits case was not strong enough to cover the costs. We then had the Baringa Partners report commissioned by DECC as part of the current consultation process which concluded that the benefits were indeed large enough to cover the costs. Most recently we have seen Ernst and Young's pronouncement that they believe that the costs have been significantly underestimated again questioning the viability of the program.

Why is there such a lack of clear cut case for smart metering?

Clearly there is uncertainty regarding the cost of implementing the smart metering program. There is also uncertainty regarding the value of the benefits.

Our view is that the list of 22 benefits has not yet been taken fully into account such that the benefits calculations to date have underestimated the value of these.

That said by far the most important reason why the case is not clear cut is that the evaluation does not incorporate the "cost of not meeting our climate change objectives" which would encompass the "costs of not smart metering".

The Stern report estimated that the cost of implementing measures to successfully mitigate climate change would cost the economy 1% point of GDP. However, the cost of not investing in mitigation initiatives was evaluated as being at least five times this amount i.e. 5-20 % points of GDP.

The consequences of failing to successfully combat climate change have also been recently spelt out in DEFRA's 2009 UK Climate projections which make clear the that the South of England will suffer from both too little (i.e. droughts) and too much (i.e. flooding) water. The costs of remedying, or even preventing, massive flooding in the Thames Valley or serious breach of the London Underground system are nowhere taken into account in the economic analyses by either OFGEM or OFWAT or DECC or DEFRA.

So how should this situation be remedied?

The answer we would propose is simple but so is being swept off the table by ministers.

Rather than valuing Carbon at its level in the ETS (EU Carbon Trading System) we should place a value on it that reflects the value to society of avoiding the costs of climate change.

At a push one could argue that the current value of carbon represents the 1% investment cost of taking action now to avert the worst effects of climate change. It probably is well below this since in reality the ETS value is an amalgam of four factors:

- The highest cost means of heavy industry reducing their CO2 output to meet their EU cap
- The cheapest way of heavy industry raising finance (by selling permits)
- The vagaries of the ETS (over issuance of permits)
- Recessionary demand reduction

What it definitely does not represent is the cost of dealing with extreme climate change if we fail to mitigate it.

On the basis of the Stern analysis, one could argue that the costs of failing to address the problem are 5-20 times greater than this. So one could argue that when looking at CO2 reduction options we should use a figure 5-20 times greater than the current cost of Carbon as indicated by the ETS market price.

Using the current ETS price of 14€/tonne CO2 appears ludicrous in this context.

Using a figure 5-20 times this looks like overkill.

Using a Carbon value of 2 to 3 times the current ETS value would seem to be a pragmatic and reasonable option.

Regulators could be forced by Ministers to use this figure in their calculations and could be directed to take into account the broad impacts of any proposed investment on overall CO2 emissions.

Markets would also need this steer – such that non-regulatory investments in low carbon technologies get the push they need. Hence, government would have to guarantee a carbon price of this order. To do this would lead to significant cost – which would need to be funded, logically through a levy on carbon.

What would be the consequences of such a measure?

There would be four main outcomes:

1. Investment in CO2 reduction measures would accelerate and grow as required to mitigate climate change
2. The “green energy” industries in the UK would get a significant stimulus
3. Electricity, Gas – and potentially Water prices would rise further
4. Fuel and Water Poverty would rise (all other things being equal)

The first two are clearly welcome outcomes.

The third, we would argue is neutral. We believe that the public would be prepared to pay more for their utilities if that meant that future generations avoided the extreme costs associated with a failure to address climate change.

Given the average home emits 6 Tonnes of CO2 per annum we could expect bills to rise by somewhere between £70-£140 per annum (i.e. 14-28 €/tonne @1.17 €/£).

This would be offset by additional energy usage reductions coming about from the increased incentive to both change behaviours to save energy and also to invest in energy saving. This could be of the same order of magnitude as the price increase given total energy costs are circa £1300 per annum for an average household. (i.e. a 5-10% energy usage drop would offset £65-130 per annum)

However, rising energy and water prices would lead to further affordability problems for poor households. This is the fourth outcome and is clearly unacceptable.

This means that all other things cannot be kept as equal. What is needed is an income redistribution solution to ensure that households that cannot afford these higher cost essentials are given help.

Whilst we have not researched the viability of alternative solutions in this area one option worth considering would be for the state to pay a proportion, say 50%, of the bills of the fuel and water poor. (This could be subject to the other 50% actually being paid by the utility user, which would dramatically reduce debt management costs in the industries which in turn would help fund such an initiative.) This could be administered through the existing Direct Pay schemes.

Whatever solution is put in place the impact on fuel and water poverty should not be used as an argument for not undertaking a CO2 reduction initiative. These initiatives will cost money, they will increase costs, and they should be paid for by energy and water users. It is an entirely separate question of how to alleviate this burden for households that cannot afford to shoulder these costs.

In conclusion, if we wish to mitigate climate change we need to invest in smart metering since it has so many positive impacts - the 23 benefits.

We also need to invest in renewables, nuclear, carbon capture, and in the energy efficiency of the housing stock etc.

Without all of these investments we will not reach our 2050 targets.

However the current methods of evaluating initiatives to get us there stand in the way of progress because they do not take into account the cost of not mitigating climate change.

The key is the price of Carbon.

Would someone please pick it up, put it into the lock and turn it. Then we can open the door onto a sustainable world for our children and our children's children.

Peter Franklin

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