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Energy & Utilities Viewpoint

Realigning UK Energy Policy

From a High Cost, Low Quality System to a Robust, Cost-Efficient Infrastructure

For more than a decade, the Government has pursued a series of inconsistent policies in the electricity sector, flip-flopping between conflicting policy objectives that if implemented would likely lead to a high cost, but low quality, electricity system that will not deliver the desired climate change objectives. We question whether the current policies offer good value for money for consumers. Lower cost solutions are possible, which would be easier to implement and produce a better quality outcome for consumers while still achieving realistic and worthwhile reductions in greenhouse gas emissions. The question is whether or not the coalition Government has the political will to change direction: if it can, there is a sizeable prize at stake for UK plc -- a lower cost way to achieve the energy policy objectives will free up resources for use in other areas. The first Annual Energy Statement published on 27 July 2010 shows that the Government is willing to grapple with the challenge.

Energy policy over the last decade

The previous government changed energy strategy several times, undertaking two energy reviews in 2002 and 2006, and publishing three Energy White Papers in 1998, 2003 and 2007. Each of the White Papers recognised the tensions between the three pillars of energy policy: security of supply, climate change, and consumer costs. However, each successive White Paper emphasised one of these concerns above the others: in the late 90s, costs were the prime concern, then security of supply came to the fore, and then the emphasis shifted emphatically to the environment, where it appears to have stayed.

Policy piled upon policy

This constant switching of focus from one issue to another has led to a successive layering of policies, culminating in the 2009 UK Low Carbon Transition Plan. The Plan set out how the UK would reduce greenhouse gas emissions by 34% below 1990 levels by 2020. This is a step along the path to the much more ambitious target of an 80% reduction in greenhouse gas emissions across the entire economy by 2050. Central to the plan is increasing the proportion of electricity from renewable sources to around 30% by 2020, up from the current level of 6.2% in the first quarter of 2010.

These targets are to be met through a plethora of initiatives and incentives ranging from the Renewables Obligation and feed-in tariffs, respectively aimed at bringing large- and small-scale renewable generation onto the system, through to increasing the share of renewable fuels in the transport sector to over 5% from 2013. There is also a plan to install smart meters in all 26 million UK homes by 2020, which, together with feed-in tariffs, are expected *inter alia* to speed-up the installation of small-scale heat and power generation in households, and to facilitate the development of smart grids to allow better system management and enable wider distributed generation growth.

Consumers are also expected to make large greenhouse gas reductions by both significant changes in behaviour, enabled by smart meters, and further energy efficiency improvements within the home. At the same time, the Government apparently favours the widespread adoption of electric vehicles, which will add significantly to the amount of power generation capacity required, and for which significant investment in a battery charging infrastructure will be needed.

Perpetual optimism

All of these measures, combined with reductions from many other initiatives in a range of sectors, are designed to help reach the Government's ambitious targets. But governments in general tend to over-estimate the level of take-up of different policy measures. The growth in large-scale renewable generation, for example, has not been anywhere near as fast

as successive government estimates have predicted, and has focused heavily on one technology, namely wind generation. This slow take-up is likely to continue, at least in the near term, and each year that passes without significant construction makes it more and more difficult to reach the 2020 targets. Recent estimates are that 7,000 offshore turbines will need to be constructed between now and 2020, nearly two per day every day of this decade. Even investors in this activity doubt that such a level of activity is achievable.

The rollout of smart meters will also be a Herculean task, with over 2.5 million meters having to be installed every year, from a near standing start, by 2020 at the latest. There is currently not enough capacity to install this number of meters, nor is it clear exactly what these meters will look like because there is, as yet, no agreed standard. It is also worth noting that there are different degrees of "smartness" in meters. They can range from meters that display real-time energy usage, to meters that allow two-way communication, enabling price signals to be sent to consumers or remote signalling of appliances to turn off during periods of high demand and high prices. It is not clear which level of "smartness" will be installed, although Ofgem proposes two-way communication as a minimum.

Again, there is an implicit assumption by policy makers that a large shift in consumer behaviour will occur once smart meters are installed e.g. responding to price signals and turning off appliances at times of high demand. However, there is little evidence that this will occur to anywhere near the expected degree: pilot studies may not reflect the real world. If parallels can be drawn, they would be with consumer switching behaviour in the face of energy market liberalisation. The UK has one of the highest rates of consumer energy switching, yet in a July 2008 survey Ofgem found that 44% of electricity and 40% of gas customers had never switched supplier, and that a further 44% of electricity and 31% of gas consumers had only switched once. This is despite high-profile advertising campaigns by retailers setting out how much money consumers could save, and very simple processes for switching, facilitated by internet sites.

No such thing as a free lunch

Despite the level of uncertainty as to how well these measures will deliver carbon reductions, one thing is certain: they all cost a lot of money. Money is being spent not only directly on the measures mentioned above, but also indirectly through investment required to enable these greenhouse gas objectives to be achieved. One obvious example is the necessary upgrading of the electricity transmission system to accommodate more wind power, both on-shore and off-shore.

But the additional investment for wind power does not stop there. With wind being an intermittent form of generation, there needs to be a high degree of redundancy and flexibility in the remaining generation fleet to allow for fluctuations in output. Currently, this is provided principally by flexible coal-fired generation capacity. However, much of this capacity is being phased out soon, with some 8.5 GW of coal and 4 GW of oil plant closing in 2015 at the end of the EU Large Combustion Plant Directive opt-out period. This at a time when, if there is a significant increase in wind generation, more flexibility will be needed.

One of the cleaner ways of providing this flexibility is with new gas turbines, built specifically to fill this gap. But again the money does not stop there. It is not necessarily just a simple case of building gas-fired peaking plant. A significant increase in these might require further investment in the gas network to allow it to deliver large volumes of gas for relatively short periods of time. This could mean not only upgrading the gas network, but also building more gas storage capacity.

And then of course there is the expected investment in nuclear generation (to replace the significant capacity of nuclear closures due over the next 10 years, let alone increasing the share of nuclear generation) as well as plans to get coal-fired generation plant (including carbon capture and storage (CCS), if and when proven) up and running, at least at a demonstration level.

All these investments add up to a huge amount of finance being required. A recent estimate put total energy investments required over the next decade in generation, grid and energy efficiency programmes at £265 billion[1] or around £450 per year for every man, woman and child living in the UK. This at a time when the UK is struggling to recover from recession and when access to funds is much tighter than it has been over the last decade.

The high cost of wind power compared to gas-fired generation plant can easily be demonstrated using public data. For instance, Centrica, a major investor in both wind- and gas-fired generation, has published figures for its recently completed 885 MW Langage plant, which cost around £400 million[2], or £450/kW, and for its 270 MW Lincs wind power project, which is estimated to cost £750 million[3] or £2,800/kW. In this example, the unit capital cost of the wind power project is over six times that of the gas-fired project. The figures look even worse when calculated on an *effective* capacity basis. A CCGT (Combined Cycle Gas Turbine) would expect to be available to generate over 90% of the time, increasing its cost of *effective* capacity to £500/kW. A wind plant, by contrast, might expect to be available to generate (at best) 30% of the time, lifting its cost of *effective* capacity to £9,300/kW, over 18 times the cost of a CCGT. These figures obviously do not address the greenhouse gas impact, nor do they account for the cost of fuel, but they do highlight the scale of the cost differences that exist.

1 Source: http://www.policyexchange.org.uk/images/publications/pdfs/Delivering_a_21st_Century_Infrastructure_for_Britain_-_Sep__09.pdf. By way of comparison, between 1998 and 2009, power investment was £77 billion.
2 http://www.centrica.co.uk/index.asp?pageid=39&newsid=950
3 http://www.centrica.co.uk/index.asp?pageid=39&newsid=1921

There are also no guarantees that this huge investment will actually lead to the desired greenhouse gas reduction and security of supply outcomes that are hoped for. Indeed, Ofgem's Project Discovery shows that, within their scenarios of *"diverse, but plausible and internally consistent futures"*, there are high degrees of uncertainty: *"energy supplies can be maintained, but the analysis continues to expose real risks to supplies, potential price rises and varying carbon impacts over the medium term."*

Balancing the three wobbly legs of energy policy

Current policies do not appear to be balancing the three pillars of energy policy: security of supply, environment and cost. It should not merely be a case of reducing greenhouse gas emissions at any price. Policy makers need to look at the £/tonne of greenhouse gas avoided and the total £/MWh cost of electricity supplied, as well as the overall impact of policy decisions on security of supply measures. Only by assessing and balancing these elements can we achieve a "best value for money" energy system.

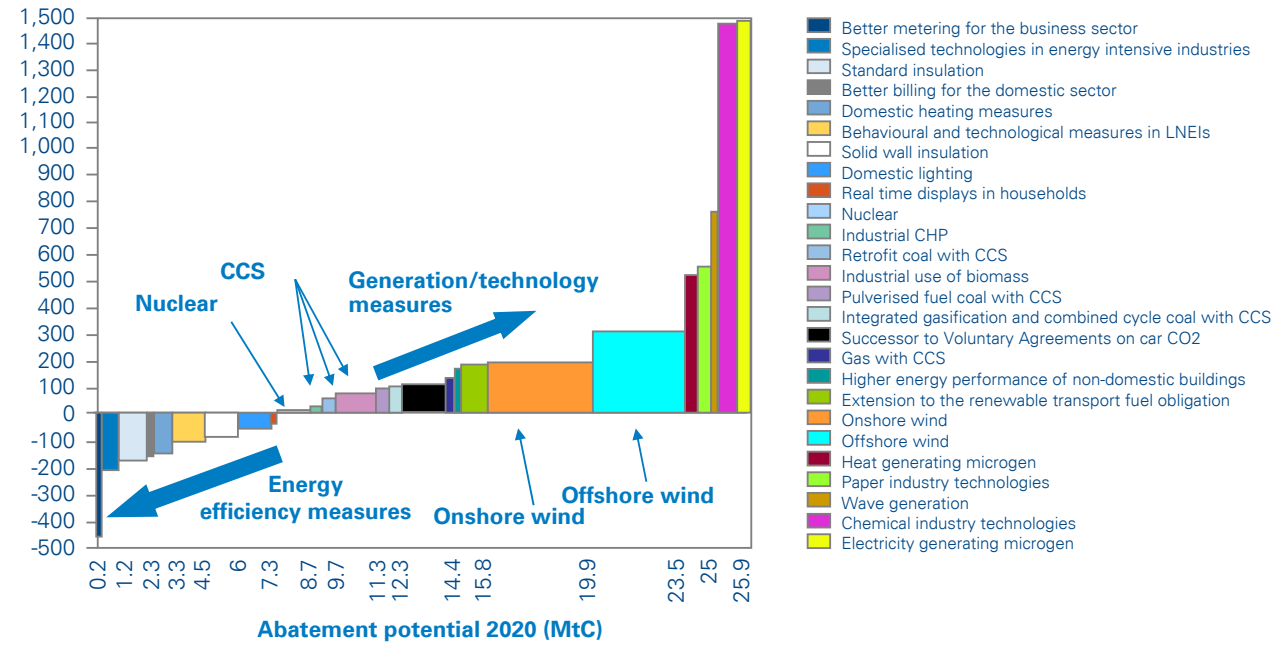
The last Government's own data demonstrate that wind power is a more expensive method of reducing greenhouse gas emissions (and a more expensive way of producing electricity) than many other options, with energy efficiency investments (e.g. better home insulation, etc) being the most cost effective carbon-reduction solution, and nuclear generation also being more cost-effective than wind power. The chart below is taken from the 2007 Energy White Paper, and shows in ascending order of cost of abated carbon a variety of measures which could be taken (see figure 1).

Current policies put the environment above everything else. Continuing down this path will lead to a high-cost, low-quality solution. It is clear that a complete rethink and realignment of policy is required. A change in Government, coupled with a recession-induced reduction of energy demand, provides a fresh opportunity to pause and to reconsider UK energy policy.

Early signs are that the coalition Government intends to maintain or even increase the targets for greenhouse gas emission reduction, perhaps spurred on by recent data that suggests that considerable progress in emission reductions has already been achieved. But a significant amount of the reduction is recession-induced, and emissions may well increase as the economy recovers.

What is really needed now will be a bitter pill for many to swallow: a slow-down in the drive for low carbon solutions. But only by pausing for reflection now can the Government form a considered and stable energy policy, fit for the future: an energy policy that does not risk costing a lot yet delivering little. This will allow us to see if other technology options are likely to be viable, for example clean coal (with CCS) and the next round of nuclear investment. It also gives industry time to reach consensus on technology issues, such as common smart meter standards. In re-assessing the situation now, the Government can help the UK avoid making costly investment decisions that may end up having relatively short shelf lives. A better mix of investments, delivering the same emissions reductions at lower overall cost, is achievable.

Figure 1: Marginal abatement cost curve 2020



Source: BERR, UK Government analysis of costs within Energy White Paper, 2007

One obvious opportunity to consider, or re-consider, is the looming closure of the currently opted-out coal and oil-fired power stations. The recession and global energy prices have conspired to ensure that these plant are unlikely to reach their 20,000 hours running time limit by 2015, when they must close, according to current commitments. At a time when this type of plant will be needed the most, it makes sense from both security of supply and cost perspectives to allow this flexible capacity to remain on the system, while still limiting their operations to 20,000 hours, providing some much-needed breathing space within the energy infrastructure supply chain.

This will result in a short-term slow-down in greenhouse gas emission reductions, but it will mean that expensive investment decisions are made wisely and that, in the long run, we will be more likely to balance ambitious environmental targets and deliver secure energy supplies while still achieving value for consumers' money.

If the opted-out plant is to be able to operate beyond 2015, decisions need to be made now. Waiting until 2013, for example, would be too late: the plant may have suffered through lack of maintenance and might be too costly to bring back into front-line service. Certainly, the Government would have to renegotiate certain commitments made within the context of EU Directives, but in these straitened economic conditions, it must surely be worth doing. Delaying plant closure would cost very little, but would provide breathing space to allow better investment choices to be made.

Conclusion

It is not too late to adjust the course of investment in the UK energy sector in order to avoid the creation of a high cost, low quality system and to put in place policy which can deliver a more cost-effective solution at lower overall cost. Developing a balanced mix of technologies, fuels and investment obligations will provide a reliable, secure, value-for-money solution with significant and realistic reductions in greenhouse gas emissions.

In order to allow investors to make the right choices, the Government's Electricity Market Reform Project needs to put in place appropriate arrangements in the electricity markets which will provide the conditions necessary to stimulate investment in the best mix of energy efficiency and generation technologies. Currently, policies are skewed to specific technologies such as wind power, which do not appear to offer the most cost-effective solution by some considerable distance. Consumers will not appreciate paying higher prices than are necessary. A thorough review is required in order to define the policy mix which will facilitate rational investments to be made which can deliver a low-cost, reliable energy system, with reduced greenhouse gas emissions.

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