



Market regulation for a secure, sustainable low carbon electricity system

INTRODUCTION

The UK is committed to transforming its energy sector – eliminating carbon pollution from the electricity sector by 2020 and from the energy sector by 2050 and using renewables to provide 15% of energy by 2020.

The pace of change has so far been very slow. In 2008, the UK produced only 1.5% of its total energy from renewable energy, despite renewable energy support mechanisms being in place since 1990.

Significant changes in energy regulation and market systems will be needed to drive the transformation needed to achieve these targets. Different rules and incentives are needed to enable energy stakeholders to reduce the risk and increase their revenue from sustainable practices. The UK's unique bilateral market is a major barrier to achieving the change needed. We propose the UK adopts a single buyer market, a model which is used widely across Europe, and establishes a system payment to ensure adequate flexible 'back-up' capacity for variable renewables.

Without these regulation and market changes, investors and the engineering community will not have the confidence to engage in the UK in a way that allows the Government to meet its targets.

MARKET FAILURE

The UK's almost unique bilateral electricity market (set out through BETTA), its rules and the network access rules make rapid progress to a secure low carbon electricity system almost impossible. The bilateral market does not allow for low carbon generation to be bought in preference to fossil fuel generation. There is no mechanism in place to build the necessary 'back-up' capacity to maintain a secure electricity system. There is no mechanism for this back-up capacity to 'share' the transmission system, which means that the low carbon generation may not have a right to be transported across it. And the current mechanism for resolving transmission constraints (ie when there is insufficient transmission capacity to take all the power generated) is expensive and again has no mechanism for favoring low carbon.

None of this gives confidence to investors in renewable energy. Until the Government addresses these issues, investment will be well below that needed to make the transition to a sustainable future.

In detail:

(1) Market incentives for flexible back-up to balance variable renewables

As more renewable generation is added to the electricity system, more 'back-up' generation for variable renewable output will be required. The most marginal of that back-up generation may not generate more than a few hours a year, and may not even be needed for a year or two at a time. However, the incentive in place has to pay enough to investors to make sure that the required back-up capacity is built to ensure continuity of energy supply. There will be a block on the confidence to invest and develop renewable energy until it is clear that such a mechanism will be put in place.

The back up capacity must be flexible so that it can meet the second to second balancing requirements of a sustainable energy system. Until alternative flexible renewable technologies or energy storage facilities become available on a sufficient scale, an obvious choice for back-up capacity is combined cycle gas turbines. Gas is less carbon polluting than coal and combined cycle gas turbines are relatively cheap, reasonably modular in size and do not have to be kept running at a low load, and polluting, during the times when they are not being used as back-up, as would be the case for coal. Nuclear is not able to be flexible in its operation, except by increasing its costs greatly and by increasing its safety concerns.

Any system payment will have to take account of the need for flexible back up. A capacity payment alone would not give incentive to the right system qualities.

(2) Market priority for non-fossil fuel generation

At the moment, most electricity markets have a small percentage of capacity over that needed at times of peak demand. Europe's average is about 5% (because of the various inter-connections that are available to mainland European countries) with UK at about 20%. This is generally perceived to be sufficient to maintain system security while taking account of routine maintenance or short-term failures.

As the generation capacity on the system increases, from new renewable electricity capacity and its flexible back-up, it will be necessary for the system to use these sources in priority ahead of fossil fuel generation in order to meet climate, sustainability and energy security goals. A bilateral market – of the sort in place in the UK – does not enable a merit order of dispatch because the buying and selling happens outside of the balancing and settlement mechanism 'bilaterally'.

(3) Sharing the capacity of the transmission and distribution networks

At the moment, transmission and distribution network capacity is built to meet the peak demand of the electricity system, which historically has always been the electricity capacity on the system (taking account of plant maintenance and shutdowns as a result of faults). This has meant that generation is able to inject its output into the electricity system as it generates it. However, as generation capacity increases either to fulfill renewable electricity targets or for its back-up, then the capacity of the transmission or distribution networks can become smaller than that of the generation. Two issues are raised from this.

Firstly, it is not economic to continue to increase the capacity of the transmission and distribution network to meet generation capacity, since much of that will be back-up which will not be running at the same time as the low carbon generation, or fossil fuel which policy is trying to displace. This means that the network capacity has to be used with a merit order which gives preference to low carbon energy. The rules of network access and payments for that priority access have to enable this, but currently do not.

Secondly, as more generation is connected there will be increasing occurrences when output from two separate power plants will be greater than the capacity on the network. This means that generation from one or other of those power plants has to be constrained off. The rules of doing this will have major implications for technology development, as access to the network (including lack of access by competitors) is fundamental to the economics of the generation and investment confidence. Different electricity systems have different rules. It is important that the rules on resolving and paying for constraints on different parts of the electricity system minimise the cost to the electricity system as a whole.

Currently, in the time of a constraint in the UK's bilateral market, the generator is paid what it was agreed it would have been paid by the buyer, were there no constraint. Then, the system operator buys more generation on the other side of the constraint and spreads the cost across the market actors. In effect, a system constraint leads to twice as much generation being bought to overcome it. Resolving a constraint is now more expensive in the UK under British electricity trading and transmission arrangements (BETTA) than under the pre-2001 Electricity Pool. The system will become increasingly expensive under the current rules as more low carbon generation is connected. Yet, there is no system in place to 'take' the low carbon generation in a constraint situation, so customers in effect end up paying for the type of generation that policy aims to move away from.

TOWARDS A SUCCESSFUL REGULATORY AND MARKET MODEL

All of this points to a new emphasis of economic regulation. Currently, the rules and incentives of different economic regulation systems around the world are on a spectrum between laissez faire independent regulation through to considerable regulatory intervention. One end of that spectrum creates cost effective mechanisms, without reflecting the real cost of unsustainability; the other, a sustainable electricity system whatever it costs. It is clear that economic regulation in the UK has to move from the former more towards the latter.

Successful market regulation to drive towards a sustainable low carbon economy must have the following characteristics:

- 1) An integrated set of rules and incentives for markets and networks for electricity, heat and natural gas.
- 2) Enable rather constrain or channel technologies to allow any new entrants to become involved.
- 3) Create incentives for the most efficient use of energy and maximise the available end-use energy.

- 4) Include energy demand responses to drive a reduction in demand across all sectors (energy, electricity and transport) so that less energy or electricity capacity needs to be built
- 5) Drive rapid change in the energy sector

A single buyer market

The bilateral market has to be terminated to enable a low carbon merit order, and this will require ending BETTA (and NETA). It should be replaced by a single buyer market, a system widespread in Europe, where the system operator is legally responsible for a secure, low carbon merit order. This enables the natural priority of low carbon generation and enables the 'sharing' of transmission capacity.

A system payment to encourage flexible capacity as back-up is required. However, it is important that the payment is a system obligation, not simply a capacity obligation and also values flexibility. The sort of mechanism which may be appropriate is the obligation in place in the PJM market, where a supplier is obliged through a Reliability Assurance Agreement consistent with Reliability Principles and Standards. The reliability principles sets an agreed reliability standard of the system and the supplier has to contract for generation which would meet that standard. In this way, all suppliers ensure sufficient capacity. In the UK context, something like this but with a component to ensure flexibility and resilience in a low carbon context could be developed.

If there were a single buyer market, the issue, and cost, of constraints would be smaller than under the bilateral market.

There are a number of other issues which would be improved by moving to a single buyer low-carbon market. For example, the current bilateral market and its dual cash-out prices penalises diversity, but will get worse as more variable renewables connect; the lack of liquidity in the BETTA short-term market is a major barrier to investment and/or economic cost for variable renewables.

Change of relationship between Government and regulator

Currently, the Government chooses the Regulator every five years and provides the Authority (ie Regulator) with Guidance. The Regulatory Authority has a number of Duties, but the economic duty still has priority.

The Duties of the Authority should be changed to reflect the priority of sustainability and security.

For a number of reasons, domestic as well as global, it seems likely that the price of energy will increase. Complementary policies have to be put in place which offset this, while simultaneously meeting sustainability and security goals. We believe a much more ambitious and comprehensive energy efficiency programme must be at the heart of this.

A clear framework for action should be given to the Authority by Government every two years based on the Committee on Climate Change reports, which set out the science.