



E3G

UK Power Sector Market Reform

The Case for Action

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Simon Skillings is a senior associate with E3G and has worked in the UK power sector for 25 years. He has been closely involved in the development of the market design throughout this period having worked on developing the initial Pool rules at the time of privatisation and subsequently sitting on the Pool Executive Committee overseeing ongoing market reform. He was also appointed by Government to be a member of the Design and Implementation Steering Group at the time new trading arrangements (NETA) were introduced.

Simon has also been closely involved in utility strategy and investment decisions and spent 5 years as Director of Strategy and Energy Policy at E.ON UK before leaving in 2007 to act as an independent industry consultant.

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UK Power Sector Market Reform: The Case for Action

Summary

- > There is emerging consensus over the important early actions that need to be taken if we are to meet our 2050 decarbonisation objectives. In particular, the widespread and urgent deployment of energy efficiency measures and the early decarbonisation of power generation.
- > Momentum behaviour by market actors is not going to deliver these objectives and change is necessary to kick-start the transition. Indeed, it is likely to directly threaten security of energy supplies as potential investors defer making the necessary investment decisions.
- > Significant investment risk is an endemic feature of the power sector which can be expected to continue for decades to come and market reform will be critical in changing investor perceptions of the opportunities and risks ahead. It is therefore an essential component in triggering and sustaining power sector decarbonisation. It also has the potential to impact on energy retail markets and could help transform the behaviour and experience of energy consumers. This note explains why market reform is necessary and how the current arrangements are affecting the behaviour of market participants.
- > It will not be possible to effectively engage in a process to define the necessary market reforms until the Government develops a clear and credible forward looking narrative for its long term role in the market. There are currently a number of plausible narratives that could be implied by Government policy but each of these would lead to very different requirements for market reform.
- > This note sets out three possible narratives: ‘market driven’, ‘resource planning’ and ‘keeping options open’ and explains the market reform agendas that would be required under each situation.
- > The choices faced by Government are intensely political and this note does not attempt to suggest a recommended way forward. The key objective is to ensure that Government recognises the choices that it will need to make and some of the policy implications that will result.

Context

A large number of scenarios have been developed which set out route maps towards a low carbon economy. There are a number of clear and consistent messages that emerge from these studies and it is anticipated that these conclusions will be reiterated by the 2050 roadmap work currently being undertaken by DECC. The key conclusions are:

- > Delivering 80% reductions by 2050 is possible but will be extremely difficult with significant contributions required in all sectors.
- > We have a number of potential pathways but these are all associated with significant delivery risk and cost uncertainty.
- > There are two key aspects which are common to all plausible pathways:
 - > The central role of a decarbonised power sector given the options it creates for decarbonising other sectors through electrification, and
 - > The importance of energy efficiency in reducing the costs of the transition and the extent of the decarbonisation challenge.

It is also widely appreciated that ‘status quo’ behaviour is wholly inadequate to meet the decarbonisation challenge. Significant investment is required in research and development of new technological options and in delivering an overhaul of the energy infrastructure. This can only be achieved through changing the way investors view the opportunities and risks of future markets.

This paper argues that action is needed now. It is essential to drive through ongoing policy processes to completion and to implement some additional key policy changes. The critical ongoing policy processes involve reform of the planning system and measures to dramatically increase deployment of energy efficiency measures. New policies are needed to reform the power markets if we are to attract the necessary investments. This paper focuses on the issue of market reform, explaining why it is so important and setting out the key choices available to policy makers. Market reform is particularly relevant to the issue of investment in generation, however, this paper also highlights where it is relevant in driving forward the energy efficiency agenda.

The opportunities of action and costs of inaction

We cannot set out a technological and investment pathway towards decarbonisation that we can guarantee will be delivered, let alone that it will be

the lowest cost option available. Many of these delivery risks are specific to the UK and relate to our national regulatory and market environment, consumer behaviour and the attitudes of investors towards these issues. We cannot therefore wait for other countries to develop the technical options and simply ‘plug’ them into our energy system once they are proven and economic. There would remain many UK-specific delivery hurdles and associated costs that would need to be overcome and the consequence of delayed action is to reduce the number of investment options available or maybe remove them altogether.

This general problem is amplified in the power sector where many of the existing assets require replacement over the coming decade. Failure to take the appropriate policy actions could directly threaten security of supply and lead to a period of very high prices if major investment decisions in low carbon generation are deferred¹. We cannot therefore afford to let the electricity market continue with status quo behaviour if we are to decarbonise the power sector whilst maintaining security of supply at acceptable costs to consumers.

However, there are also significant opportunities that will emerge from taking the policy actions which drive the necessary investments. The construction of new low carbon assets and the establishment of the necessary local supply chains will stimulate the economy and create a significant number of new jobs. In addition, provided that the UK makes these changes in advance of most other countries, then UK manufacturers and equipment suppliers would be well placed to develop substantial export markets. Finally, the widespread availability of low carbon and indigenously produced electricity could well prove very attractive for future industrial development by businesses in which low carbon and stable priced sources of power are an important consideration in their decision to locate.

There are therefore compelling reasons to move forward quickly to implement the necessary policy changes that will trigger the start of the transformation to a low carbon economy. This paper explains why reform of the UK power market arrangements is needed and what these changes might involve.

The importance of power market reform

Investors contemplating major investment opportunities in power generation face significant uncertainty:

¹ Any existing assets kept operational beyond expected closure dates are unlikely to perform reliably since there will have been insufficient investment in these assets in the run-up to closure.

- > *Market uncertainty:* Power stations are long term investments and the attractiveness of an investment will depend critically on the market opportunity one or two decades into the future (or further in the case of nuclear). Over these timescales there is huge uncertainty over both the market need and the potential market prices. The success in reducing energy demand and in deploying the various low carbon generation technologies will significantly affect the attractiveness of investments in new generation capacity. Indeed, failure in energy efficiency programmes and deployment of low carbon generation could create a large need with significant investment required to maintain security of supply. The consequence of this is that, under the current market rules, the economics of all new and existing capacity improves greatly (at least in the short to medium term) in the circumstances where the transition to a low carbon economy fails. This inevitably dilutes the commercial imperative of incumbent players to promote the transition and may even lead to them obstructing the change. Moreover, it seems likely that under the current market arrangements wholesale prices will need to change significantly in character with more periods of low prices offset by periods of very high prices. It is therefore necessary for investors to believe in future prices, and associated behaviour on the part of competitors and the regulator, which are entirely without historical precedent. These market uncertainties are in addition to the already significant and more traditional uncertainties associated with commodity prices, technical performance, competitor behaviour, etc.
- > *Policy uncertainty:* Significant Government involvement in the market is accepted as inevitable given the intense political interest in energy costs, security of supplies and impacts on the environment and given the inability of markets to guarantee prescribed outcomes in these areas. In particular, the market has failed to bring forward cost effective measures to improve energy efficiency or to drive forward the development and deployment of new technologies which have significant but uncertain future potential (e.g. renewables, CCS). In consequence, investors see that a significant proportion of investments in the market are being driven by direct Government interventions. However, there is no clear and accepted narrative that explains where these interventions will focus in the future and how long they will last. Indeed, the stated role of the ‘market’ as central to current energy policy seems entirely at odds with the self-evident investment realities. Moreover, the existing Government policy claims that the EU Emissions

Trading Scheme is central in driving the decarbonisation of the power sector. However, there is little or no evidence that it is capable of efficiently incentivising significant and long term low carbon investments. Again, this arises from the fact that current experience makes investors sceptical that politicians can deliver the tight and reducing caps that are necessary to create the required carbon prices.

Recent events in the financial market have both limited the availability of capital and increased the awareness of risk amongst investors. In light of the uncertainties associated with investments in the power market, it seems inevitable that investors will be wary of making large financial commitments and, where they are prepared to make investments, they will certainly be looking for healthy financial returns. These issues are relevant for all key generation technologies:

- > *Renewables*: Significant work has been undertaken to increase the robustness of the Renewables Obligation, both in terms of improving its attractiveness to investors and in reducing the threat of excessive profits for certain technologies, and the key obstacles to large scale renewable deployment that remain relate to planning and grid access issues. However, there is no accepted narrative for what happens to large scale renewables and the associated support mechanisms beyond 2020². Apart from affecting the longer term investment decisions of companies operating in the renewables supply chain, this creates huge uncertainty for all other generation investments whose economics will depend critically on the nature of the market beyond 2020. Small scale renewables on the other hand are now in receipt of support through a feed in tariff and it is, as yet, too early to say how this might drive the development of decentralised renewable generation going forward. Over the next few decades it is possible that generation from this source could form a significant part of the energy mix; however, as with large scale renewables, there is no long term commitment by Government relating to the future size of the distributed generation market and it remains another major uncertainty that must be faced by investors in large scale low carbon generation.
- > *Coal and CCS*: The Energy Bill currently passing through parliament is seeking to introduce a levy on suppliers to fund up to four demonstration

² Under current legislation, the RO remains in place until 2037, but the flexibility to adjust parameters such as headroom and banding levels provides no guarantee that it will be used to incentivise new renewables out to this point.

CCS projects. However, the longer term regulatory arrangements surrounding the operation of coal plant remain highly uncertain. In particular, will some form of carbon regulation be introduced to limit carbon emissions from coal plant, when will CCS be technically proven and will there be some form of enduring subsidy mechanism to support the deployment of CCS technology once proven? These uncertainties create huge risks for potential investors in coal plant and will inevitably increase the price at which they are prepared to build a demonstration project. This in turn could undermine the enthusiasm of future Government(s) to pursue the demonstration programme.

- > *Nuclear*: Current UK energy policy involves enabling the construction of a new fleet of nuclear power plant and much of the necessary regulatory and licensing work is well underway. Apart from the inevitable cost uncertainties, particularly for the first few plants constructed, there is massive market (volume and price) uncertainty over the timescales that are relevant for a nuclear investment. Potential developers are already floating market reform ideas to help underpin investment in nuclear power plant and it is likely that these concerns will come into sharper focus as the need to make substantial financial commitments approaches.
- > *CCGTs*: Combined cycle gas turbines are often seen as the ‘easy’ investment option since projects can be developed, approved and constructed relatively quickly (say 3 to 4 years) and, indeed, it is likely that CCGT capacity will act as the ‘swing’ investment with volumes adjusting in light of progress in the delivery of low carbon investments. Traditionally, most of the payback on new CCGT plant has arisen through 5 to 10 years of ‘base load’ operation before adopting a more flexible ‘system support’ role. However, except in circumstances where the low carbon transition plan fails to deliver, this opportunity will not exist and investments must be justified on the basis of receiving high prices for flexible operation virtually immediately after commissioning³. An additional concern for CCGT developers is that the lifetime of existing fossil plant may be extended through derogations from the LCPD and IED legislation, thereby suppressing market prices for flexible plant. Also, it is recognised that attempts to regulate carbon emissions from coal plant alone will prevent investment in CCS plant and lead to more investments in unabated CCGTs unless the regulations are extended to cover

³ This is why developers of new CCGT plant may not be strong supporters of the effective and timely delivery of the low carbon transition plan.

all fossil plant. Market and policy risks are therefore equally relevant for CCGT developers and risk-averse behaviour may well lead to a delay in constructing new plant and the need for additional policy interventions to maintain security of supply (unless, of course, investors are confident that the low carbon transition plan will fail).

Potential investors in new power plants are being asked to bear considerable risks and, if they are prepared to take these risks, they are only likely to do so at a price. At a time when massive investment in new infrastructure is needed this creates major obstacles to deliver the necessary changes and significantly increases the associated costs. It is also a mistake to assume that investment risks are necessarily unusually high at the moment. The power market will constantly face new technology challenges and opportunities and be affected by developments in global markets that are impossible to predict. Significant investments will be required throughout the coming decades and we cannot expect future risks to decline.

Market reform presents the opportunity to re-balance the risks away from individual investors to electricity customers or society as a whole, thereby facilitating and sustaining the transition to a low carbon power system and reducing the overall costs.

Framing the market reform debate

The need to improve the operation of the ‘market’ has become a dominant theme in the UK power sector over the past two decades and has become an important stated objective for regulators and Governments as well as the energy companies. In reality, different stakeholders tend to interpret the ‘market’ in different ways. Regulators think in terms of market mechanisms which effectively allocate risk and a structure that supports high levels of competitive intensity between existing and potential market participants. Governments, however, are primarily focused on being confident that the lights will stay on whilst minimising costs for customers and the exchequer. Market participants, on the other hand, seek freedom of investment choice and to minimise the regulatory burden.

Suggestions that there could be value in introducing an element of centralised resource planning tend to fall on stony ground, primarily because this appears to be a fundamental departure from the accepted ‘market’ paradigm and a step back to old and failed approaches. However, this should not be viewed as a

‘black and white’ debate since there are many shades of grey between pure market and centralised planning models. Moreover, the reality of today’s investment situation is that Government policy is the prime driver behind many investment decisions. It is now critical that Government, Regulator and market participants are prepared to engage in a mature debate about the future role of Government in the power market.

It is essential that the Government provides a clear narrative relating to its role in the market going forward to frame the policy debate. Without this framing it will be impossible to have a coherent debate about specific policy measures and the extent to which they are appropriate or not. There seem to be three credible bases for this framing narrative:

- > *Market driven:* The Government believes in the market and not in picking technology winners. Interventions are only temporary measures to pump prime immature technologies and subsidies will be removed as soon as the technologies have been demonstrated. In particular, the Government will not support any increase in the target for renewable energy beyond 2020 and will cease to increase headroom in the Renewables Obligation beyond this point (and, presumably, remove feed in tariffs for small scale renewable generation at some point as well). In addition, CCS plant will receive no further subsidy beyond the four demonstration plant already agreed. Market reform needs to focus on establishing technology neutral and long term pricing mechanisms which allow investors to efficiently choose between the complete range of potential generation investment options.
- > *Resource planning:* The Government believes that it will be impossible to design technology neutral investment incentives which enable investors to invest efficiently to deliver security of supply and decarbonisation goals at lowest cost. In particular, the absence of long term certainty over future deployment of a particular technology constrains the development of supply chains and leads to inefficient or inadequate investment in the necessary infrastructure. It is therefore necessary to take a long term strategic view for technology deployment for certain key technologies⁴ and define long term capacity or volumes targets. In these circumstances, market reform needs to focus on developing efficient incentive mechanisms for the chosen technologies consistent with delivering the targets, long term technology

⁴ Candidates include: renewables – both small and large, CCS with coal and/or gas, nuclear, storage, demand-side response

neutral incentive mechanisms that allow investors to take efficient investment decisions relating to the residual market and identifying how these two parts of the market fit together to ensure efficient allocation of risk.

- > *Keeping options open:* The Government recognises that the market will not deliver the required mix of investments but it is also unable to identify long term deployment targets for certain technologies given the extent of the technology and cost risks involved. The key challenges for the next decade are therefore to flush out the potential of each low carbon technology through delivering the EU 2020 renewables targets, stimulating the growth in decentralised generation, demonstrating CCS and ensuring first of a kind nuclear plant are built. Investments in infrastructure will also be made to create the option for ongoing growth of these technologies. Also, if the existing market incentives prove insufficient to encourage sufficient capacity in the residual market to maintain security of supply, then the Government will act to ensure that sufficient capacity is available through incentivising new build or applying for derogations to prolong the life of existing capacity. Here, the market reform debate needs to focus on the least cost delivery of those investments required this decade and a review of the longer term arrangements can be left until a later date.

These narratives are all credible interpretations of current Government policy and yet they would each involve very different approaches to market reform. It is therefore essential that a narrative for the long term role of Government is established to enable a coherent market reform debate to proceed.

The market reform choices facing Government

Market reform will involve the imposition or removal of constraints on the actions of market participants (regulation) or increasing or reducing the cost/value of these actions (incentives). The power market arrangements have been extensively debated since privatisation in an ongoing process primarily lead by the Regulator but with occasional interventions by Government (e.g. the current review of transmission access arrangements). The agenda has principally involved the removal of unnecessary trading constraints and a 'polluter pays' approach to cost allocation. However, clarification of the longer term role of Government in the market is essential to enable a focused market reform discussion going forward.

Under the ‘market driven’ narrative, the objective is to identify enduring and broad-ranging economic incentives to enable investors to efficiently make investment decisions associated with delivering security of supply and carbon reduction targets. The debate is likely to focus on two key issues:

- > How to create a reliable long term signal to drive investment in low carbon generation sources at the expense of high carbon generation sources, and
- > How to remunerate sufficient capacity to maintain security of supply in the situation where the key generation sources have high capital costs and low variable costs.

The first of these issues will critically involve a debate about the future of the EU Emissions Trading Scheme and, assuming that it has a future, how it can coexist with complimentary measures to drive longer term investment decisions (e.g. emission performance standards, carbon taxation, caps and collars). The second issue relates to the value of capacity and how mechanisms might be implemented which are durable and not amenable to manipulation by market participants or policy change on the part of Government.

Critically, under this narrative, there is no role for strategic infrastructure planning since there is no basis on which to construct a plan and the regulatory process to approve new infrastructure would need to be robust to a range of possible future generation mixes.

In the case of the ‘resource planning’ narrative, the issues described above would be equally relevant since it is unlikely that the ‘plan’ would relate to the entire market. For example, a target to increase the proportion of renewable generation by 10% each decade beyond 2020 would still leave a residual market of 30-40% by 2050. However, there would be additional challenges that would need to be resolved.

It would be necessary to identify the most appropriate incentive mechanism to efficiently drive the requisite level of investment in the relevant technologies. Renewables support mechanisms have been widely studied and the majority of energy markets have adopted a ‘vintaged feed-in-tariff’ approach since this is seen to provide the best balance between minimising financing costs for investors whilst avoiding the risk of windfall profits and excessive costs to consumers and, of course, such tariffs are now available to small scale renewable generation in the UK. However, there are practical limits to the volume of generation that could qualify for this support mechanism and be

effectively insulated from any incentive to balance the system or sell output forward in the wholesale markets. The key market reform challenge under this narrative would be to identify the necessary balancing and wholesale market arrangements that would enable the ‘subsidised’ part of the market to co-exist efficiently with the residual part of the market. It seems likely that some transfer of responsibility for system balancing and the associated wholesale market risks would need to be transferred to the System Operator (potentially at both transmission and distribution level depending on the levels of distributed generation).

The ‘keeping options open’ narrative is, by definition, the least complicated from a market reform perspective since the tough decisions relating to the future of the market are deferred. Nevertheless, the acknowledgement that a future reform of the market arrangements is required will highlight the level of risk being faced by investors making large commitments on the basis of expectations of future revenue streams. It will therefore be necessary to consider interim measures to ensure that the appropriate investments are delivered over the coming decade. In reality, the Renewables Obligation, feed in tariffs and the proposed CCS levy should provide appropriate routes to finance the necessary projects for these technologies. Therefore, new arrangements would only need to be considered for nuclear and CCGT projects.

Subsidising nuclear will clearly be politically challenging but it would also involve technical challenges. In particular, the problem of devising subsidy arrangements that minimise the necessary subsidy given the small number of players interested in developing new nuclear power plant and holding a virtual monopoly position. In terms of investments necessary to maintain security of supply, the simplest approach would probably involve long term contracts with the system operator for provision of certain capacity and/or balancing services. The advantage of this approach is that the ‘market’ can be given maximum time to deliver the necessary capacity before intervention on the part of the System Operator is necessary.

Within the ‘keeping options open narrative’, perhaps the most challenging element relates to infrastructure development since creating the options for the future growth of a technology will necessarily risk stranding of assets if the technology fails to deliver as hoped. The two areas where infrastructure developments are particularly relevant involve the development of the electricity grid to accommodate large volumes of renewable energy and the creation of

carbon networks to assist the ongoing deployment of CCS both within power sector and in other industrial sectors. The current regulatory framework is not capable of effectively authorising such strategic infrastructure (indeed, in the case of carbon networks, a regulatory framework doesn't yet exist) and therefore particular attention will need to be paid to defining the appropriate regulatory arrangements.

This section has set out some of the choices and issues facing Government in the market reform debate. However, it is particularly important to note the different nature of the debate depending on the long term narrative that the Government adopts for its role in the power market going forward.

Market reform and energy efficiency

The previous sections highlight the critical role that market reform has to play in driving decarbonisation of the power sector. However, market reform is also relevant to the energy efficiency agenda. The rapid and widespread deployment of energy efficiency measures will require the careful balance of centralised programmes to deliver momentum and critical mass along with market processes to ensure innovation in energy service product offerings. The current incumbent energy suppliers do not appear well positioned to deliver in either respect. Their poor 'trust' ratings and dispersed geographical presence make them inappropriate vehicles to drive centralised delivery whilst their business models constrain their ability to engender genuinely disruptive innovation in product design.

There are many potential benefits in attracting new and fast-moving retailers into the energy supply business. An improved focus in delivering customer benefits along with a broader approach to customer value is likely to improve the customer experience. Also, a dynamic approach to product development provides the best chance of discovering the 'holy grail' of a product that makes people's lives better through using less energy. However, major retailers brands have hitherto been deterred from adopting an aggressive growth strategy in the energy markets for two principal reasons. Firstly, the quality of the metering and billing systems are incompatible with the standards of customer service that these brands seek to deliver and the risk of brand damage has been a significant deterrent. The advent of smart metering and billing systems should overcome this concern – indeed, the wealth of lifestyle information available from smart metering data would provide a gold mine of opportunity for the focused retailing of lifestyle products. The second obstacle has involved the management

of wholesale market risks associated with sourcing supplies of electricity. The current market arrangements ensure that the value that can be made or lost through hedging decisions in the forward markets can dominate the overall retail margins and this is not a core competence of retail focused organisations. The result is that customers are always ultimately worth more within the portfolio of large vertically integrated energy companies than with stand-alone retailers and this situation is likely to persist until reform of the wholesale markets is implemented.

Interestingly, the reform agenda that emerges from the ‘resource planning’ narrative described above also involves reform of the wholesale markets and the transfer of risk from market participants to the system operator. This provides the opportunity to expand this narrative to embrace competitive retail markets and the improvement in delivering customer service.

Conclusions

Power market reform is needed to drive the transition to a low carbon economy. This is particularly relevant to the decarbonisation of power markets but will also impact on energy retail markets and could help transform the behaviour of energy consumers.

It seems difficult to envisage that a sensible debate surrounding the market reform choices can occur until the Government sets out a clear narrative explaining its future role in the energy market. This paper does not seek to identify a preferred narrative given that this will be an intensely political decision. However, it does set out the choices and the technical implications that will flow once a decision is made.