



UK ENERGY RESEARCH CENTRE

UKERC, Imperial College Centre for
Energy Policy and Technology,
University of Exeter - response to the
Ofgem consultation: 'Project
Discovery, options for secure and
sustainable energy supplies'

UK Energy Research Centre
58 Prince's Gate
Exhibition Road
London
SW7 2PG

Submitted on behalf of UKERC by Dr Robert Gross
Tel: +44 (0) 20 7594 9324
E mail to: robert.gross@ic.ac.uk
www.ukerc.ac.uk

THE UK ENERGY RESEARCH CENTRE

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UKERC Response

The UK Energy Research Centre welcomes this opportunity to provide input to the Ofgem consultation 'Project Discovery: Options for delivering secure and sustainable energy supplies'. The UKERC response addresses a number of the questions posed in the consultation document. The response has been prepared by Catherine Mitchell and Phil Baker from the University of Exeter and Robert Gross from ICEPT at Imperial College. It makes a number of high level and specific points but does not seek to be exhaustive. We refer the reader also to UKERC's submission to Ofgem's previous consultation over Project Discovery, in which we make a number of observations about the various scenarios considered by Ofgem. These provide some important context for the comments provided below.

Substantive points are made on a chapter by chapter basis below, with higher level issues pulled out as appropriate. Our main generic concerns relate to ensuring that the full range of options is given proper attention, the limitations of some of the options are better recognised and that international best practice is drawn upon to inform an evidence based approach to policy development.

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CHAPTER: Three

Question 1: Do you agree with our assessment of the current arrangements?

Question 2: Are there other aspects of the current arrangements which could have a negative impact on secure and sustainable energy supplies, or costs to customers?

Question 3: Do you agree that the five issues we have highlighted are the most important?

Introduction

In this section we provide some commentary on specific aspects of the discussion in Chapter 3 drawing upon research and policy analysis undertaken in the UKERC Systems theme, Technology and Policy Assessment theme and from ongoing work at the University of Exeter and Imperial College. We do not attempt to deal with each question in turn, since for the most part the issues at stake are cross cutting.

We broadly welcome the spirit and intent of the discussion provided in Chapter 3, at least insofar as it provides an explicit recognition of the potential limitations of the current arrangements. We would stress that progressing new arrangements is becoming increasingly urgent, both in terms of meeting targets and accommodating the impacts of the LCPD. UKERC and others have been providing analysis that highlights problems with the current arrangements for several years. It is important that policymakers remain mindful of the risks attendant in change, since this can in itself create delays while investors await information, and act swiftly once the case for change is accepted.

It is also important to note that in many instances 'tried and tested' policy options exist and the UK should do all it can to learn from international evidence of 'what works' as well as best practice from other regulated sectors. In the period since privatisation the UK has often been in the forefront of regulatory innovation, with mixed results as the consultation document highlights very well. Given the urgency with which policymakers must act we would caution against 'experimental' policymaking in the form of new or relatively unproven approaches. Similarly the UK policymaking community may be well advised to proceed with an open minded, empirical and pragmatic view of policy effectiveness rather than taking forward policy dominated by particular theoretical prejudices. The international experience suggests that abstract principles of economic efficiency may not provide the best guide to what is practical, effective and attractive to investors.

Many of the issues at stake are complex and a full blown analysis would be beyond the scope of a consultation response. We therefore also refer the reader to the various references included in this response, to the UKERC website and to the webpages of the authors for further information. We would be very happy to discuss all or any of the issues we raise below in more detail.

Investment risk and wholesale prices

UKERC has been engaged in research and policy analysis in the areas the chapter discusses for several years. We refer the reader in particular to the UKERC Technology and Policy Assessment from May 2007 - 'Investment in electricity generation, the role of costs incentives and risks' (Gross, Heptonstall, & Blyth 2007). This report describes and discusses many of the issues discussed in Chapter 3. It places particular emphasis on the relationship between market design, technology characteristics and investment risk. It urges policymakers to pay far more attention to the exposure to wholesale price risks associated with investment in capital intensive low carbon generation.

Many of the issues UKERC has highlighted with respect to the riskiness of capital intensive generation investment are addressed to some degree in Chapter 3. Section 3.18 touches on hedging strategies and continued preference for gas irrespective of gas price movements. However we remain concerned that the chapter lacks an explicit

discussion of the importance of the role of 'price maker' in power generation investment decisions. The potential exposure of capital intensive plant in lower wholesale price scenarios is not considered (or explained to the reader), which means that an important part of the story of why suppliers continue to favour CCGT over nuclear or any other option except (subsidised) wind is omitted. It is possible that the discussion is therefore overly focused upon uncertain carbon prices and the strength of short term price signals. As a result the consultation places considerable overall emphasis on securing a more stable carbon price and on specific changes to the balancing arrangements. These are not unwelcome developments in themselves but it is important to be clear that they may not be sufficient if underlying problems related to the GB market are neglected. As we explain below we are also concerned that the consultation considers only one means by which capacity can be secured (capacity tenders), which may not be best suited to the particular technology types the government wishes to encourage.

A comparative assessment of bilateral trading

It is somewhat surprising that the appraisal of current arrangements set out in Chapter 3 does not include some discussion of whether the current bilateral electricity trading arrangements are best suited to the development of a sustainable electricity system, or whether some alternative regime would be more appropriate. While there is some discussion in Chapter 4 of the centralised renewables market that operates in Spain, the extension of such arrangements to the electricity market as a whole is not considered.

Within the current market arrangements, large vertically integrated players attempt to self supply as far as their portfolios allow, are encouraged to self-insure against imbalances while the System Operator is deliberately relegated to the role of "residual balancer". The outcome is a generation dispatch that is probably less than "optimal" (Sioshansi, Oren, & O'Neill 2008) and an electricity market that is almost always long - both outcomes resulting in inefficient operation and unnecessary carbon emissions. Looking forward to a future with perhaps 30 GW of wind capacity where short-term balancing requirements, constraints and energy price volatility are very much greater than today, such arrangements seem less than ideal.

It would have been useful therefore, when discussing issues with market rules, to attempt some comparison of the current market arrangements with the full range of alternatives. It is clear that we have to move to a system where low carbon generation has priority in terms of access, dispatch and constraints. Without this, we will continue with the current situation of the bilateral market arrangements where the type of generation which has priority does not reflect policy priorities. We would not support a wholesale return to the 'pool' because of its well-recognised difficulties. Nevertheless, we would support, with appropriate attention to regulatory design, a system of dispatch that permitted the System Operator to be significantly more involved in system balancing. The opportunity would exist for energy, operational reserves and the resolution of network congestion to be dealt with in a far more holistic fashion than at present. Such a system should be much cheaper and simpler from the electricity system operation point of view, and much less risky from a low carbon generator point of view (Baker et al 2009).

The limitations of the RO and its role in carbon pricing

Chapter 3 does not consider the difficulties with the Renewables Obligation many commentators have highlighted, or its comparative performance when viewed alongside alternative arrangements used to good effect in other countries. UKERC analysis of this issue highlights the additional price risks associated with the RO (Gross, Heptonstall, & Blyth 2007). As the main mechanism to promote one category of low carbon technology, the strongest overall intervention in the electricity market and the principal means to meet the UK's EU target for renewable energy we find this surprising, particularly given the apparent willingness to dispense with the Renewables Obligation demonstrated in Chapter 4. We would note with respect to the RO that we disagree with the remark made

in 3.22 that a plethora of mechanisms places implicitly different values on carbon. The RO is a market enablement mechanism that seeks to deliver a number of objectives, most importantly to secure a range of scale and learning effects in the renewable energy sector and hence ultimately reduce costs. As well as being important to properly evaluate the RO relative to other options (see below) it is also unhelpful to conflate the range of policy goals served by the RO with carbon pricing alone.

CHAPTER: Four

Question 5: Do you believe that our policy packages cover a sufficient range of possible policy measures?

Question 6: Do you have suggestions for variants to these policy packages?

Question 7: What other policy measures do you believe should be considered, and why?

Introduction

As with chapter 3, the questions above interrelate strongly, we therefore address them collectively.

The policy packages discussed in detail in Chapter 4 exclude a number of important possibilities. Whilst most of these receive a brief mention in Figure 7 (table, P51), it is not clear why some of the most promising options are excluded from the main discussion. Moreover, the package *includes* a form of support that is likely to be problematic. In what follows we discuss specifically the absence of discussion of feed in tariff (FiT) style arrangements to support emerging technologies and some the difficulties that surround the use of capacity auctions.

Provision of capacity

Chapter 3 and 4 both discuss a range of problems associated with delivering new electricity capacity in general and low carbon capacity in particular. A related concern is the provision of appropriate flexible capacity to provide system services alongside variable renewable and largely inflexible nuclear plant. In the subsections below we discuss both the options to directly support low carbon generation and some of the problems associated with auctions when applied to emerging/unproven technologies. However we would also like to draw attention to two key options for providing capacity *per se* and in particular for ensuring that the system has sufficient margin to meet peak demands reliably.

Chapter 3 identifies the risk management issues attendant in the GB market. These issues have been discussed extensively in the literature in terms of the *externality* associated with secure supplies, and we refer the reader to the excellent work undertaken in this area by the late Shimon Awerbach. However Chapter 4 provides surprisingly limited discussion of the range of options for providing capacity. One potentially useful, and cheap, way forward would be for the system operator to have the ability to bring new capacity forward, of particular technology if necessary, size and in a particular place. This would deal with *system margin* risk by extending the responsibilities of the system operator so that they explicitly include capacity provision. In effect this is merely a reworking of the timescale associated with the SO's existing remit since it contracts for short term system balancing on a days to hours/minutes basis already. There is no conceptual reason why the SO could not have its duties extended to allow it to contract for plant margin, for example in combination with the Winter Outlook Report (which already seeks to encourage the market to provide margin). The specific form of contract this duty could take is something for subsequent discussion (see below on auctions however).

Another option that is surprisingly absent from the discussion in Chapter 4 is any form of capacity payment. Problems with capacity payment gaming under the pool are well

documented. Different policies bring different strengths and weaknesses but we believe that in this area as in others a more complete discussion of the range of options available would aid understanding and could help build consensus on the route forward.

Feed in Tariffs

Given the experience gained in many countries with Feed in Tariffs (and variants thereof) it is very surprising that this option is not discussed at all in Chapter 4. Analysis by the IEA and European Commission amongst others concludes that FiTs are the most effective and cost efficient forms of support for renewables currently in use (CEC 2008; IEA 2008). Eighteen EU states use FiTs, as do a number of non-EU countries that have been successful at delivering renewable energy. FiTs bring considerable advantages for investors and offer greater potential for community scale investment than alternative schemes such as the UK RO (Toke, Breukers, & Wolsink 2008). The IEA notes that FiT type arrangements have delivered much greater capacities at lower costs than certificate trading schemes such as the RO. There is a wealth of international empirical experience available on renewables support schemes and it is surprising that this evidence base is not referred to all in Chapter 4.

Some industry bodies and participants in other consultations have argued strongly against replacing the RO (DECC 2009; House of Lords 2008). Their principal arguments focus on the potential for further regulatory change to introduce delays and create a heightened perception of regulatory risk in the UK market. Of particular concern is the likely hiatus in development associated with another round of consultation and re-regulation, given the short time in which the 2020 target must be delivered (ibid). Few recent analysts suggest that the RO is intrinsically more effective than a FiT. Rather they stress the other factors (grid access, planning and various specific aspects of the RO) that have impinged upon UK progress with renewables and argue in effect that the RO *per se* is not the problem. Hence arguments that caution against wholesale change to the RO are combined with assessments that suggest that low levels of delivery in the UK are due to other policy problems.

The arguments in favour of maintaining the RO in order to *maintain investor confidence* and *avoid delay* have obvious merit and need to be weighed carefully. The consultation document is predicated on an understanding that a range of choices face policymakers in this area. However, we suggest that if the case for replacing or augmenting the RO overrides concerns about regulatory risk and delay, i.e. that changes are needed, then policymakers should take an evidence based approach and look to experience gained overseas. Given the strength of international evidence that exists around the effectiveness of feed in tariffs we believe that failing to attend to their potential (for future developments) is a serious omission from the Ofgem analysis.

The problem with auctions

Project Discovery does consider options for replacing the RO (and supporting other low carbon options). With very little supporting analysis the paper suggests that the RO could be replaced with a capacity based tender – essentially a return to the sort of capacity auctions seen previously in Britain under the NFFO. It also moots this approach for other low carbon options, possibly differentiated by technology. We are concerned that the case for using tenders is not well supported in the document, the evidence base, or in economic and business theory. There are fundamental problems associated with the use of auctions, particularly for emerging technology sectors. As we now explain.

Tender based schemes are poorly suited to relatively risky emerging technologies that have yet to be proven on the scale envisaged (like CCS, offshore wind, wave, tidal and some biomass technologies). In many cases core technology costs are based upon estimates and models rather than experience. In addition, where supply chains are largely absent, costs of key components/construction tasks cannot be known accurately.

Cost escalations have become a prevalent feature of the offshore wind market in Britain, in part because of early optimism, part because of supply chain constraints. Auctions may also be inappropriate for technologies that have not been developed in the UK context for many years and which are associated with particularly rigorous regulatory requirements during construction (nuclear). Under such conditions market participants seldom have sufficiently good cost information available ex-ante to be able to provide well judged bids.

These problems are well documented in the literature, with numerous examples cited. The phenomenon known as 'winner's curse' can occur whenever market participants must bid for an asset/licence/opportunity in the absence of perfect (or even adequate) information. Analysts note that the existence of winner's curse cannot be readily determined a-priori. It is an empirical phenomenon rather than something that can be demonstrated from theoretical principle (Mackley 2008). However, as we explain in more detail below, in the energy sector we already have indications of poor cost data ex-ante, of cost escalations and of disappointing auctions. In such conditions it is appropriate to view auctions with considerable caution relative to other, better proven, forms of support.

Classic winner's curse occurs when companies overpay for a licence/asset, for example in the 3G licence auctions in the telecommunications sector (Mackley 2008). In low carbon capacity auctions this can take an inverted form; participants make unrealistically low bids to deliver new assets in order to win contracts. Experience suggests that this happened in the UK under the former NFFO, leading to low completion rates (Mitchell & Connor 2004). The NFFO was not successful, mainly because there was a limited amount of money and no penalties. The consultation alludes to the low completion rates seen under NFFO and suggests penalties for non-delivery. However, this does not remove any of the underlying problems associated with insufficient information about cost, nascent supply chains and uncertainty about technology performance. Indeed where auctions incorporate sanction for non-delivery participants may be especially subject to winner's curse.

Conclusions

Proper evaluation of the appropriateness of auctions in the low carbon technology area is beyond the scope of this submission. This is an important area for future analysis. Nevertheless the circumstantial evidence against the use of auctions is considerable and we suggest that a wider set of options should be given a far more systematic analysis than is currently provided by Ofgem. In conclusion we would note the following:

- The leading low carbon supply options including offshore renewables, CCS and nuclear are all subject to considerable uncertainties ex-ante, making bidding for tenders difficult and creating a strong possibility of winner's curse.
- A key premise of 'Discovery' is that current market based systems may not be able to balance cost reduction against certainty of delivery. It therefore seems rather strange that the project proposes a new and uncertain market based solution of its own – a return to capacity auctions. As the UK's experience with NFFO indicates, auctions may not be the best means by which to ensure delivery and create effective supply chains.
- Strong arguments against further change to the RO need to be weighed carefully against the importance of delivery. This assessment should also factor in the characteristics, novelty and track record of measures that might replace the RO. If the RO is to be replaced to enhance delivery we would urge that the best proven option, the feed in tariff, is assessed carefully against more experimental options such as capacity auctions. These have considerable benefits for investor confidence, are proven to work and can be adjusted or regressed over time to encourage cost reduction. Their suitability for options outside the renewables arena needs to be considered carefully.

It is important to note that many of the concerns we have articulated above pertain to technology areas where cost or other key information is poor. There may be instances where auctions are an appropriate and cost effective means to deliver capacity or system services. It is also important to note that *tenders* need not be associated with *auctions* (though that is implicit in the consultation). Evaluating 'bids' on a non-auction basis (sometimes referred to as a 'beauty contest') is well established in the energy area and other regulated sectors. This approach was used by the Crown Estate when evaluating Round 3 offshore wind applications. When considering the full range of options to promote low carbon technologies this approach needs to be considered carefully. It is not possible to provide a more detailed review in this response. The first step is to properly evaluate the *full range* of options to support different types of technology, drawing on experience overseas as well as from other sectors. Unfortunately the Consultation fails to do this, which seems to be something of a missed opportunity. We urge Ofgem to take forward such an assessment in collaboration with DECC and other interested parties.

CHAPTER: Five

Question 8: Do you agree with the assessment criteria that we have used to evaluate the policy packages?

Question 9: Do you have any comments on our initial assessment of each of the packages?

Question 10: Do you agree with our summary of the key benefits and key risks of each policy package?

Question 11: Do you have a view on which package is preferable, or alternative policy measures or packages that you would advocate? We are particularly interested any analysis you may have to support your views.

Our comments on Chapter 5 are generic, and follow from the comments on the preceding chapters. Our main and over-riding concern is that because important options are excluded from consideration, the range of options Chapter 5 evaluates is not complete. Moreover, some of the options included in Chapter 4 have considerable problems associated with them which are not made explicit in that chapter. Any evaluation is therefore already incomplete and potentially flawed.

With respect to the assessment criteria themselves we suggest that these are not set at an appropriate theoretical/analytical level and hence are not particularly revealing as tools for analysis. Rather than a set of criteria that can be judged against tangible operational objectives the criteria are simply reflections of a set of high level policy goals. For example, in seeking to assess whether a particular policy/policy package will accelerate investment or reduce the cost of capital the sort of question that might be appropriate to use in assessment might be 'does the provision reduce investment risk relative to existing arrangements?' Similarly, in seeking to evaluate whether a particular policy/package might improve the prospects of the UK meeting its renewable energy target an appropriate level of assessment might be 'will the provision ease the integration of renewables into electricity networks?' (or similar).

The chapter does provide an interesting high level discussion of the various reforms that Ofgem has chosen to evaluate, however for the above reasons we are not able to provide meaningful answers to questions 10 and 11 above. The arguments and issues put forward for each package are internally consistent, hence within its own terms the answer to Q10 has to be 'yes'. Unfortunately this does not allow a proper discussion of the more detailed issues we highlight in the preceding paragraph. As there are both omissions from the full set of policies and packages discussed in Chapters 4 and 5 and important limitations are omitted in the discussion of Chapter 4 it is not possible for us to provide a view of which package is 'best'. We do advocate that a range of alternative

measures are at least given proper consideration and therefore in answering question 11 refer you to our answers to questions 5 to 7.

CHAPTER: Six

Question 12: Do you agree with our assessment of the timing for important investment decisions?

Question 13: Do you believe that early actions should be considered?

Question 14: Do you think that the issues are such that policy measures should be considered as a package or should they be considered on a case by case basis?

The timelines set out in Chapter 6 appear sensible. We would simply reiterate our earlier point about urgency of action, minimal delay during consultation and the importance of drawing upon tried and tested policies using best practice internationally.

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