PÖYRY

Pöyry Management Consulting (UK) ("Pöyry") welcomes the opportunity to respond to the consultation on Energy Market Reform. We have worked extensively on the implications of the transition to a de-carbonised electricity system for a range of private and public sector clients, and we have a long history of experience in electricity market design in the UK and elsewhere.

We agree that the present market arrangements and support policies are unlikely to deliver the 2020 and 2050 decarbonisation targets as envisaged by Government. We perceive two distinct challenges; firstly the delivery of low carbon generation, and secondly ensuring that the power system maintains sufficient flexible capacity to ensure secure electricity supplies.

Our overriding concerns are that:

- the proposals cover such a large share of long-term future electricity generation that the price signals in the residual market may become meaningless;
- unintended consequences will result in the need for further changes in the future, thereby increasing perceived regulatory risk; and
- the demand side may be locked out of the market by the proposed forms of the capacity mechanism.

Generally we favour market-based approaches wherever possible. Below we comment on the proposals as presented. In Annex A, we outline a market-based alternative to the capacity mechanism, and in Annex B, we present responses to some of the consultation questions.

Investment in low carbon generation

- We agree that unilateral UK carbon price support alone is insufficient to deliver the long-term decarbonisation goals – the price may have to be too high (threatening UK competitiveness), and as the system de-carbonises, the cost of carbon starts to fall out of the electricity price.
- In practice, the economics and the types of risk faced by different low-carbon technologies are very different. Therefore the nature of the support that is required for each will need to be tailored to the technology:
  - in particular, the technical and commercial characteristics of CCS are uncertain; the form of support should be designed once the technology has passed through the demonstration phase.
- 'Production-based' subsidies should where possible be avoided – any support mechanisms which are intended to cover a large part of the generation mix should avoid distorting the cost-based merit order and locking out flexibility:
  - this assumes that carbon prices are sufficient to deliver low carbon dispatch, for example for CCS which sees a significant reduction in efficiency when compared to unabated gas and coal power stations;
  - if this assumption does not hold, then there may be a case for limited production-based support for certain technologies, e.g. to ensure that CCS or biomass generation runs ahead of unabated fossil fuel generation.
- We therefore advocate the concept of common market access for all technologies, supplemented where necessary by **availability-based** rather than **output-based** financial support (subject to appropriate verification that the availability is genuine).

- If the CFD option is chosen then the choice of index in the CFD should be appropriate for the technology to minimise basis risk; closer to real time for wind (which by necessity will trade a part of its volume within-day), and further ahead for nuclear and CCS.
- Whilst auctions appear superficially attractive on competition grounds, we foresee serious implementation issues if the successful bidder is chosen solely on price, since auction candidates would face considerable uncertainty over costs of the technologies between the time of the auction and the fixing of those costs with suppliers. The low build rates under previous renewable energy auctions (e.g. NFFO) illustrates this risk, which may be termed the 'winner's curse'.

Delivering flexible capacity

A decarbonised electricity system will be characterised by generation which is less technically and/or commercially flexible than the present fleet, and the existing 'predict and provide' paradigm in which generation is flexed to meet demand will need to be altered.

In future, we will need to draw on flexibility from a wide range of sources: demand; renewable and low carbon generation; interconnection; as well as conventional generation. The market arrangements should value these various sources of flexibility appropriately.

In particular, demand side participation could provide a cost-effective alternative to dedicated peaking generation, and our work for the Committee on Climate Change[1] demonstrates its potential to assist with energy balancing in a world dominated by low carbon generation. Decarbonisation of the economy is likely to include significant electrification of heat and transport, which have a high potential for flexibility in the timing of consumption.

Our work on intermittency[2] has shown that thermal generation will operate at lower load factors and face greater price and quantity volatility than today, and a limited quantity of additional dedicated peaking capacity may be required to ensure secure supplies by the late 2020s. However, the requirement and timing for any new peaking capacity is very dependent on assumptions on the build of renewable and other low-carbon generation and the extent of demand response, and early action could prove costly.

We believe that a pure energy-only market remains capable of delivering investment in flexible capacity which will attain a significant load factor, but the combination of price and volume risk associated with low-merit peaking capacity means that it is unlikely to be delivered under a pure energy-only regime. However, a market-based approach could still be applied to the valuation of such capacity.

Capacity as an 'option'

Capacity is essentially an '*option*' to produce energy. In the future de-carbonised system energy market volatility will be greater, increasing the value of such options.

The appropriate response is to ensure that market participants are able to trade energy 'options', perhaps in the form of reserve contracts, and that the market itself is able to

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1 "Options for Low-carbon Power Sector Flexibility to 2050"; a report by Pöyry to the Committee on Climate Change, October 2010

2 "Implications of Intermittency"; Pöyry, May 2009

reveal the value of and the required investment in new flexible capacity. We believe that the present market arrangements prevent the development of such options.

Flaws in the existing arrangements

The present energy-only trading arrangements have flaws which affect (mainly) investment in peaking facilities. In markets in which the efficient new build technology is CCGT (i.e. the 'business as usual' world) then this is a less serious concern, as the majority of their net revenue is earned from operation in the energy market and is spread over a large number of hours. However, peaking facilities (whether flexible demand or generation) are more problematic, as within an energy only market they must recover fixed costs over a much shorter number of hours.

Essentially, peaking facilities can be thought of as insurance, an option against a short (imbalance) situation. However, market participants have little incentive to contract for peak insurance, for a variety of reasons:

- the imbalance prices are damped by imbalance price calculations which use average rather than marginal prices, and through National Grid's use of pre-contracted generation (e.g. under short term operating reserve STOR contracts) which socialises part of the cost of the reserve (explained briefly below); and
- even if a participant chose to hold an option contract with a peaking facility, it has no way of calling delivery of that contract after gate closure. Essentially, there is a basis risk between the price at which the peaking facility will generate and the imbalance price which the participant faces if they are short.

Note that many of the most significant triggers for imbalance (e.g. thermal plant failure) occur without notice, so participants are obliged to face imbalance charges even if they have provided reserve capacity prior to Gate Closure. Shortening Gate Closure would perhaps improve matters, but the nature of mandatory imbalance regime without potential to hedge the imbalance price provides a barrier to the development of reserve option contracts even with a shorter Gate Closure. The poor levels of liquidity in the energy markets remain a concern.

Distorting effect of reserve contracts on imbalance and market prices

The present arrangements include a distortion in that National Grid buys reserve (e.g. STOR) in advance, paying an availability fee (which is socialised across all demand and generation) and pre-determining a utilisation fee, expressed as an offer price for later submission the Balancing Mechanism.

On the day, this pre-contracted generation competes in the Balancing Mechanism alongside generation without contracts which would generally expect to cover their fixed costs of operation from within their offer prices. By comparison, the pre-contracted generation offers at prices which are not truly 'energy-only' in their formation.

As a consequence, pre-contracted capacity may be expected to 'crowd out' uncontracted generation within the Balancing Mechanism, and the imbalance prices which are based on the offers instructed are damped, compared with those which would be found in a true energy-only market.

Separation of reserve and energy prices

There are several ways of achieving a separation of reserve from energy prices under the present arrangements, which could equally be applied to any generation under contract within a capacity mechanism or similar.

One possibility would be to ring-fence pre-contracted plant for 'last resort' dispatch as outlined in the EMR consultation, but we believe that this is an inefficient use of capacity and that it would be preferable to achieve the separation through other means if possible.

The separation of energy from reserve prices could be solved by reform of the imbalance price to isolate the energy imbalance prices from the cost of reserve. The EMR document seems to accept this, as it states that under the targeted capacity mechanism option in which the capacity is not held for last resort dispatch, then the imbalance price should reflect the full cost of the capacity (not just its operating cost or utilisation fee). In our view this applies equally to capacity contracted under STOR and similar arrangements.

One option ('Option X') would be to 'tag' those Balancing Mechanism offers which are associated with a reserve contract (or, in the future market, a capacity or 'option' payment) and to adjust their offer prices upwards using some algorithm solely for the purposes of calculating the imbalance prices. The intention of this algorithm would be to add a part of their availability fee in some targeted way to those hours in which they are called to deliver energy. For example, there might be an estimation at the beginning of the year of the level of output that the unit would be expected to deliver under contract, and the option fee would be spread pro rata across this output. This may appear arbitrary, but we contend that adding an arbitrary (estimated) value to bridge the gap between the offer price and the full cost is preferable to adding the arbitrary value of zero.

Another option ('Option Y') would be to tag these pre-contracted offers, and exclude them entirely from the imbalance calculation. For example, the imbalance price could be calculated using an ex-post unconstrained schedule calculation including all uncontracted offers, whether accepted or not. This would mean that pre-contracted plants would not influence imbalance prices (expect perhaps in extremis when there are insufficient non-STOR offers to the Balancing Mechanism.)

Incentives to contract for 'option' capacity

Due to the mechanics of imbalance calculation, participants are unable to hedge their imbalance risk through contracting with reserve generation. Imbalance reform, although a necessary step, would not solve this issue alone.

We contend that although dealing with the investment case for low-carbon generation is urgent, the need to implement radical amendments for the provision of capacity is unproven, and not immediate. Such flexibility can be deployed at relatively short notice (including from the demand side) and a market-based approach is liable to deliver more efficient outcomes than appointing a central buyer for ever-growing volumes of capacity.

Any market-based approach for energy 'options' must recognise the essential role of National Grid in real-time balancing, while permitting trading (and re-trading) of options over a range of timescales which can support investment decisions and shorter-term trading of obligations.

PÖYRY

In Annex A below, we sketch a proposal for an alternative, market-based capacity mechanism which builds on the existing de-centralised arrangements which have delivered investment successfully until now.

In Annex B we present responses to some of the questions asked in the consultation.

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ANNEX A – CAPACITY MECHANISM STRAW MAN PROPOSAL

We outline a possible alternative to the capacity payment models proposed in the consultation document. Although not complete (and by no means the only possible option), we present it as a straw man with the explicit intention of avoiding the centrally-planned single buyer models which are proposed in the consultation (and which have been rejected for the energy element of the market).

We put forward a bilateral model for the trading of energy 'options' and the provision of flexible capacity. The details have to be resolved, but in this brief submission we trust that we have been able to demonstrate that there is a basis for further development. In particular, the model begins with the assumption that the reserve options are deployed within the Balancing Mechanism, whereas in practice participants would want the ability to exercise before Gate Closure; this issue could be resolved with further development. In sketch form, the model would operate as follows.

In advance:

- National Grid would coordinate markets for reserve 'options' in various timescales – e.g. annually (looking forward a number of years), monthly, and daily using a set of 'products' defined by National Grid;
- the nature of these contracts is that they would require the seller to submit offers to the Balancing Mechanism with pre-determined utilisation prices and other characteristics, and that the buyer and seller would agree an option fee;
  - due to the nature of the products, which include both an option fee and a utilisation fee, each 'trade' would have to be under a 'pay-as-bid' arrangement;
  - variants on the contract form could include the use of varying utilisation prices (e.g. oil-indexation for longer term contracts) and different levels of firm advance commitment (similar to the existing National Grid STOR arrangements);
  - it would ideally be possible to make the arrangements flexible, permitting reserve option holders to call the reserve capacity before Gate Closure, although this has not been fully worked through;
- forward trading could occur as many years in advance as participants chose;
- willing buyers and sellers would participate in the forward markets;
- any participant may offer to sell reserve 'options' over longer timescales, but within [6] months of delivery there must some demonstration of ability for physical delivery (to National Grid's requirements);
- National Grid would act as buyer of last resort in case it believed that insufficient reserve option capacity had been procured at the [6] month ahead stage.

It is essential that participants could re-trade their reserve options and commitments, so that some form of forward and spot market could exist. This would include an on-the-day reserve market as mentioned in the EMR consultation.

On the day,

- contracted reserve providers would bid into the Balancing Mechanism at their pre-determined prices and technical capabilities (noting that ideally the mechanism would also allow the reserve options to be called before Gate Closure);

- National Grid would balance the system using all of the tools at its disposal, including the various reserve option offers in the Balancing Mechanism (which would be under pre-determined prices).

After the event, there would be two regimes for imbalance prices:

- participants who are short and who hold (adequate) reserve options would pay the price in their bilateral agreement for the utilisation cost of the reserve option;
- participants who are short but hold insufficient reserve options would pay a full imbalance price as in Option X or Option Y discussed above.

Some enforcement would be required for reserve option providers which fail to fulfil their obligations. There would also be a mechanism by which reserve option holders are paid for any of their unused reserve options. The mechanics of this are to be determined but it could be either a payment for the reserve holding at the on-the-day reserve price, or a higher payment in the event that the capacity is called for the benefit of other participants. This would increase the incentive to buy reserve options and avoid a manifestation of the 'free rider' problem.

In the end, there may be different 'products' developed in the same way that National Grid has a suite of ancillary service contracts for reserve and response over different timescales.

ANNEX B – ANSWERS TO SELECTED CONSULTATION QUESTIONS

We have answered the following questions:

1, 2, 3, 6, 10, 11, 18, 20, 21, 22, 23, 24, 31, 33

1. Do you agree with the Government's assessment of the ability of the current market to support the investment in low-carbon generation needed to meet environmental targets?

Yes. We agree that the present market arrangements and support policies are unlikely to deliver the 2020 and 2050 decarbonisation targets as envisaged by Government. We perceive two distinct challenges; firstly the delivery of low carbon generation, and secondly ensuring that the power system maintains sufficient flexible capacity to ensure secure electricity supplies.

2. Do you agree with the Government's assessment of the future risks to the UK's security of electricity supplies?

No. Our work on intermittency[3] has shown that thermal generation will operate at lower load factors and face greater price and quantity volatility than today, and a limited quantity of additional dedicated peaking capacity may be required to ensure secure supplies by the late 2020s. However, the requirement and timing for any new peaking capacity is very dependent on assumptions on the build of renewable and other low-carbon generation and the extent of demand response, and early action could prove costly.

We contend that although dealing with the investment case for low-carbon generation is urgent, the need to implement radical amendments for the provision of capacity is unproven, and not immediate. Such flexibility can be deployed at relatively short notice (including from the demand side) and a market-based approach is liable to deliver more efficient outcomes than appointing a central buyer for ever-growing volumes of capacity.

We believe that a pure energy-only market remains capable of delivering investment in flexible capacity which will attain a significant load factor, but the combination of price and volume risk associated with low-merit peaking capacity means that it is unlikely to be delivered under a pure energy-only regime. However, a market-based approach could still be applied to the valuation of such capacity.

3. Do you agree with the Government's assessment of the pros and cons of each of the models of feed-in tariff (FIT)?

In practice, the economics and the types of risk faced by different low-carbon technologies are very different. Therefore the nature of the support that is required for each will need to be tailored to the technology:

- in particular, the technical and commercial characteristics of CCS are uncertain; the form of support should be designed once the technology has passed through the demonstration phase.

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3 "Implications of Intermittency"; Pöyry, May 2009

6. What are the efficient operational decisions that the price signal incentivises? How important are these for the market to function properly? How would they be affected by the proposed policy?

Price incentivises efficient production and consumption decisions, and an output-based support scheme risks distortion to market price for a significant part of the year. For that reason, as stated below, we believe that production-based' subsidies should where possible be avoided – any support mechanisms which are intended to cover a large part of the generation mix should avoid distorting the cost-based merit order and locking out flexibility.

10. How important do you think greater liquidity in the wholesale market is to the effective operation of the FIT with CfD model? What reference price or index should be used?

Very. If the CFD option is chosen then the choice of index in the CFD should be appropriate for the technology to minimise basis risk; closer to real time for wind (which by necessity will trade a part of its volume within-day), and further ahead for nuclear and CCS. It is far from clear than any single index can meet the needs of all technologies.

11. Should the FIT be paid on availability or output?

Generally, on availability although perhaps with exceptions.

- 'Production-based' subsidies should where possible be avoided – any support mechanisms which are intended to cover a large part of the generation mix should avoid distorting the cost-based merit order and locking out flexibility:
  - this assumes that carbon prices are sufficient to deliver low carbon dispatch, for example for CCS which sees a significant reduction in efficiency when compared to unabated gas and coal power stations;
  - if this assumption does not hold, then there may be a case for limited production-based support for certain technologies, e.g. to ensure that CCS or biomass generation runs ahead of unabated fossil fuel generation.
- We therefore advocate the concept of common market access for all technologies, supplemented where necessary by **availability-based** rather than **output-based** financial support (subject to appropriate verification that the availability is genuine).

18. Do you agree the principle of exceptions to the EPS in the event of long-term or short-term energy shortfalls?

Yes, although the detail clearly needs further thought. We would advocate a sliding scale arrangement which balances emissions with operating hours.

20. Do you agree with the Government's preferred policy of introducing a capacity mechanism in addition to the improvements to the current market?

No. We propose an alternative market-based approach.

We contend that although dealing with the investment case for low-carbon generation is urgent, the need to implement radical amendments for the provision of capacity is unproven, and not immediate. Such flexibility can be deployed at relatively short notice (including from the demand side) and a market-based approach is liable to deliver more efficient outcomes than appointing a central buyer for ever-growing volumes of capacity.

21. What do you think the impacts of introducing a targeted capacity mechanism will be on prices in the wholesale electricity market?

There is a significant risk of price 'contagion' (damping imbalance and forward prices) without imbalance price reform, and we note that this occurs already through the operation of STOR contracts. We propose two outline options.

One option ('Option X') would be to 'tag' those Balancing Mechanism offers which are associated with a reserve contract (or, in the future market, a capacity or 'option' payment) and to adjust their offer prices upwards using some algorithm solely for the purposes of calculating the imbalance prices. The intention of this algorithm would be to add a part of their availability fee in some targeted way to those hours in which they are called to deliver energy. For example, there might be an estimation at the beginning of the year of the level of output that the unit would be expected to deliver under contract, and the option fee would be spread pro rata across this output. This may appear arbitrary, but we contend that adding an arbitrary (estimated) value to bridge the gap between the offer price and the full cost is preferable to adding the arbitrary value of zero.

Another option ('Option Y') would be to tag these pre-contracted offers, and exclude them entirely from the imbalance calculation. For example, the imbalance price could be calculated using an ex-post unconstrained schedule calculation including all uncontracted offers, whether accepted or not. This would mean that pre-contracted plants would not influence imbalance prices (expect perhaps in extremis when there are insufficient non-STOR offers to the Balancing Mechanism.)

22. Do you agree with Government's preference for the design of a capacity mechanism?

- a central body holding the responsibility;

No. We advocate a bilateral arrangement with a central role as buyer of last resort.

- volume based, not price based;

Yes

- a targeted mechanism, rather than market-wide.

In our view, either arrangement could be made to work but the former is less disruptive to the market arrangements and the case for a bigger reform is not proven. We believe that providers of the same service should be paid equally, and in particular that demand side providers can access the markets on an equal basis.

23. What do you think the impact of introducing a capacity mechanism would be on incentives to invest in demand-side response, storage, interconnection and energy efficiency? Will the preferred package of options allow these technologies to play more of a role?

We fear that the centralised nature of the proposed scheme risks that the demand side and other flexible providers may be locked out of the market.

24. Which of the two models of targeted capacity mechanism would you prefer to see implemented:

Economic dispatch.

31. Do you have views on the role that auctions or tenders can play in setting the price for a feed-in tariff, compared to administratively determined support levels?

Whilst auctions appear superficially attractive on competition grounds, we foresee serious implementation issues if the successful bidder is chosen solely on price, since auction candidates would face considerable uncertainty over costs of the technologies between the time of the auction and the fixing of those costs with suppliers. The low build rates under previous renewable energy auctions (e.g. NFFO) illustrates this risk, which may be termed the 'winner's curse'.

33. Do you have view on how market distortion and any other unintended consequences of a FIT or a targeted capacity mechanism can be minimised?

We have proposed a market-based alternative to a capacity mechanism with imbalance price reform and the development of a short-term reserve market, and that 'production-based' financial support should generally be avoided.