The Institution of Engineering and Technology

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Matt Wieckowski
Electricity Market Design
Department of Energy & Climate Change,
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3 October 2011

Dear Mr Wieckowski,

Electricity Market Reform (EMR) White Paper: Annex C: possible models for a Capacity Mechanism

The Institution of Engineering and Technology (IET) is pleased to respond to this consultation. The submission is supported by the Royal Academy of Engineering and the Institution of Mechanical Engineers.

The factors which we wish to bring to your attention concern the context in which the possible capacity mechanisms need to be considered and the primary issues that need to be resolved. We have not addressed the individual questions because these seem mainly to relate to issues of market design rather than engineering, but we would be pleased to engage with those designing the market to assist them in understanding the new technology and system issues further.

The future of electricity generation in the UK is uncertain, as it is in many other countries. Key factors that contribute to this uncertainty include:

- The potential for very large amounts of variable renewables to enter the plant mix and the lack of experience of operating electricity systems in this condition, especially largely islanded systems such as the GB one.
- The rate of deployment of smart grids and smart demand
- The rate of deployment of technologies where electricity substitutions for other inputs, such as electric vehicles and electric heat pumps
- The response of the public to energy saving programmes
- The emergence of electricity storage as a practical and commercial possibility
- The extent to which new nuclear may be delayed
- The operability of large power plant fitted with carbon capture equipment, and associated carbon storage infrastructure
- New interconnectors with other parts of Europe
- The emergence of consumer / community active 'energy engagement' that includes local trading

There is thus significant potential for the system to evolve in unexpected ways, and/or for supply and demand to become mismatched. All the above issues also carry risk associated with new technology and have potential for type faults to remove capacity from the system at short notice.

Experience would indicate that in such circumstances plant margins probably need to increase at just the time that they are trending downwards. Ensuring reserve capacity should thus have greater importance in the reformed electricity market. We recommend that the amount of capacity should err more towards "too much" rather than "too little" as the economic consequences of insufficient supply are high.

There are two principal shortfall scenarios for capacity:

a) A loss of capacity because of anti-cyclonic weather limiting generation from wind across a wide area of Europe, without the possibility of additional supplies from the interconnectors
b) Short duration peaks (typically on a winter's evening) for anything from a few minutes to a few hours, caused by a lack of availability of generating plant

A capacity mechanism optimised for one of these scenarios will not necessarily be suited to the other which is a major issue, given the importance of both.

It is not clear from the consultation whether DECC has yet given detailed consideration to where, in practical terms, standby capacity could and arguably should come from. We believe this is necessary to enable an effective incentive design. Our thoughts are that primary candidates to provide additional capacity lasting for **a few days** are:

- Coal and oil fired power plants currently being run down for closure by their owners because of emissions regulations
- Standby generators in industrial and commercial buildings
- First generation gas fired combined cycle plants that no longer find their place in the market
- Temporary shutdown of industrial processes, where they are not already participating in the market
- Newly built open cycle gas turbine and reciprocating engine plant, though one has to ask why the market should not be incentivised to deliver such plant into the peaking segment rather than the strategic reserve.

The nature of this plant probably influences the design of the capacity mechanism. For example:

- If existing power plant is to be kept running owners need to have reasonable visibility of its likely life so maintenance can be planned, leading to a need for longer term contracts
- There needs to be enough visibility of the life of new plant to justify its investment
- Use of existing standby plant and interruptions to industrial processes could be on a shorter term basis
- All standby plant needs to be subject to a regular testing regime, including testing under load, in order for there to be confidence it will operate when required. This carries costs that would need to be handled.
- Notice periods for generation requirements need to be considered as part of the contract, as this will affect the degree of cold storage in which plant is kept and hence its standing costs.

There seems a case here to consider long term mothballing of plant. A great deal of capacity is coming off the system in the next three to seven years. Many of the issues around capacity shortfalls will not be manifest until we are potentially in a renewables-heavy system with strongly

increasing demand, in say around 10 to 15 years. It would seem regrettable if many GW of serviceable plant were to be scrapped over the next few years only to need replacing with new reserve plant a few years later. Issues such as cost, ensuring continuity of skills, availability of parts and service for obsolete equipment, and potential impact of environmental regulation would need to be considered in this analysis. The operating regime of such plant would need careful management to minimise emissions and fuel stocks would need to be monitored and managed for safely purposes and to deal with deterioration.

Standby and reserve plant able to be placed in service at reasonably short notice needs appropriate levels of investment and maintenance. Therefore if this plant is to be retained, signals need to be sent to owners soon because it is currently being run down for closure. An early decision is therefore needed, leading to a restart of capital maintenance programmes by owners to ensure adequate standby reliability.

New technologies in demand management and storage have a significant part to play in managing **short duration** peaks for anything from a few minutes to a few hours (typically on a winter's evening), however we would hope that the market can be designed to incentivise the best balance of these technologies for what would be a routine issue on the envisaged power system of the future. It would be wise however for emergency provisions to be in place to enable additional short duration capacity to be provided if the market fails to do so sufficiently.

It is clearly important to avoid the situation that companies try to manipulate the interface with the capacity mechanism in their favour, and also that demand reduction, storage and peaking capacity that should be participating in the **normal** market is not disengaged from that market in favour of forming standby capacity.

This submission has been prepared on behalf of the IET Trustees by the IET's Energy Policy Panel and is supported by both the Royal Academy of Engineering and the Institution of Mechanical Engineers. If we can be of further assistance to the DECC Team as the consultation progresses please do not hesitate to contact us.

Yours sincerely

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