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POLICY BRIEFING

The Energy Bill: Will the Capacity Market be fit for purpose?

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As part of the Energy Bill the government has proposed a Capacity Market which is designed to ensure that the UK has enough electricity supply to meet demand. This briefing explains WWF's concerns about the Capacity Market and outlines steps the government can take to improve the proposals.

Summary

1. The Energy Bill gives the Secretary of State powers to introduce a Capacity Market (Part 2, Chapter 3 of the Bill), but most of the details will be in secondary legislation which is not yet available for scrutiny. DECC are still considering key details of the design.
2. The Capacity Market has been designed to ensure security of supply through prolonging the operational life of existing power generation capacity and incentivising the building of new, mainly gas, generation plant. If too much capacity is procured then the UK may be locked-in to excessive high carbon infrastructure at considerable cost to consumers.
3. Generators with fossil fuels in their portfolio will benefit from the Capacity Market and the early introduction of capacity payments.
4. The Capacity Market as currently designed will fail to incentivise sufficient investment in non-generation forms of flexible capacity such as electricity storage, demand-side response and interconnection. These technologies reduce the total amount of new generation capacity required by allowing more efficient use of existing assets.
5. The Government recently announced its intention to run a pilot for electricity demand reduction through the Capacity Market. See our separate briefing on [demand reduction](#) for more details.



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Summary of Policy Recommendations

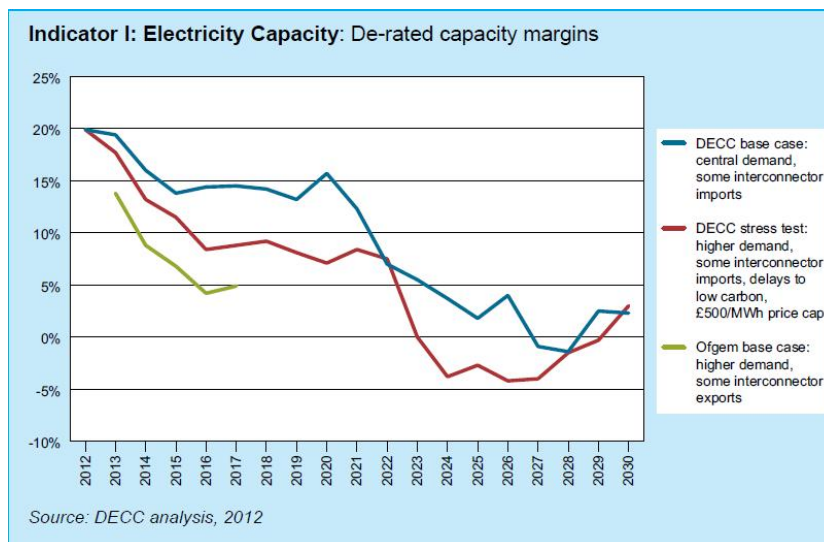
Policy recommendations on the Capacity Market and security of supply are outlined in detail at the end of this document. In summary, WWF's view is that the government must stop the Capacity Market from funding a dash for gas by:

1. Amending the market design to ensure that non-generation, interconnected capacity and demand reduction can participate successfully in capacity auctions and receive a significant and growing proportion of capacity contracts, rather than being peripheral.
2. Only running a supply-side capacity auction on the basis of robust, independent, published evidence, for example from National Grid, that shows conclusively that, after contributions from demand side response, storage, interconnection and demand reduction have been taken into account, payments to generators are genuinely required to maintain security of supply.

Introduction

Over recent years, UK electricity capacity margins have been relatively large. As is always the case when there is ample supply, this has left wholesale electricity market prices relatively low. It is generally agreed that capacity margins will become significantly tighter over the next two years as a number of old coal and oil plants close.

Capacity margins are based on an assessment of the ratio of total reliable generation capacity relative to peak demand. In practice, peak demand is only reached on cold days during the winter with average demand significantly lower. The graph below was included in DECC's Energy Security Strategy which was published in November 2012ⁱ and shows assessments from Ofgem and DECC on future electricity capacity margins.



The chart above compares DECC's and Ofgem's forecasts for future amounts of spare capacity. Looking ahead to 2015/16, capacity margins will be significantly lower than they are today, but, according to Ofgem, "the most likely implications are small, occasional shortfalls which could be dealt with by National Grid through demand-side action, with little or no impact on customers. The annual loss of supplies arising from transmission and distribution outages is

typically more than three times this amount". As shown above, DECC are more optimistic about future margins.

How will the Capacity Market work?

The Capacity Market will change the way that power generators are paid. At present, plants are paid only for producing and selling electricity. The proposed Capacity Market design is to run auctions for capacity (both new and existing plant), based on an assessment on the volume needed four years ahead. Under current proposals, participants will receive a fixed annual payment for the capacity they provide in addition to the revenues they receive for selling electricity. In return for the capacity payment, capacity providers will be expected to be delivering electricity at times of scarcity. They will pay penalties which could potentially exceed their total capacity payment if they fail to do this.

The Capacity Market will be open to generating plant such as coal, gas and nuclear as well as non-generation technologies including demand side response and electricity storage. With the exception of the pilots, auctions will be technology neutral. Therefore there will be no prioritisation of a particular type of capacity based on beneficial characteristics for example, flexibly (ability to increase and decrease output quickly) or lower carbon emissions.

The auction clearing price will set the level of an annual payment for capacity which will be received by all generators which were successful in the auction. Plants with a Contract for Difference will be unable to receive capacity payments and those receiving Renewable Obligation Certificates¹ may also be excluded.

The proposals published by DECC in December 2012 suggest that the Capacity Market will be composed of two different elements:

- The enduring design, the main capacity auction under which the bulk of UK capacity will be auctioned four years ahead of delivery starting in 2014 for delivery in 2018/19.
- Pilot auctions (transitional arrangements) which will be time limited and intended to bring forward non-generation technologies such as storage and demand side response which have a short lead time for implementation. These auctions will be run on an annual basis one year ahead of the delivery year and are expected to cover the period between 2014 and the first delivery year of the enduring design in 2018/19.

What are the benefits of non-generation forms of capacity?

The UK's future electricity system will include growing amounts of renewable electricity, a substantial amount of which will be wind. Whilst wind output can be predicted accurately at least 24 hours in advance, there are times when wind speeds are low and to maintain system security, alternative sources of power are required. Demand also fluctuates widely throughout the day and generators such as coal and nuclear are inflexible and cannot respond to these short term fluctuations. Flexible capacity is therefore needed to ensure that supply matches demand at all times.

While gas generation can provide the flexibility required, building large volumes of gas generation capacity, some of which will sit idle most of the time, is expensive and carries environmental risks which are outlined in the next section. A far more sophisticated way of ensuring electricity security of supply in future is to balance generation capacity with flexible

¹ Contracts for Difference will replace Renewables Obligations Certificates as the primary means of providing support to renewable generation after the 2013 Energy Bill is passed into Law. Contracts for Difference will also be open to new nuclear and carbon capture and storage generation as these are also classed as low carbon.

non-generation technologies which will ensure that generation capacity is used far more efficiently. This is where demand side response (DSR), storage and interconnection have an important role to play.

Interconnection: Enables sharing of electricity resources between countries to reduce the amount of back up generation capacity required to maintain security of supply and provides access to a market for selling surplus electricity. Modelling by the European Climate Foundation demonstrates that from a system balancing perspective *“ more transmission capacity and grid interconnection are the most favourable and economic options. More use of back-up may interfere with emission targets and leads to higher curtailment”*⁴ⁱ

Electricity storage: Electricity storage provides particularly valuable services to the grid as it can both absorb excess power when it is generated at times of low demand and supply it to the grid when needed. Storage can be controlled easily and is able to respond rapidly to fluctuations in supply and demand. The UK currently has 3GW of electricity pumped storage. Some electricity storage technologies like pumped storage, are already mature while others are promising and could play a key role if properly supported. The storage industry has set itself a target to build 2GW of additional capacity by 2020.

Demand-side response: Demand side response (DSR) is used to shift demand for electricity away from peaks, thereby reducing the overall volume of capacity required. DSR is already used in the UK to help balance supply and demand. Large users of electricity are paid to reduce their demand when the system is under stress as a result of forecasting errors or disruptions to supply. This is proven to work and is highly valued in the US where demand-side reduction and response has grown significantly (for example in the NE ISO and PJM forward capacity and reserves markets). DSR has been shown to have reduced some US capacity auction clearing prices by more than 15% on an annual basis.

Will the Capacity Market work for non-generation technologies?

The Capacity Market has been designed almost entirely to suit the characteristics of electricity generation. At present the proposals for the main auction are designed in a way that will put storage, interconnection and DSR at a disadvantage. Storage and DSR will be allowed to participate in auctions but in practice face substantial barriers to securing capacity contracts. While the initial pilot auctions have been designed with non-generation participants in mind, it is important that these technologies are able to secure capacity contracts in the main Capacity Market as well to so they can flourish in the long term.

A worst case scenario could see electricity storage, demand side response and interconnection unable to participate in the main Capacity Market at all, because the favoured design may not suit their needs. This may leave these technologies worse off than they were before, given that the introduction of the Capacity Market will reduce both the level and the volatility of the wholesale market price and that of ancillary and balancing services currently procured by the Transmission System Operator (National Grid). The non-generation technologies would therefore potentially be the only participants in the whole electricity market which are dependent on revenue from selling electricity alone and unable to access capacity revenues despite their obvious contribution to security of supply.

Critical elements of the enduring market design, which will be included in secondary rather than primary legislation, are still being considered by DECC and are subject to change. Elements of the design which are particularly problematic for these technologies include:

Dispatch - Capacity providers must provide electricity during system stress events, the periods during which margins fall below a pre-defined threshold. If they fail to do so they must pay a penalty. However, under current proposals, capacity providers will not be told exactly when to run but will have to rely on guess work to determine whether or not a stress event is occurring. This represents a far bigger risk for DSR and new storage which can only run for limited periods of time and are not used to trading in the electricity market, than it does for conventional generators.

Penalties for non delivery – Providers will be penalised if they fail to deliver capacity during a system stress event. Current proposals in the enduring design suggest that these penalties could significantly exceed the annual capacity payment. This would be too risky for DSR and storage participants, particularly when combined with other elements of the market design.

Duration of delivery – Individual storage and DSR providers are only able to deliver capacity for a limited amount of time. A requirement to deliver for four hours is manageable and stress events are unlikely to last longer than this due to other generators being brought on line and demand falling back. However, these technologies may not be able to deliver for several four hour periods back to back which may be a requirement of the Capacity Market.

Capping – Storage and demand side response have shorter development lead times than generation and will therefore participate in one year ahead auctions. However, the main auction, which new generation capacity will take part in, will be run four years ahead. Therefore in deciding how much capacity to buy in the main auction, government will need to subtract the anticipated contribution from DSR and storage from the total volume required four years out. There will be a strong incentive for government to be conservative about how much capacity to withhold for the one year ahead auctions. This will act as a cap on the growth of DSR and storage.

What are the wider risks of the Capacity Market?

1. A dash for gas infrastructure - The amount of capacity auctioned through the Capacity Market will be informed by an assessment by National Grid for Government of how much capacity will be needed to meet a specified level of security of supply four years ahead. Ministers will have the final decision on how much to procure. Understandably, they are likely to be risk averse as no minister wants to be blamed for the lights going out. Therefore the Capacity Market may result in the building of too much new unabated gas power plant capacity with an expected lifetime of 25-35 years.

Government models have suggested that gas plant must operate at low load factors in the future, operating only as back up for low carbon generation as the UK electricity sector is decarbonised. In practice, once a plant has been built, it creates infrastructure lock-in. Its owners will want to operate as often as possible to maximise returns and will lobby accordingly. Building too much gas capacity may therefore lead to pressure to scale back investment in low carbon generation.

2. Windfalls and vested interests - Most fossil fuel generators have been strong supporters of the creation of a Capacity Market as capacity payments will cover a large chunk of their fixed costs and therefore reduce risk and make plant more profitable. The auction design currently preferred will mean that all plant which is successful in the auction will receive the auction clearing price regardless of their costs. This will be set at the cost of the most expensive new plant that bids into the auction and is accepted.

Capacity payments are due to start in 2018/19. However, a number of generators are currently asking government to introduce payments to existing plant starting in 2014 on the grounds that some gas plants are currently unprofitable and might otherwise close or be mothballed. They claim that failure to do this could leave capacity margins uncomfortably tight and therefore threaten security of supply. Whether introduced in 2018 or 2014, capacity payments will risk a windfall falling to many existing plants including old coal, nuclear and the most efficient gas. Much of this existing generation capacity currently receives healthy returns and does not need a capacity payment to continue operating. Any windfall will be at the consumer's expense.

Given the oligopolistic nature of the UK electricity market, there are also concerns that market power may enable some players to employ tactics to manipulate the auction clearing price.

3. Inhibiting cross-border trading –By only providing payments for capacity to UK based generation, the Capacity Market will distort the electricity market. This will be to the detriment of overseas generation capacity which might otherwise be able to provide electricity at a lower price but will be disadvantaged as it will be competing against plant receiving a capacity payment. The European Commission has expressed concern about this issue.
4. Affordability - The proposed Capacity Market is technology neutral which may not prove cost efficient in the longer term. For example, it fails to differentiate between plant that have beneficial attributes such as low carbon emissions or an ability to provide flexibility services to the grid, rapidly increase or decrease their output when needed. The Capacity Market risks incentivising inflexible or high carbon capacity which will become a liability as the UK electricity sector moves towards decarbonisation. Inflexible, high carbon coal fired power stations will be penalised for their emissions through the carbon floor price but will then benefit from capacity payments.

What is WWF's position on the Capacity Market?

WWF cannot support the Capacity Market design currently proposed. The policy is immensely complicated and has a significant number of serious unintended consequences which are outlined above.

In WWF's view, the Capacity Market should reward capability rather than provision of capacity alone, to ensure procurement of technologies able to operate in a flexible way and therefore provide useful services to the system over the course of the transition to a decarbonised electricity sector with a growing share of variable renewable energy technologies.

What changes could be made to reduce the risks of current proposals?

The Energy Bill gives the Secretary of State powers to introduce a Capacity Market (Part 2, Chapter 3 of the Bill), but the critical details will be in secondary legislation which is not yet available for scrutiny. Secondary legislation will therefore require high levels of scrutiny.

The policy recommendations below should be taken in the context that we consider these suggestions to be damage limitation of a policy which, based on decisions already announced, is not fit for the purpose of supporting the transition to a decarbonised power sector rather than a model that we would have chosen. A number of crucial policy design details are still being considered.

Avoid over supply and excess costs

1. Government must resist pressure to introduce a Capacity Market before one is needed. It should introduce pilots as soon as possible for electricity demand reduction, demand side response and storage to see how much they can contribute and enable these industries to develop. If after this, a Capacity Market for generation is still needed, the volume of capacity required should be based on robust evidence which takes into account the contribution which interconnected resources make to ensuring security of supply. There is a temptation to be risk averse and procure too much capacity through the auctions. Over supply of capacity would come at considerable cost to consumers and result in too much new build fossil fuel capacity being built, high carbon assets with an expected life of 25-35 years and the potential to jeopardise the UK's climate change goals. Procuring too much capacity in the main four year ahead auctions would also risk restricting deployment of demand-side response and storage.

Don't disadvantage non-generation

2. The enduring design of the Capacity Market - and not just the pilot capacity auctions - must work for all players. The Government must recognise that technology neutrality does not have to mean the same rules for every technology. Storage and demand side response participate in the market in different ways to generation. The Capacity Market design should provide different regulations for demand side response and storage to reflect this. As a minimum the following must be addressed:
 - a. Provision of an ahead of time signal for storage and demand side response so they know when they're required to provide capacity.
 - b. Penalties for non-delivery during a system stress event which are capped at the value of the annual capacity payment.
 - c. Eliminate the requirement for demand side response and storage to deliver for more than four consecutive hours.
 - d. Ring fence a volume of capacity in the pilot and enduring auctions specifically for electricity storage to reflect its wider system benefits.

Make it work for interconnection

3. The Capacity Market design must be modified to correct the current bias against interconnected capacity by, for example, allowing overseas generators to participate directly in auctions. It would also be extremely beneficial to provide price incentives to reward electricity flows towards and not away from the UK when electricity is most needed. Proposals of this nature have already been discussed by the Capacity Market expert stakeholder group run by DECC.

Capability not just capacity

4. Amend the auction design to introduce differential weightings for low emission and flexible technologies to reflect their long term benefits over other forms of capacity.

Wider Policy Recommendations on Security of Supply

1. The Government recently proposed that a pilot for electricity demand reduction be included in the Capacity Market. Clarity is urgently needed on how the pilot will maximise energy savings and in the longer term, how demand reduction will participate in the full market. However, a report, *Creating a Market for Electricity Savings*ⁱⁱⁱ,

published in 2012 showed that the best way to incentivise demand reduction would be through an electricity efficiency feed in tariff (EE FiT) not the Capacity Market. This view was echoed by responses to the government's recent consultation on electricity demand reduction. This could substantially increase security of supply in the long run whilst reducing emissions and costs for consumers. We therefore also recommend that energy efficiency feed-in tariffs are piloted alongside the Capacity Market pilots for demand reduction.

2. Modifying the Capacity Market design to allow interconnection to participate on an equal basis with domestic capacity is essential. However, to attract substantial investments in new interconnection, additional measures will be needed. WWF would support a Government review of the benefits of interconnection and consideration of alternative regulatory models which could more effectively support its expansion.

3. The Capacity Market can help or hinder the deployment of electricity storage technologies depending on the final design. However, even if the Capacity Market design is modified to help storage to participate, it is unlikely to provide sufficient revenue on its own and storage will need to benefit from multiple income streams to prosper. There are a number of additional regulatory and financial barriers to investment in electricity storage which need to be addressed. We therefore recommend development of a specific storage strategy to address deployment routes, in support of an overall target to build a minimum of 2GW of new storage capacity to be operational on the GB system by 2020.

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ⁱ <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/energy-security/7101-energy-security-strategy.pdf>

ⁱⁱ http://www.roadmap2050.eu/attachments/files/PowerPerspectives2030_FullReport.pdf

ⁱⁱⁱ http://assets.wwf.org.uk/downloads/creating_a_market_for_electricity_savings_oct_2012.pdf