



Department of Energy and Climate Change  
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## Energy

Dear Sirs

## Electricity Market Reform Consultation Response

Siemens has been established in the UK since 1843 and has been working in the energy industry ever since. Today it serves every aspect of the energy sector, from building and maintaining power stations through to customer data collection and meter management. As a global company, Siemens has created energy infrastructures in some of the world's most demanding environments and its experience in the UK has provided a detailed understanding of the way the market is developing.

Siemens is the largest supplier of wind turbines in the UK market as well as providing turbine generators and other equipment for thermal power plants, transmission solutions for onshore and offshore grids, smart technology solutions for metering and networks, as well as energy efficiency solutions for the demand side. About a third of the UK's electricity is generated on Siemens equipment.

Siemens employs more than 16,000 people in the UK with some than 5,000 of those in the energy sector. Its global technology and manufacturing centre for small gas turbines is situated in Lincoln. A new manufacturing facility to support the delivery of large wind turbines for Round 3 is planned. Siemens has also invested directly in offshore wind and large biomass developments in UK because of the strong, consistent policy measures that have been implemented.

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## **Electricity Market Reform Consultation – Siemens Response**

Please see below our response to individual questions in the order that they are presented in the consultation document.

We have found it difficult to respond clearly to many of the questions because the level of definition of many of the issues is at a very early stage and it is not clear for instance that a single solution for design of the FIT would suit all technologies or all classes of developer.

We agree that the present market can continue to deliver the objectives in the short term but that some reforms are required in the longer term, particularly to engage the demand side in control of capacity margin and to encourage storage technologies.

There is a danger though that the prospect of reform, welcome in some sectors, might create continued hiatus in others by undermining investment in the short term. We commend the government for its desire to reach a fast conclusion as the hiatus is damaging to the supply chain and jobs as well as to delivery of renewables in particular.

There is also a danger of creating a complex mix of incentives with the four proposed mechanisms and it would be valuable to consider their relative importance. Of the three under the EMR banner we consider that the FIT is the most vitally important, that the capacity mechanism is unlikely to be needed for generation for some time and could undermine the wholesale market and that the EPS is merely a signal at this stage as provisions are already in place for consenting to restrict development of unabated new coal-fired plant.

To be successful we suggest that the final outcome needs to be simple, clear and create easily analysed incentives for all the desired technologies and players, avoiding unintended and damaging side effects.

### **Current Market Arrangements**

*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?*

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

See general comments above

## Options for Decarbonisation

### Feed-in Tariffs

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

Yes on a theoretical basis but subject to the comments below and under Q9 regarding the practicality of the CfD.

*4. Do you agree with the Government's preferred policy of introducing a contract for difference based feed-in tariff (FIT with CfD)?*

We agree in general that the CfD has theoretical advantages over the fixed FIT in maintaining the presence of all players in an active wholesale market and avoids the danger of excessive future payment in the event of high wholesale market prices. We note however that this mechanism does not suit all forms of low carbon generation, see Q9 below.

We are also concerned that what is seen as a complex mechanism (the RO) would be replaced by another complex mechanism that might be mistrusted initially and relies on as yet unknown changes to the wholesale market to deliver liquidity and visibility of a meaningful reference price. Whether this reference price then has any relevance to the price received by a particular project developer would also be open to doubt.

Bi-lateral CfD contracts were seen to work for some independently developed CCGTs under the Pool during the 1990s but in this case all generators received the same price in the wholesale market providing an undisputed visible reference price in real time. We have difficulty in understanding how the theoretical advantages of the CfD can be delivered with the present wholesale market arrangements, even if some greater liquidity can be achieved at the margins.

*5. What do you see as the advantages and disadvantages of transferring different risks from the generator or the supplier to the Government? In particular, what are the implications of removing the (long-term) electricity price risk from generators under the CfD model?*

We are convinced that some generators would find the government taking price risk to be an advantage under a CfD but until there is more detail of how a reference price can be calculated and how sufficient liquidity can be injected into what is fundamentally designed as a bi-lateral market, it is difficult to assess how the risks will be perceived.

*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?*

Any form of FIT will encourage efficient operation with minimum down-time but exposure to the wholesale electricity market, either directly or by bilateral contract with an off-taker, will encourage maintenance to be scheduled at times of lower price expectation, ie at times of lower demand, reducing the impact of wind in particular on operation of the system as a whole.

*7. Do you agree with the Government's assessment of the impact of the different models of FITs on the cost of capital for low-carbon generators?*

*8. What impact do you think the different models of FITs will have on the availability of finance for low-carbon electricity generation investments from both new investors and the existing investor base?*

*9. What impact do you think the different models of FITs will have on different types of generators (e.g. vertically integrated utilities, existing independent gas, wind or biomass generators and new entrant generators)? How would the different models impact on contract negotiations/relationships with electricity suppliers?*

For plant with high capital commitment and low operational/energy costs we believe that the fixed FIT provides the best security of income stream for investors, is the simplest to understand and model, and would be cheap to administer.

The fixed FIT and CfD take price risk away from the generator but leave no room for upside potential for investors. The premium FIT is the closest to the RO in leaving generators to compete in the wholesale market, which they understand. This allows investors to take a view of the forward markets with up-side as well as down-side scenarios.

We believe that any of the options can be made to work but that the CfD needs complete transparency in the wholesale electricity market if it is to work fairly and might also be extremely difficult for new entrants if CfDs are classified as financial instruments. This could give rise to regulatory issues and difficult credit tests such that only companies with strong balance sheets could act as developers. We therefore regard the CfD as the least likely to encourage entrepreneurial new entrants.

For fossil-fired plant the electricity price is to some extent hedged by the fuel cost but the additional costs of CCS on a gas or coal-fired plant are effectively fixed by the capital and infrastructure costs. A fixed FIT or CfD would provide a variable reward relative to the electricity price that could even reduce to zero if electricity prices rise sufficiently. We therefore consider that only the premium FIT is suitable for CCS unless other corrections are introduced to compensate.

*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?*

We believe that CfDs have been applied so far only in wholesale markets operating on a pool-price basis. The examples quoted of Netherlands and Denmark illustrate that point. We believe that very high visibility of price and a simple, verifiable calculation is essential to the fair operation of the CfD and hence to its attractiveness to investors other than those capable of complex market trading and modeling.

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

If the FIT is paid on availability then it becomes in effect a capacity payment for all low-carbon generation that would not be paid to other fossil power required for security of supply. This is contrary to the concept of a targeted capacity mechanism applicable only for short-term system support.

We would favour a FIT payable on output but also payable when constrained off by Grid in addition to any other constrained-off compensation.

## **Emissions Performance Standards**

*12. Do you agree with the Government's assessment of the impact of an emission performance standard on the decarbonisation of the electricity sector and on security of supply risk?*

We understand the desire to have a visible standard for CO<sub>2</sub> emissions from fossil-fuelled power plants and that this would be aimed, at least for the time being, at preventing the development of new unabated coal plant. It is our understanding though that this is already achieved in the consenting process, which not only requires CCS demonstration but also requires an undertaking to fit CCS to the remainder of the plant capacity when it becomes technically and economically feasible.

It is not clear to us if the EPS proposals would supersede the consent requirements or whether, having met an EPS, the grandfathering proposals would remove the requirement for later retrofit.

*13. Which option do you consider most appropriate for the level of the EPS? What considerations should the Government take into account in designing derogations for projects forming part of the UK or EU demonstration programme?*

Given that we already have the consent conditions, we would favour the later introduction of any EPS, perhaps at or towards the end of this decade, when it

can be set with greater knowledge of the cost and other issues associated with CCS technology.

If the government is determined to introduce it now then we believe that the 450 g/kWh level, with exceptions for coal plant with demonstration CCS, sends a marginally better message being no higher than present grid average.

*14. Do you agree that the EPS should be aimed at new plant, and 'grandfathered' at the point of consent? How should the Government determine the economic life of a power station for the purposes of grandfathering?*

We agree that any EPS should be grandfathered at consent.

It is a natural progression that as plant becomes older it will be superseded by more efficient new designs that are also likely to offer better operational flexibility. They will require fewer carbon allowances and might benefit from financial rewards for carbon capture and storage. It is therefore likely that the newer plants will be called to run much more than older plants and all fossil plant is likely to run for fewer hours per year in the 2020s and onwards. The overall impact of older grandfathered plant is therefore likely to reduce with time and will contribute to much needed secure capacity. We therefore do not favour an artificial time limit on EPS grandfathering to force closure.

If a time limit is to be imposed this should be significantly longer than the "period investors would expect to see a return on their capital" in order to avoid the perception of a power plant being a fixed-life asset with no possibility of upside to mitigate operational risks that might impact return. We would however favour encouragement for grandfathered plant to fit CCS at part-life on the basis of incentives rather than threat of closure unless the carbon trajectory is seriously off course.

*15. Do you agree that the EPS should be extended to cover existing plant in the event they undergo significant life extensions or upgrades? How could the Governments implement such an approach in practice?*

Power plant life upgrades are frequently incremental with benefits to efficiency and emissions as well as to lifetime, and form part of a sensible asset management programme.

It would be perverse to discourage significant plant improvement programmes by the threat of having to fit CCS to meet the latest EPS but we would agree that the possibility of "gaming", eg by building a completely new plant in an existing building to avoid an EPS, should be disallowed. A clear definition is required.

As an example, we would expect that the replacement of old gas turbines with up to date versions of the same class of machine (as at Didcot B for instance) would be considered to be allowable.



*17. How should biomass be treated for the purposes of meeting the EPS? What additional considerations should the Government take into account?*

It is not logical to treat biomass as a renewable on the one hand and then subject it to the EPS on the other. We would favour biomass being exempt from the EPS but having available to it rewards for CCS to incentivize the resulting negative life-cycle carbon impact.

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

Yes but we do not understand the suggestion in para 96, first bullet point, that plant can compensate for unconstrained operation by operating for reduced hours unless this applies only to plant intended for peaking for which a total annual emission cap (t/y) might be appropriate rather than an EPS. The EPS by its nature must be for emissions per unit output, not per unit of capacity, even if it is averaged over a year. We do not see how reduced running hours can be considered to reduce the plant emissions per kWh.

For limited unabated operation of plant fitted with CCS, we agree that a catch-up would need to be enforced if this were a voluntary reaction to market price signals; this would require the CCS capture plant to be of sufficient capacity to catch up over the operating year.

If unabated operation is at the request of the system operator it is less reasonable to expect the plant to catch up with its EPS limit and indeed it might not be physically capable of doing so.

We believe that the definition of the EPS should be revisited (page 71). We would suggest that the EPS should be based on the total emissions of the plant over an operating period divided by the net generation over that same period, otherwise a plant emitting say 800 g/kWh at full load could, in theory, comply with a 600 g/kWh limit simply by operating 75% of the time.

## **Options for Market Efficiency and Security of Supply**

*19. Do you agree with our assessment of the pros and cons of introducing a capacity mechanism?*

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

Peaking capacity has traditionally been provided by older, less efficient plants that might otherwise be retired, with pump storage hydro for fast response and open cycle gas turbines for extreme conditions. As wind power becomes a greater part of the UK mix it is clear that there is likely to be a greater requirement for

fossil plant to operate flexibly and for fewer hours per year and for storage and demand reduction offerings to be encouraged.

We agree therefore that some generation capacity might eventually be needed that might not earn its keep from energy production alone but are not convinced that a capacity mechanism is needed at this time.

We agree strongly that demand-side capacity response, including storage, needs to be rewarded but whether this should be via a new capacity mechanism or easier access to existing markets is still an open question for us.

We would suggest that the need to encourage demand-side participation is more urgent at present than grid-connected peaking plant and fits with current initiatives on smart metering and networks.

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

We are not in a position to model the effects but would be extremely concerned if a capacity market undermined peaks in the wholesale electricity market with the consequence of reducing average earnings and the incentive for all types of generating plant to be available at peak times.

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

- *a central body holding the responsibility;*
- *volume based, not price based; and*
- *a targeted mechanism, rather than market-wide.*

We are not clear how the proposals for a targeted mechanism differ so radically from the STOR contracts that this system could not be adapted.

See also Q20 above

*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?*

See Q20 above.

## **Analysis of Packages**



26. Do you agree with the Government's preferred package of options (carbon price support, feed-in tariff (CfD or premium), emission performance standard, peak capacity tender)? Why?

27. What are your views on the alternative package that Government has described?

As comments above

28. Will the proposed package of options have wider impacts on the electricity system that have not been identified in this document, for example on electricity networks?

As mentioned elsewhere we expect that demand-side participation can be facilitated by faster uptake of smart technologies for metering and network operation. The ability of distribution networks to accommodate reverse flows in some locations might be critical to full demand-side participation. Demand-side participation can also offer an opportunity for optimization of network operations and asset optimization with the aid of smarter systems.

## **Implementation Issues**

30. What do you think are the main implementation risks for the Government's preferred package? Are these risks different for the other packages being considered?

Please see our response to Q34 and Q35 below

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?

- Can auctions or tenders deliver competitive market prices that appropriately reflect the risks and uncertainties of new or emerging technologies?
- Should auctions, tenders or the administrative approach to setting levels be technology neutral or technology specific?
- How should the different costs of each technology be reflected? Should there be a single contract for difference on the electricity price for all low-carbon and a series of technology different premiums on top?
- Are there other models government should consider?
- Should prices be set for individual projects or for technologies
- Do you think there is sufficient competition amongst potential developers/sites to run effective auctions?
- Could an auction contribute to preventing the feed-in tariff policy for incentivizing an unsustainable level of deployment of any one particular technology? Are there other ways to mitigate this risk?

It is our view that auctions can only be successful if there is a surplus of buyer appetite over opportunities.

Auctions had very limited success under the NFFO in delivering real project outcomes and only limited success in the quoted examples of Denmark and Netherlands. In the present case there is enormous ambition and the challenge is to attract capital investment not to select developers on a price basis.

We also note that if auction outcomes are to be real commitments, then environmental investigations, consultation and consenting needs to take place in advance of the auction. This is an unattractive outlay for a developer who is still unsure of securing a place in an auction and is likely to drive capital away from the UK to other markets in which it is easier to operate.

It seems therefore that auctioning would be inappropriate for most low-carbon developments and a price-setting mechanism, as under the RO, is required to attract investors at a reasonable and known price. The set price would need to vary by technology as in the banded RO.

*34. Do you agree with the Government's assessment of the risks of delays to planned investments while the preferred package is implemented?*

There is and has been for some time a hiatus in large-scale renewables development, particularly in off-shore wind and biomass, pending the outcome of the RO Review. This hiatus is in our view set to continue at least until the exact method of "vintaging" has been determined and until the impact of other mechanisms on the wholesale electricity price can be understood and modeled. This is extremely damaging to the supply chain at a time when it is expected to grow to enable the UK to meet its targets with maximum benefit to the UK economy.

*35. Do you agree with the principles underpinning the transition of the Renewables Obligation into the new arrangements? Are there other strategies which you think could be used to avoid delays to planned investments?*

It is vital in our view to keep to the fastest possible timetable for decisions and legislation, consistent with proper analysis of the market implications and consultation with stakeholders. As implied in 34 above, early signaling of key decisions would assist in ending the hiatus and moving projects through financing towards construction.

*36. We propose that accreditation under the RO would remain open until 31 March 2017. The Government's ambition is to introduce the new feed-in tariff for low carbon in 2013/14 (subject to Parliamentary time). Which of these options do you favour:*

- *All new renewable electricity capacity accrediting before 1 April 2017 accredits under the RO;*
- *All new renewable electricity capacity accrediting after the introduction of the low-carbon support mechanism but before 1 April 2017 should have a choice between accrediting under the RO or the new mechanism.*

We would prefer that there is a choice to avoid there being a critical point where projects risk a forced switch from one scheme to another because of timing around the end of March 2017. This is particularly important as the FIT will be determined at an earlier point of commitment and would enable large projects with long lead times to plan on the basis of the new FIT regime and secure funding on that basis at a time when they might be unsure of meeting the RO cut-off. It is likely that only projects scheduled for late 2016 or 2017 would be in a position to choose because of the timing of introduction of the new scheme in relation to the project development cycle. Any delay in introducing the new

scheme could create a fresh hiatus in development of large schemes that require investment decisions in 2013 for operation in 2017.

The government should make it clear whether the phasing mechanism for off-shore wind RO accreditation will operate beyond March 2017 for those projects whose first phase is RO accredited.

*38. Which option for calculating the Obligation post 2017 do you favour?*

- *Continue using both target and headroom*
- *Use Calculation B (Headroom) only from 2017*
- *Fix the price of a ROC for existing and new generation*

We agree that fixing the price of the ROC would have the virtue of simplicity but are concerned that such a fundamental change now would undermine confidence in future commitments to support mechanisms. If it is foreseen that Calculation B is likely in any case to set the RO, we would agree that this method be used at least while existing Power Purchase Agreements that rely on the methodology of the RO are in effect. It is particularly important to be able to segregate the elements of the present renewables benefits to enable existing PPAs to be administered.

