Mrs Fay Geitona
European Regulators' Group for Electricity and Gas
Council of European Energy Regulators ASBL
28 rue le Titien
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18 February 2010

Dear Fay

Regulatory aspects of the integration of wind generation in European electricity markets

EDF Energy welcomes this consultation on the regulatory aspect of the integration of wind generation into EU electricity markets. This represents one of the most challenging issues the EU electricity markets will have to face in the coming years with potentially significant impacts on the technical, commercial and financial market arrangements.

EDF Energy is one of the UK's largest energy companies with activities throughout the energy chain. Our interests include nuclear, renewables, coal and gas-fired electricity generation, combined heat and power, electricity networks and energy supply to end users. We have over five million electricity and gas customer accounts in the UK, including both residential and business users.

According to UK government scenarios, about 30% or more of all the UK electricity could come from renewable sources, a major part coming from onshore and offshore wind. This development cannot happen without significant subsidies which will be passed to the final consumers and this will also impact the functioning of the markets.

Furthermore, one of the intrinsic feature of wind energy production is its intermittency, which will pose new problems in virtually all components of the energy markets. There is presently no clear vision on how markets should be adapted to face this and other challenges arising from the expected increase in wind generation development.

Precisely because of these uncertainties, we believe that any market rule changes should be introduced with great caution and that where such changes are made, they will need to reflect the different features from one country/market to another. Clearly in these circumstances a "one size fits all" approach is not appropriate, a view we also expressed in the previous ERGEG consultation on the Regional Initiatives.

The key points from our response can be summarised as follows:

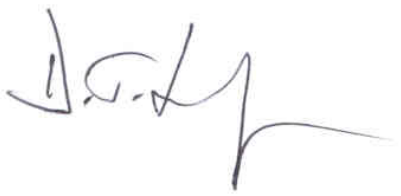
- Market distortions, discrimination and hidden subsidies for wind (such as discounted connection/use of system charges or lower balancing obligations) should all be avoided as much as possible
- Balancing obligations, various network use of system and access charges and arrangements should be the same for wind generators as for other generators

- The integration of high volumes of wind generation into mature markets presents particular challenges due to its predictability and typically remote distance from electricity demand and from existing networks (offshore in particular)
- These factors need to be considered on a transparent and consistent basis to ensure that trading arrangements remain competitive and continue to provide appropriate market signals
- Wind energy is already subsidised by specific schemes in various EU countries - network charges and trading arrangements should not be used to provide further hidden subsidies which would result in suboptimal solutions and higher costs to consumers.

Our detailed responses to the open questions are contained in the attachment to this letter.

We hope you find our comments useful. If you have any queries regarding this response, please contact my colleague Michel Tocher on +44 (0)20 7752 2167 or myself.

Yours sincerely



Denis Linford
Corporate Policy and Regulation Director

Attachment

Regulatory aspects of the integration of wind generation in European electricity markets

EDF Energy response

Question 1: How will the expected growth in wind generation affect the markets in which you operate? What are the key challenges you foresee?

EDF Energy estimates that by 2030 some 85% of UK generation may need to be from very low carbon sources. This is required to meet the level of electricity decarbonisation in the UK that has been recommended by the Committee on Climate Change (a carbon intensity of 70g CO2/kWh, compared to c.500g CO2/kWh today). Based on the UK Government's "Low Carbon Transition Plan and Renewable Energy Strategy" White Paper", published in July 2009, we expect that a significant proportion of the renewable capacity will be wind[1].

Achieving this high level of renewables penetration in the UK will require significant subsidies. The subsidy mechanisms used should be limited in level and duration to minimise the costs to consumers by avoiding adverse effects on wholesale energy markets and incentivising the economic and efficient development of renewables.

In addition to reducing the carbon intensity of UK electricity generation, the expected growth of wind generation will have profound consequences for security of supply. The intermittency of wind output means there is a clear need to ensure that adequate capacity of short-term response and standby plant is available to provide back-up for variations in wind output at least cost to consumers. In so far as other plant needs to be operated more flexibly because of fluctuating wind output, this could have an adverse impact on reliability and expected economic life.

A key challenge from a market perspective will be to provide the appropriate investment signals to secure the investment needed in stand-by plant, without undermining the competitive market or the revenue streams of the other plant required in the overall generation mix. Allowing wholesale prices to 'spike' freely at times of system shortage would provide an investment signal. But it is by no means clear that this signal will be robust enough, given that the frequency and magnitude of such wholesale price spikes would be unpredictable in timing or duration. If so, we suspect it may prove difficult to make a convincing investment case for the back-up stand-by plant needed to maintain secure system operation. The uncertainty around day to day and year to year revenue streams may present an unacceptable risk for investors. Demand-side management may have a role to play in helping to manage fluctuating wind output in future but at present it simply creates further uncertainty for potential investors in back-up stand-by plant. Similarly, the potential for, and role of, 'smart demand' also remains very unclear.

Any intervention to manage the delivery of stand-by plants is likely to introduce distortions into the market and into wholesale electricity price formation. The risk is that a situation could arise whereby each specific intervention has an effect elsewhere which will also need to be addressed, ultimately leading to a segmented market regulated by different rules. Thus,

[1] The lead scenario suggests that by 2020 about 30% or more of all the UK's electricity could come from renewable sources, a significant majority of which will be onshore and offshore wind. See, for example Chart 2.4, The UK Renewable Energy Strategy, Department of Energy and Climate Change, July 2009.

any new scheme should be thoroughly investigated and carefully considered before being introduced to mitigate the adverse effects of the original non-market measure.

Greater output from subsidised wind capacity is likely to make investing in alternative forms of low carbon generation more challenging as well. Power prices in the UK are typically set by the marginal (mostly fuel) cost of the most expensive plant required to meet system demand. With significantly higher levels of wind penetration, there is a real possibility that, at certain times, all generation output could come from low marginal cost, low carbon plant (e.g. Wind and nuclear). This would reduce average base load power prices and therefore also reduce the incentive for investment in non-renewables base load capacity. With renewables output receiving significant subsidies in addition to the wholesale electricity price, there is a real possibility that GB power prices could become negative – with wind capacity still possessing a financial incentive to generate even at negative wholesale prices. At times, short-term curtailment of wind generation could represent the most efficient means of managing the system, but may lead to significantly increased costs for balancing services.

Affordability for customers and the competitiveness of UK industry are also likely to be adversely impacted by the addition of significant capacity of subsidised wind capacity – in particular, offshore wind– to the UK's generation mix:

- Credible estimates suggest that the cost of offshore wind could be in the range £98-£144/MWh, as much as two to three times the level of current wholesale prices. Given this expected price disparity it is incumbent on all parties to minimise, so far as is possible, the costs of including wind generation within the mix;

- Wholesale electricity prices are expected to become more volatile as output from intermittent wind capacity grows. This increased volatility may increase risk-premiums included within retail and industrial & commercial customer prices,
- Considering the generation fleet as a whole, wind has a relatively low load factor and the larger capital asset base needed to deliver the required overall wind capacity will therefore lead to higher costs.

The expected growth in wind generation may also have important implications for related gas markets. If gas-fired capacity is the principal means of backing up intermittent wind, this could imply relatively sudden and sharp changes in demand for gas for power generation. Although the implications of this are still being explored, it could be a key concern that needs addressing.

Finally, it is worth highlighting that the specific impacts are likely to differ from country to country. We recognise, therefore, that there may not be a 'one size fits all' solution to these challenges which is appropriate to all European markets.

Question 2: What are the implications for market rules? Can you identify changes which would better facilitate integration of wind generation, including management of intermittency?

The current electricity market arrangements in the UK were designed to achieve efficient dispatch and optimisation of a system dominated by fossil plant and do not necessarily tend to incentivise large-scale investment in capital intensive, low carbon technologies. Wind capacity has arguably only been growing because of significant and increasing levels of subsidy (for example, in the UK through the Renewables Obligation); subsidy can have a distorting effect on the market and undermines the investment case for other (non-subsidised) low carbon technologies.

EDF Energy believes that there is a clear need to address how the UK market can best be adapted to incentivise the low carbon electricity production that will be required to meet common climate change obligations. This implies reform of the energy markets.

The existing market mechanisms need to be strengthened so that they incentivise investment in low carbon, secure and affordable energy. Revised market arrangements should be suitable for a future generation capacity mix that is dominated by plant that has high capex and low marginal costs, such as wind, CCS and nuclear, but also includes substantial peaking capacity (typically lower capex, higher marginal operating cost plant) in order to balance supply and demand in real time on a day to day basis. What detailed form these revised arrangements need to take is not yet clear. However, EDF Energy welcomes the ongoing debate about potential options for future market design and believes that creating a robust and sensible floor price for carbon, a clear signal of the need for low carbon plant of all technologies, will be a necessary part of the solution. The future market design will also need to ensure that there are no 'hidden' subsidies for wind (such as discounts for connection and use of system or imposing less stringent balancing obligations than those of other forms of low carbon generation, for example).

Renewable generation and notably wind generation is not presently the most cost effective way to reduce carbon emissions. Their development though specific subsidy schemes reduces the demand for EU carbon allowances, leading to a lower EU-ETS price than otherwise. This distortion undermines the investment case for other low carbon technologies which only rely on carbon prices to support their development like nuclear.

Within this context of wider market reform, increasing interconnection between national grids and harmonising market gate closure and moving it as close as possible to real-time all appear to be sensible measures that will better facilitate the integration of wind generation by maximising the flexibility inherent in the European-wide electricity systems. Providing wind generators access to meteorological expertise on some kind of centralised basis may also be worth considering as a way of enhancing the accuracy of output forecasts and thereby reducing system balancing costs.

Question 3: Would moving the market's gate-closure closer to real-time facilitate the deployment of wind generation? Would this have any adverse consequences on the functioning of the electricity power system?

In principle Yes. Moving gate-closure times nearer to real-time would be beneficial to all participants (including wind generators) by reducing system balancing costs. This would arise from having more accurate weather forecasting and hence production by the wind generators as well as better demand forecasts.

Currently different member states have different regimes in place to incentivise wind generation, and as a result the treatment of the additional balancing costs arising from wind generation also differs, sometimes radically. In order to achieve the maximum benefits from moving gate closure closer to real time, we believe that gate closure and balancing arrangements should be non-discriminatory and technology neutral and should not be used to shield any particular technology from market or balancing price signals faced by others. .

Question 4: Are emerging cross-border congestion management models compatible with wind generation? Should further attention or priority be given to intraday capacity allocation mechanisms and markets, in light of the issues associated with forecasting wind generation?

In principle, Yes. The various models being discussed for cross-border congestion management, from the merchant option to the TSO owned option and using either explicit or implicit auctions, should in our view be able to cope with intermittent wind generation, as indeed they should be able to cope with any other form of generation. Wind generation has variable output, but even though it may be more variable than most other forms of generation, it should have no adverse or beneficial impact on the operation of any interconnectors. It may however give rise to an increase in their use for balancing purposes.

Interconnector flows are highly flexible in that they can be controlled upwards or downwards (subject to any capacity limitations) very quickly. They therefore have a potentially valuable role to play in facilitating system balancing services. Depending on the market rules and the gate closures applicable to interconnectors, programme changes could be carried out by market participants through the nomination procedures or by the System Operators within the balancing mechanism. This would be in response to any short-term changes in generation (whether wind or not) or demand variations that occurred on the system, taking into account the respective energy prices on either system. In any of the models, the System Operators either side of the interconnectors will be able to determine the final flows on each interconnector, using whatever price exchange mechanism has been adopted between them.

Large capacities of intermittent wind generation will present significant challenges in maintaining system balance and, undoubtedly, interconnectors will provide an effective operational tool, augmenting other reserve facilities, to help balance consumer demand with available generation in real time and so maintain security of supply.

Question 5: Should wind generation be subject to the same balancing obligations and the same types of charges as other types of generation?

Yes. In line with our arguments above, wind generation should be subject to the same balancing obligations and the same balancing charges as all other types of generation. Any tailored arrangement will lead to market distortion, a sub-optimal allocation of resources and hence higher costs to consumers. Generators in general, and wind generators in particular, are best placed to manage and hedge their balancing position. With this framework the overall costs of balancing should continue to be socialised amongst industry participants.

Wind is already subsidised by specific mechanisms and balancing arrangements should not be used to provide, in effect, further hidden subsidies.

Question 6: Should TSOs engage in research and development (R&D) to address issues associated with a large share of wind generation included in the network? If so, how should the regulatory framework require or support this?

Yes. EDF Energy supports continued R&D to help address further issues arising from large scale wind generation given its potential impact on system stability and integrity. Much of the technology in generation and networks (particularly offshore wind networks) is relatively new and evolving. It is likely that more information is needed in order to allow the networks to run optimally and as new projects go through the process the lessons learned should be fed back into the network mechanism.
TSOs have an important role to play in providing clarity on issues that will affect the costs of operating the system. The regulatory framework to support this should be primarily via

incentive based payments for running the network more optimally and also via specific R&D and innovation funding schemes.

Question 7: Part 1: Should wind generators face the same types of network charges as other new generators, calculated using the same methodology?

Yes. Wind generators should face the same network use of system and access charges as other new generators, calculated using the same methodology (please also see our response to Questions 3 and 5). It is important that all technologies are exposed to the same price signals to minimise market distortions and hence the overall costs to consumers.

Question 7: Part 2: What is needed to provide a sufficient incentive for generation in choosing where to locate?

Generators connecting to the transmission system face 2 main locational charges: a local, effectively distance-related, access charge to connect the scheme to the main grid system; and a charge for the use of the main transmission system. EDF Energy believes that this combination of charges, which includes a long run marginal cost based charging methodology for transmission use of system (as it is currently the case in UK) provides the most appropriate price signals for where generation should be located.

However, care needs to be taken to ensure that the prices are stable and predictable enough over investment timescales. Any additional locational charges (for example for transmission losses or balancing services) are unnecessary and potentially counter-productive.

Question 7: Part 3: What is needed to provide an appropriate balance of risk among market players? When should this not be the case?

All participants should contribute equitably to network costs and it is important that any allocation of costs does not directly discriminate against any particular technology. .

Question 8: Broadly, what is the appropriate allocation of responsibilities, risk and cost among market players in developing new network infrastructure (e.g. ahead of or in response to new generation connections)? Should this be different for wind generation? Where is harmonisation required?

In general, EDF Energy believes that participants are appropriately incentivised to liaise with the system operator to ensure network connections are available for forecast new generation as it comes on line not least because this is critical for the effective commissioning and operation of the plant. Correspondingly, the Transmission Operator is also sufficiently incentivised and focused on the timely delivery of the necessary works to ensure the new connections and any associated system upgrades are available when required.

Nevertheless, if we are to meet the government's challenging objectives on renewables and climate change there will be a need for some 'strategic' network reinforcement ahead of specific need which will necessitate a proactive investment policy from TSOs. Although we do not expect it to be significant in practice, there is a risk that some of this strategic investment may become stranded investments. If that turns out to be the case, then this risk should be socialised to all market participants. It is the role of the regulator to make sure that such risks are minimised, for instance by involving stakeholders in the strategic network development process.

Co-ordination may also be required where two networks join, for example in the connection of new offshore networks to onshore, to ensure that the connection proceeds smoothly and on schedule. Again, it is important that the Transmission Operator is appropriately incentivised towards the timely delivery of the necessary onshore works.

Question 9: Do you agree that the "supergrid" issues for regulators identified in 5.1 are relevant? Is there anything else European regulators should be considering?

- Different Regimes

EDF Energy agrees that the main issue in relation to a supergrid relates to the fact that it will comprise a series of national networks each with its own charging and regulatory regime. There are broadly two regimes for the creation of offshore grid connections: either the developer of the offshore scheme builds to the shore; or the onshore grid is extended offshore to meet the development. (The UK has chosen to introduce competition in the grid offshore extension regime. An Offshore Transmission Owner (OFTO), appointed by the industry regulator, builds and operates the connection and is paid through the network tariff). Both these regimes are currently used in Europe and have their strengths and weaknesses and neither works perfectly. If the grid is to operate on a trans-national level then the System Operator will need to look at harmonising the individual regimes, to avoid distortion and to enable efficient transportation of power around the network. For example, there is a need to consider the interaction of the OFTO regime with connection to renewable generation outside UK waters and interconnection with other countries.

- Interconnection and Transmission

We would highlight the fact that OFTO's may seek to connect to renewable generation outside UK waters, and possibly with other counties. Currently this is not being adequately considered within the regime. To extract the most value from offshore transmission systems, EDF Energy believes that the regulators must:

a) Provide a neutral and non discriminatory environment for cross-border trading;
b) Consider integration of OFTO policy into the proposed interconnection regimes at the European and national levels;
c) Consider exploitation of offshore networks as interconnectors if they are not connected at present.

Question 10: Is the current ownership structure of the offshore lines or their regulatory framework a potential issue for the integration of offshore network? Are there other considerations affecting this ownership structure?

Please see our view outline under question 9.

Question 11: Do you agree that the Regional Initiatives should be used to address the issues associated with the development of the regional projects? What challenges does this present?

The impact of the regional projects on adjacent markets cannot be ignored by the Regional Initiatives as regards their objective of developing more effective cross-border trade and regional market integration, taking account of national market characteristics. Nevertheless we believe that specific arrangements related to theses projects should be set up by national entities which are better able to deal with complex international legal matters and may need legal changes.

Question 12: What other issues should European regulators consider in relation to the integration of wind generation?

In addition to our views expressed in questions 9 and 10, the major issue with wind generation is its unpredictability; this in itself places a limit on the amount of wind capacity that can be installed on the network without affecting network stability and security of supply. We believe that more investigations should be developed on technical issues as well as on commercial issues.

Both the networks and the generators themselves should consider operational measures to mitigate the consequences of unpredictability, perhaps by construction of further pumped storage facilities or investment in new technologies which may eventually allow for the commercial storage of electricity. This could allow wind generators take a share of the electricity mix, subject to other economic and energy policy consideration, and reduce system balancing costs and the carbon footprint of electricity generation.

EDF Energy
February 2010