

**Embedded generation: price controls,
incentives and connection charging**

**BWEA's response to Ofgem's preliminary
consultation**

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1. Introduction

The British Wind Energy Association (BWEA) represents 173 companies involved in all aspects of the UK wind energy market, including the operators and developers of all installed wind energy capacity and all companies holding offshore agreements for leases.

BWEA welcomes this opportunity to participate in the debate over the future of network charges for embedded generators. The Association's membership includes owners and developers of wind generation projects, almost all of which are, or will be, 'embedded generators'. Given that wind energy is the fastest-growing form of generation worldwide, our primary concern is to ensure that future network charging arrangements will enable prospective generators in the UK to obtain access to the network on fair and reasonable terms. We are also concerned to represent the interests of members with existing generation projects.

BWEA is pleased to be able to say that we are broadly in agreement with Ofgem's initial proposals, as outlined in the consultation document. However, we anticipate that some difficult issues will have to be addressed in order to bring about a satisfactory implementation of these proposals. The Association looks forward to participating in further discussions and consultations in pursuit of this goal.

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2. Summary response

- BWEA believes that the present network charging arrangements constitute a significant obstacle to the development of embedded wind generation projects. We urge Ofgem to review and revise these charging arrangements as a matter of priority.
- BWEA supports Ofgem's proposal to move to a 'shallow' connection charging policy combined with a generator DUoS charge. This support is based on the following arguments:
 - Network charges should reflect the long-run cost of making network capacity available for use by generators. Deep connection charges tend to reflect short-run network costs.
 - Network charges should be equitable. Deep connection charges routinely result in major disparities between treatment of generator connectees.
- BWEA asks Ofgem to give very careful consideration to the design and implementation of the proposed generator DUoS charge. The following outcomes are considered to be important:
 - The charge should be cost-reflective. Generator charges should be linked to factors with demonstrable impacts on network costs. These factors may include the geographic location of generation schemes, as well as electrical characteristics such as fault contribution.
 - The charge should enable DNOs to recover their net costs arising from the connection and operation of embedded generators. Generation-related benefits to the network should be accounted for, as well as generation-related costs.
 - The charge should be calculated according to a straightforward and transparent methodology. The level of charges for individual generation schemes should not be negotiable.
 - The charge should result in equitable treatment of generator connections with respect to other network entry points.
- BWEA advises Ofgem to consider the issue of interruptible connections sooner rather than later. The treatment of interruptible connections will affect long-term investment decisions, both in generation projects and in network infrastructure.
- BWEA supports the introduction of a simple, standard connection charge and generator DUoS charge for generators falling within a defined 'small generation' band.

3. Discussion

This section discusses at length some of the key issues relating to network charging for embedded generators. The discussion here covers many of the issues discussed in section 5 of the Ofgem consultation document. References are made to parts of the consultation document, where appropriate.

3.1. Charging principles

The consultation document outlines three general principles for connection and use of system charging: efficiency, equity and comprehensibility (page 23). Efficient charges give appropriate cost signals to prospective generators. Equitable charges do not create cross-subsidies between customer groups. Comprehensible charges are calculated according to a transparent policy and methodology.

BWEA attaches particular importance to the principles of equity and comprehensibility. Although we do not seek cross-subsidies from other customer groups, we are concerned that charges levied on wind generation schemes should not over-recover the costs they impose on the network. Of equally great importance, developers of wind energy projects need to be able to budget for connection costs and other network charges. Transparent charging policies enable developers to calculate the level of network charges for potential projects. This reduces the financial unknowns in the project development process, and enables developers to 'screen' projects more effectively.

3.2. Arguments for change

The consultation document discusses the pros and cons of the present 'deep' connection charging policy (page 25-28). It suggests that this policy is not consistent with key obligations on these businesses – for example, the obligation to facilitate competition in the generation and supply of electricity. Ofgem is particularly concerned that high connection charges may constitute a barrier to entry into the generation market.

The debate over 'deep' versus 'shallow' charging is central to the present consultation. Some of the issues linked to this debate are discussed here. Overall, the discussion favours a change from the present 'deep' charging policy, along the lines of Ofgem's initial proposals.

3.2.1. Incentives affecting network design and operation

Under the present 'deep' connection policy, there is no incentive at all for DNOs to plan and operate their networks in order to make capacity available to embedded generators. If there is not enough capacity available to accommodate a proposed generation scheme, the cost of the necessary reinforcement works can be charged to the prospective generator at no cost to the DNO. If unused capacity is available, the generator gets to use it at no charge, leaving the DNO with less capacity available to serve other network users.

Under a 'shallow' connection policy, the costs of making network capacity available for use by generators would be internalised by DNOs. Although a generator DUoS charge could be set at an

appropriate level to enable DNOs to recover these costs, there would be an incentive for DNOs to find the most cost-effective ways of making capacity available for each individual generation project. This approach would arguably provide a more positive system of incentives, in line with the need for distribution networks to evolve to accommodate high levels of embedded generation.

BWEA supports Ofgem's proposal to move towards a 'shallow' connection policy for embedded generators, combined with the introduction of a generator DUoS charge. We believe that this policy is necessary to encourage DNOs to seek cost-effective ways of accommodating high levels of embedded generation.

3.2.2. Short-run versus long-run cost signals

The principle of efficient charging dictates that network charges should provide appropriate cost signals to prospective generators, such that generators have incentives not to impose avoidable costs on the network as a whole. These cost signals may influence developers' decisions over the location of wind generation projects, the number and size of turbines, or the type of turbines to be used.

Although the principle of efficient charges is not in question here, the issue of how it should be implemented is a matter of some controversy. One of the key arguments used to support the present policy is that 'deep' connection charges provide very clear cost signals to prospective generators. This is undoubtedly true – high network reinforcement costs, reflected in connection charges, have stopped numerous wind generation projects and forced developers to look elsewhere. The key question is whether the cost signals provided by the current policy are appropriate.

If we only consider short term costs, the present policy (ie. 'deep' connection charge with no generator DUoS) does indeed provide appropriate cost signals. A generation scheme utilising previously unused network capacity pays nothing for the use of this capacity, as no immediate costs are incurred to make the capacity available to the generator. A second generation scheme that triggers reinforcement of the network is required to fully fund the necessary reinforcement works.

The present policy appears less valid if we consider costs over a broader timescale. The network capacity that is used by our first generation scheme did not come free of charge – it was paid for by other network users. Moreover, making this capacity available to the generator means that new capacity must be provided – at a cost – as and when other parties wish to connect to the same part of the network. Given this perspective, it appears that the generator does impose costs on the network, even if they are not incurred immediately.

BWEA considers that network charges should reflect the long-run cost of providing the network capacity used by generation schemes. This argument tends to support the proposal to move towards a 'shallow' connection policy, combined with generator DUoS charges that reflect underlying long-run network costs.

3.2.3. Equity, cross-subsidies and second-comers

The principle of equity is also relevant to the argument over ‘deep’ versus ‘shallow’ charging. Equity dictates that charges should not create cross-subsidies between customer groups. Although some level of cross-subsidy is inevitable, an equitable charging policy does not result in grossly unfair charging in practice.

The treatment of second-comers is one area where the present ‘deep’ charging policy can result in outcomes that are clearly at odds with the principle of equity. The Ofgem consultation document addresses the treatment of second-comers (pages 33-34). It notes that current regulations allow DNOs to reimburse reinforcement costs from connection charges levied on subsequent connectees. However, Ofgem recognises that these regulations are difficult to apply in practice.

BWEA considers that ‘deep’ connection charges are not consistent with the principle of equity. The treatment of first- and second-comers is just one of the more obvious examples of non-equitable outcomes under this policy. A move to ‘shallow’ connection charges together with generator DUoS would provide a more equitable basis for network charging.

3.3. Implementation issues

In principle, BWEA supports Ofgem’s proposed move to a ‘shallow’ connection policy combined with a generator DUoS charge. However, there are a number of issues that will have to be resolved before this charging policy can be implemented. Some of the main implementation issues are discussed here.

3.3.1. Rules for ‘shallow’ connections

Given the proposed move to a ‘shallow’ connection charging policy, it is important that all parties have access to clear protocols defining the extent of the network assets to be funded directly by the connectee. There are two main issues to be covered.

Firstly, rules are needed to define which existing network assets can be used to provide a connection for a proposed generation project. As an example, it would normally be appropriate to provide a connection for a single 500kW wind turbine using a simple (and cheap) tee into a nearby 11kV distribution circuit. Conversely, it would clearly not be appropriate to use the same scheme for a 50MW wind farm. But what about a borderline case involving a 5MW wind farm? Without clear rules, a ‘shallow’ connection policy is likely to result in numerous disputes over the level of connection charges. However, drafting a universally acceptable protocol is not likely to be an easy task.

Second, there must be rules defining the boundary between ‘shallow’ and ‘deep’ network assets. BWEA would prefer to see a reasonably narrow definition of ‘shallow’ network assets, in line with the definition used at transmission level. This definition would include only those assets which, at the time of construction, are to be used exclusively by

the connectee or are to be shared between a clearly identified group of connectees.

3.3.2. Generators' export rights

As part of the discussion of 'deep' versus 'shallow' charging, the consultation document notes that the present 'deep' connection charging policy provides embedded generators with firm access to network capacity (page 28). Under a 'shallow' charging policy, there may be a need to negotiate interruptible connections in locations where network constraints are an issue.

Access to export capacity is of prime importance for the financial viability of generation projects. Without it, a project cannot export energy into the network and thereby earn revenues. Thus, if an embedded generation project has an interruptible connection, the level of financial risk associated with the project will be higher than it would be otherwise.

Having said this, the majority of wind generation projects do not require 100% firm export connections. Most generators will accept a certain amount of constrained running under distribution plant outage conditions. Reinforcing distribution networks to provide generators with totally firm connections would be economically inefficient, and would lead to unnecessarily high network charges.

BWEA believes that the proposed move to 'shallow' connection charging is likely to focus attention on the treatment of non-firm generator connections. As such, this issue merits careful consideration by Ofgem, sooner rather than later. In general, we favour approaches that enable generators to be connected on a non-firm basis, so long as generation projects are not exposed to unknown and uncontrollable levels of risk as a result.

Some issues associated with non-firm generator connections are discussed briefly here:

- Prospective generators will need to assess the likely frequency and extent of interruptions or constraints, in order to evaluate the likely impact on the operating revenues of proposed generation schemes. It will be necessary to define what obligations DNOs would have to enable developers to make this assessment.
- There will be situations where two or more generators are connected to a constrained network. Given this scenario, it will be necessary to define how the necessary constraining down should be shared between these generators. This sharing mechanism will have implications for prospective generators as well as existing generators.
- In some areas, the cumulative effect of generator connections may result in the need for generators to be constrained on a routine basis. This could result in significant loss of generation revenues, with obvious consequences for the financial viability of the affected

generation schemes. It will be necessary to define what responsibilities or incentives DNOs would have to upgrade the network, given this type of scenario.

3.3.3. Implementation of the generator DUoS charge

The proposed generator DUoS charge is a central theme in the consultation document closely linked to the proposed move from 'deep' to 'shallow' connection charges. Several sections of the document touch on generator DUoS charges (pages 36-39, 39-40, 42-44).

Viewed as an accompaniment to a shallow connection charging policy, a generator DUoS charge should have two main objectives. Firstly, it should enable DNOs to recover costs of 'deep' network reinforcements that are required in order to make export capacity available to embedded generators. Secondly, it should provide appropriate cost signals to prospective generators, reflecting the long-run costs of providing this network capacity.

There has been much debate over the effect that embedded generation has on overall network costs. Given that power flows in distribution networks tend to be 'top-down', it can be argued that embedded generation reduces network loading, allowing more demand loads to be served using the same network assets. Others, including DNOs, point out that embedded generation tends to increase fault levels, voltage fluctuations and so on, requiring network upgrades to maintain safe network operation and power quality.

There are certain technical characteristics of generation schemes that are closely linked to impacts on network costs. For example, the short circuit current contribution from generators tends to increase network fault levels. If fault levels rise too much, network switchgear has to be upgraded. Following the principle of efficient charges, it would seem reasonable that the proposed generator DUoS charge should be linked to those characteristics that increase network costs.

Network cost impacts are also linked to location. Generation schemes located close to load centers tend to reduce power flows on circuits feeding power to the load centers. By contrast, remote and rural areas tend to be served by weak distribution networks with low levels of incoming power flow. Locating large generation schemes in these areas can reverse the direction of these power flows, and increase their magnitude. Again, it would seem reasonable that the proposed generator DUoS charge should be linked to these locational factors.

BWEA supports the proposed introduction of a generator DUoS charge to accompany the proposed move from 'deep' to 'shallow' connection charges. However, this support is conditional on meeting the three principles of efficiency, equity and comprehensibility.

- For efficiency, the charge should be cost-reflective. DUoS charges for individual generation schemes should reflect locational factors and technical characteristics that have demonstrable links to network costs.

- For equity, the charge should not lead to cross-subsidies between customer groups. The generator DUoS charge should enable DNOs to recover their *net* costs resulting from generator connections. As such, it should reflect benefits to the network as well as costs.
- For comprehensibility, the charge should be easily understood. Generator charges should be calculated according to a straightforward and transparent methodology.

3.3.4. Treatment of other ‘entry points’

In the current consultation, one of Ofgem’s fundamental objectives is to promote effective competition between embedded generation and transmission-connected generation. To do this, Ofgem aims to create a ‘level playing field’ with respect to network access and charging. Given that transmission-connected generators pay a shallow connection charge and ongoing use of system charges, the idea is that distribution-connected generators should pay according to a similar formula.

In pursuit of this objective, Ofgem is proposing to move towards a ‘shallow’ connection charge for embedded generators, together with a generator DUoS charge. The proposed generator DUoS charge is effectively a network entry charge. As such, it is a little surprising that the consultation document does not discuss the treatment of other entry points to distribution networks – in particular, points of interconnection with the transmission system.

BWEA regards this as an important issue, particularly in the light of Ofgem’s concern to create a ‘level playing field’ for embedded generation. In our view, the implementation of generator DUoS must result in equitable treatment of new generator connections with respect to new or augmented entry points from the transmission system.

4. Responses to specific points

This section provides responses to some of the specific points raised in the consultation document. A reference to the relevant paragraph in the document is provided at the start of each sub-section.

4.1. Principles for connection charging

Refer to paragraph 5.6

BWEA considers that the principles of efficiency, equity and comprehensibility constitute an appropriate basis for construction of a charging policy. The policy should provide a 'happy medium' between the aims embodied by the three principles. See section 3.1 of this response for further discussion of charging principles.

4.2. Barriers to entry

Refer to paragraph 5.16.

BWEA considers that 'deep' connection charges do constitute a barrier to entry into the market for generation. There are extensive geographical areas where it is extremely difficult for prospective generators to gain access to the network on reasonable terms. An additional barrier is provided by the tendency of DNOs to levy substantial charges simply to carry out the 'system studies' that are required in order to evaluate the connection costs associated with a proposed generation scheme.

Some BWEA members have indicated that they would be prepared to provide Ofgem with evidence relating to high connection charges. BWEA would be pleased to put Ofgem in touch with the appropriate people.

4.3. 'Deep' versus 'shallow' charging

Refer to paragraph 5.26

BWEA considers that 'deep' connection charges are not consistent with the principles of equity and transparency. See section 3.2 of this response for a more in-depth discussion of 'deep' and 'shallow' charging.

4.4. Interruptible generator connections

Refer to paragraph 5.27

BWEA considers that Ofgem should give careful consideration to the issue of interruptible generator connections, as a matter of priority. See section 3.3.2 of this response for a more in-depth discussion of this issue.

4.5. Banding of generators

Refer to paragraph 5.30.

The consultation document discusses the possibility that different network charging methodologies could be adopted for embedded generators in different size ranges or 'bands' (page 29). It suggests that very small generators could be charged according to a standard tariff, while a more complex charging approach could be used for large-scale generation projects.

BWEA supports the use of a 'small generation band', with a standard connection charge and generator DUoS charge. In our view, this band should only include generators that can connect to low-voltage distribution networks, as defined by the protocols discussed in section 3.3.1 of this response. This should include small grid-connected wind turbines as well as photovoltaic generation and domestic CHP.

4.6. Negotiation

Refer to paragraphs 5.42, 5.43 and 5.44.

It is normal and necessary for connectees to discuss the specification and configuration of 'shallow' connection assets with the DNO. Some of the charges payable by the connectee will depend on the outcome of these discussions. However, the basis on which these charges are calculated is not normally subject to negotiation.

BWEA is strongly opposed to the use of negotiation in setting network charges for generator connections. In our view, negotiation of charges on a site-by-site basis is not consistent with the need for transparent charging policies. Moreover, small developers do not have the information or resources to engage in negotiations with DNOs on anything like an equal footing. We support the adoption of a straightforward and transparent methodology for the calculation of connection charges and generator DUoS charges, as outlined in sections 3.3.1 and 3.3.3 of this response.

4.7. Options for connection charging

Refer to paragraph 5.66.

BWEA considers option 3 to be the most appropriate model for both interim and final solutions. See sections 3.3.1 and 3.3.3 of this response for further discussion of charging options.

4.8. Structure of DUoS charge

Refer to paragraph 5.71.

BWEA considers that generator DUoS charges should be designed to reflect long-run network costs and benefits. Charges should be related directly to generator characteristics that have demonstrable links to network cost impacts. Fault current infeed could be used as one such characteristic. See section 3.3.3 of this response for a more in-depth discussion.

4.9. Zonal charging

Refer to paragraph 5.82.

BWEA considers that generator DUoS charges should be designed to reflect long-run network costs and benefits. Charges should have a zonal component, reflecting the value of transfer capacity between geographical areas. Where generators reduce circuit loading, this zonal component should be negative. DUoS charges should be calculated according to a straightforward and transparent methodology.

4.10. Existing embedded generators

Refer to paragraph 5.91.

Existing embedded generators have secured access to the network under the present 'deep' charging policy. In some cases, the connection charges paid by these generators have included provision for 'deep' network reinforcements.

In considering appropriate arrangements for these generators, the primary consideration should be to ensure that these generators do not pay twice for the same 'deep' reinforcement costs. There are two broad options that meet this aim. Under the first option, the generator is simply exempted from the proposed generator DUoS charge. Under the second option, the generator is reimbursed the part of their connection charge relating to the cost of 'deep' network reinforcement.

5. A note on long term charging arrangements

Ofgem has indicated that it intends to introduce interim charging arrangements, to take effect within the term of the present distribution price control. These interim arrangements will be consolidated at the start of the next price control period, in 2005.

While BWEA supports this approach, we are concerned about the potential for uncertainty about charging arrangements in the longer term. Generation projects are long-term investments, and investors will consider long-term costs and risks when evaluating projects. The possibility that the basis for generator DUoS charges could undergo a significant change in 2005 could be a particular concern to potential investors in embedded generation projects.

BWEA would prefer Ofgem to minimise this uncertainty, as far as possible. In addition to implementing interim arrangements, we would like Ofgem to give firm undertakings regarding the basis for generator charging arrangements in the longer term. Such undertakings will be vital in order to create a stable basis for investment in wind generation and other forms of embedded generation in the period up to 2005.