Centre for Sustainable Electricity and Distributed Generation

Response to the Offshore Electricity Transmission - A further Joint Ofgem/DECC Regulatory Policy Update

December 2008

In response to sections 4.25-.31 and 4.70-.78 of the Offshore Electricity Transmission Regulatory Policy Update consultation.

Ofgem's logic of using redundancy to justify different compensation regimes for on- and off-shore networks has fundamental flaws.

We at the Centre for Sustainable Electricity and Distributed Generation (SEDG) have severe concerns regarding the nature of the compensation arrangements for offshore generation as proposed by OFGEM in the latest Regulatory Policy Update. This response is complementary to our response to an earlier consultation (2007). This appears to be a result of OFGEM's apparent confusion regarding the principles of *security* and *redundancy*.

To illustrate this flaw in OFGEM's decision to use the redundancy argument to justify different compensation arrangements for on and offshore networks, we will consider the analogy of two planes, both capable of flying on a single engine (the same analogy that was used in the P2/6 debate). The single engine has an availability of 99%, whereas the twin engines have an availability of 70% each. A reasonable person looking at these figures would conclude that, despite the presence of redundancy on the twin-engined plane, the plane with the single engine possesses greater security and lower risk of failure.

Similar situations can be found when one compares the actual security performance of fully redundant on-shore networks and optimally designed offshore networks with no redundancy. The *actual security performance* of offshore networks for larger wind farms is *comparable with* and could be *higher* than those onshore, with full N-1 redundancy. Consider for example a 500 MW wind farm offshore that will require installation of at least *three* 132 kV cables. This is driven by the power transfer limitations of AC undersea cables that can only carry approximately 215MW. The level of security that this offshore network provides is comparable and often can be superior to a fully redundant "n-1" overhead-based on-shore design[1]. However, according to OFGEM's logic, which they have not supported by any substantial analysis or evidence, offshore generation, unlike onshore generation, will not receive compensation arising from network unavailability.

It is important to recall that a conceptually identical discussion was carried out during the development of Engineering Recommendations P2/6[2] when the initial erroneous belief was that *single* unit generators (no redundancy) should be excluded from being considered of providing any contribution to network security on the basis of the absence of redundancy. However, given the evidence that redundancy is *not* equivalent to security, as described in section 4.1.3 (see footnote 2) of the document "Security Contribution from Distributed Generation") it was concluded that the argument based on the absence of redundancy could not be used to discard the contribution that single-unit distributed generators could make to network security. As a result, the contribution that single-unit generators (no redundancy) make to network security is now incorporated in the distribution networks security standard. OFGEM was a member of this Industry led Working Group.

[1] By applying the values of failure and repair rates for overhead and cable networks used in the development of Offshore Network Design Standards

[2] R Allan, G Strbac, P Djapic, Security Contribution from Distributed Generation, Oct 2003 (www.sedg.ac.uk)

Ofgem's logic of extending the notion of redundancy that is used onshore to offshore networks is unjustified.

OFGEM's argument that extends onshore regime arrangements, based on the concept of redundancy, to offshore networks is flawed, as it does not recognise that the *intrinsic economic performances of these two networks are fundamentally different*. SEDG has carried out extensive cost-benefit analyses of the fundamental economic performance of offshore networks[3,4]. These show that economically efficient offshore networks for wind energy should be designed with *no redundancy*, due to the significantly higher unit cost of undersea cables when compared to overhead lines, the absence of demand offshore, the relatively low load factor of wind generation (40%), the low capacity (security) value of offshore wind generation that can be relied upon to secure onshore demand and a significantly lower failure rate of offshore cables when compared with onshore overhead lines. This is different from the present solution for an onshore network, which features *some redundancy*.

The concept of redundancy, as a *proxy* to security, has been applied to onshore networks in the context of compensation arrangements. However, OFGEM failed to demonstrate that the redundancy *proxy* can be extended and applied to offshore networks that have a *fundamentally different economic performance*. Work carried out by SEDG has demonstrated that on and offshore networks are different and hence the redundancy concept cannot be blindly extended to an offshore context. OFGEM has not demonstrated sufficient analysis to justify the decision of ignoring the findings of our studies on which the security standards for offshore networks are based.

On- and offshore network security standards are based on the same principles and there is no reason for the compensation arrangements to be different

The standards for onshore networks are based on optimisation of the network design in order to accommodate requirements for reliability and economic efficiency at the least cost. The cost-benefit approach that SEDG developed and applied to determine the economically efficient design of offshore networks is conceptually identical to that used onshore, although the detailed solutions are different due to differing cost structures and the fundamental characteristics of generation. The resulting optimum standard represents the efficient network solution that balances costs of operation (constraint costs, losses etc) against capital investment costs.

OFGEM proposals are discriminatory against offshore connected generators and may lead to inefficient network investment

OFGEM's confusion of redundancy and security is fundamental and serious. It will lead to unjustified discrimination between on- and offshore generation and to inefficient investment in offshore transmission networks, which will ultimately lead to higher electricity costs to the GB consumers. The regime proposed by OFGEM may also have negative effects on the government's energy strategy given that a critical component of this strategy is the rapid expansion of offshore wind power. We are extremely concerned that OFGEM has misunderstood the findings of our studies,

[3] P. Djapic, G. Strbac, Cost Benefit Methodology for Optimal Design of Offshore Transmission Systems, May 2007 (www.sedg.ac.uk)

[4] P. Djapic, G. Strbac, Grid Integration Options for Offshore Windfarms, November 2006 (www.sedg.ac.uk)

reduced redundancy levels of offshore networks when compared with the onshore, to propose radically different but unjustified compensation arrangements offshore. SEDG sincerely hopes this issue is urgently revisited. We would like to meet with OFGEM as soon as possible in order to discuss this matter further, and hope a productive dialogue can be established on this matter.