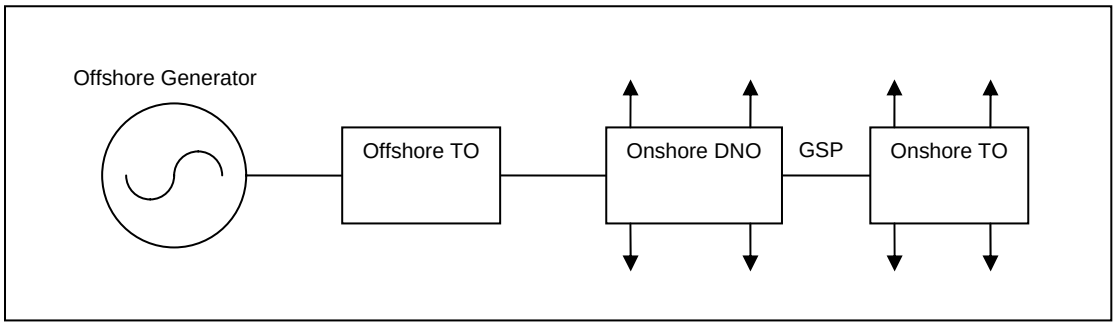
Offshore Transmission connecting to DNOs

A discussion of the issues

Introduction

1. Offshore transmission networks may connect to onshore transmission networks via DNO networks. Under these circumstances, the DNO networks will distribute power from offshore TO networks to customers, or if the injection of power from the offshore network is greater than the demand in the DNO network, the DNO network will be transited by transmission powerflows.



Current arrangements onshore

2. In the current onshore arrangements generators can connect to either a transmission system or a DNO:
   - If connection is to a transmission system, then the generator applies to the GBSO. The GBSO identifies the affected TOs (which may be one or more, depending upon where the generator is located) who determine the work required on their networks and put together individual offers. The GBSO consolidates the TO offers and makes a single offer back to the generator. Thus the contract for connection to, and use of, the transmission system is between the generator and the GBSO. The contractual interface between the GBSO and the TO is managed via the SO-TO code.
   - If the connection is to a DNO, then the generator applies directly to the DNO who makes an offer to the generator, and contracts with him. Depending upon the size of the generator, the GBSO is informed, and a transmission use of system agreement is put in place.

Potential arrangements offshore

3. Under the proposed arrangements for offshore transmission networks (namely that 132kV and above is classed as transmission) it is clear that transmission from offshore generators can (and will) connect via DNOs onshore. Given that the offshore generator will be connecting to a transmission system then, to be consistent with the onshore arrangements, the contract for connection to, and use of, the transmission system will be with the GBSO. To make a consolidated offer to the generator, the GBSO will need to identify the affected TOs, and if the connection onshore is to be via a DNO, will also have to include the impact on the DNO system in the offer.

4. These proposed arrangements introduce a new interface that has to be managed contractually and operationally, namely that between the offshore TO and the

onshore DNO. The role of the GBSO and how it interfaces with the offshore TO and the DNO also needs to be considered.

5. The closest analogy to this issue within the current onshore arrangements is the connection of a large power station to a DNO. As stated above, in this circumstance, the generator contracts directly with the DNO, and the GBSO is informed in order to put in place a transmission use of system agreement. The proposed offshore arrangements however are significantly different as they introduce the extra roles of the Transmission Owner between the generator and the DNO, and the role of the GBSO as contracting party with the generator and the operator of the offshore TO assets.

6. It should be noted that as 132kV is defined as transmission onshore in Scotland, this issue only arises in England and Wales, where an offshore connection to 132kV is a connection to a distribution system.

Principles

7. A commercial framework needs to be developed to accommodate any TO – DNO connections, and this framework must achieve the following principles:
    - the appropriate contractual relationships between the User and the GBSO
    - the appropriate contractual relationships between the TO and the GBSO
    - the appropriate contractual relationships between the TO and the DNO
    - the appropriate contractual relationship between the DNO and the GBSO
    - the appropriate contractual relationship between the User and the DNO
    - a mechanism for the provision of transmission/distribution capacity (via the offshore TO, onshore DNO and onshore TO), and the appropriate (if any) compensation arrangements if this capacity is not available
    - a mechanism for the sharing of data between the GBSO, offshore TO, onshore TO and DNO to allow for the efficient and economic operation, planning and development of their respective systems.

Assumptions

8. The following assumptions have been made in order to develop this paper:
    - The GBSO operates Offshore TOs
    - Offshore generation makes connection applications to the GBSO, and the connection agreement is between the GBSO and the offshore generator
    - DNOs own and operate their distribution assets
    - Relevant onshore investment planning is done in conjunction between the GBSO and the affected DNO

All of these assumptions are consistent with the legislation within the Energy Act 2004, and it is assumed that this legislation will not change.

Issues

9. The TO-DNO connection gives rise to a number of issues which are discussed below (this is not intended to be an exhaustive list):
    a. **How is the most efficient and economic connection option onshore determined?** Once an offshore TO has been identified for the particular offshore connection application, who determines what the onshore connection arrangements should be, and what the overall most efficient connection solution is?
    b. **Generally, how is the integration of the DNOs into the exsiting framework achieved? How is the interface between the GBSO and the DNO managed?** At present, the GBSO/onshore TO interface is managed via the SO – TO code (STC). Interface issues between the GBSO and DNOs are managed via the CUSC and the Grid Code. The options for managing the issues surrounding offshore TO connection to DNO are to augment the existing provisions within the CUSC and Grid Code, to extend the STC to include DNO interface issues as well, or to establish a new code (SO-DNO code).
    c. **How does a DNO determine what investment is required to support the application?** Once it is determined that the onshore connection will be via a DNO, what standard is applied to determine the appropriate level of investment in capacity? Is a new DNO Planning Standard required to determine this? How is this investment funded?
    d. **What assumptions are appropriate for the treatment of the offshore TO connection by the DNO?** Should the TO be treated as a generator under the DNO's charging regime? Or should it be treated as normal customer investment? This question is important in respect of whether the costs and revenues are treated under the main DNO price control or under the DG incentive arrangement. If the latter then any DNO reinforcement might not be funded.
    e. **Who contracts with the DNO for the provision of this capacity?** This could be the GBSO, in which case the DNO would charge the GBSO, and the GBSO would pass these charges through to the offshore User. Alternatively it could be the offshore User contracting directly with the DNO and the DNO charging the offshore User directly.
    f. **What compensation arrangements are in place if the capacity is not available?** Clearly this depends upon the agreed planning assumptions adopted, and who is contracting for the capacity. However if it were deemed appropriate that either the GBSO or the DNO compensates the offshore User when the capacity was not available, then a mechanism to raise this revenue would need to be established. Alternatively, it may be appropriate to impose output restrictions on the generator under certain circumstances.
    g. **How is the physical connection arrangement between the offshore TO and the DNO managed?** The STC provides for Service Capability Schedules between TOs and a similar mechanism may be required to manage the physical interface between offshore TOs and DNOs.
    h. **How are generation power flows controlled?** Are there appropriate arrangements in place for GBSO or the DNO to control power flows from generators in the DNO's network or from the DNOs network to either TOs network, but particularly the onshore TO network. It needs to be determined how the DNO-GBSO interface will work in operational timescales, for example, if there is a fault on the relevant part of the DNO network that will require a reduction in the output of the offshore generator, how is this information relayed to the GBSO/Offshore User?

Models

10. A number of different models could be developed to address these issues. Initial work has been undertaken to identify specific models and it is clear that these will each give rise to differing levels of complexity. Further work is required to develop and refine these models and to determine which is the most appropriate going forward.

Summary and way forward

11. This paper has highlighted the following:
    a. The proposed offshore transmission regulatory regime can result in circumstances where an offshore TO connects onshore to a DNO
    b. This interface is not present in the current onshore arrangements and mechanisms need to be developed to manage it
    c. A number of detailed issues arise out of this interface that need to be considered
    d. It is clear that a number of different models could be developed to manage these new arrangements

12. OTEG is invited to:
    a. Consider the this paper and agree that there is an issue that needs to be resolved
    b. Consider whether the principles to be achieved are appropriate and exhaustive
    c. Consider whether the assumptions are appropriate
    d. Consider whether the issues to be resolved are appropriate
    e. Agree how and where the work associated with resolving this issues should be done