NIE Response to DS3 Consultation on System Service Review – New products.

1. Background

Under the DS3 proposals to allow better use of renewable generation and replace conventional generation, a number of 'new products' have been proposed. These products are proposed to address the challenges associated with frequency control and voltage control for a power system with high levels of variable non-synchronous generation.

These products are believed to the first of their kind within Europe and may also be the first of their type in the world so require some consideration as to their impact on the system as a whole but particularly on the distribution system.

The products include:-

- Fast Frequency response
- Post fault active power recovery
- Ramping Margin
- Dynamic Reactive Power

Although we agree with the rationale for the development of such products, we would have some concern over the impact that they will have on the operation on the system, particularly the distribution system, to which some parties that may avail of these products will be connected. We would also have some concern over difficulties that could result from the establishment and management of products that result in commercial arrangements between TSO's and distribution connected parties.

2. Position on Fast Frequency Response

2.1. Background

The SO has recognised a requirement for an active power response in advance of the primary operating reserve (POR)

They have 2 options for delivery:-

Option 1 – Additional energy supplied between t=0 and t = 5 (i.e. prior to POR)

Option 2 – additional power delivered at t=2 and sustained until t = 15s

2.2. Consideration

In the context of the above the following considerations apply.

2.2.1. Power delivery headroom

It is not clear how this additional headroom will be managed. It is understood that it may called upon by the automatic removal of a previously applied instruction to reduce output. If so this would be a concern as the previously

applied instruction may have been in place to prevent an over load condition occurring on the distribution and/or transmission system. The operation of this reserve in this manner may cause damage to the asset and cause addition system distress by un-expected tripping.

2.2.2. Automatic Load shedding

Presently one of the responses to a frequency deviation is the operation of automatic load shedding at predetermined frequencies and load block disconnections. In terms of a new product to arrest system frequency deviations, consideration needs to be given to the availability of this product to the customers that make up the demand reduction facilitated by the above arrangement. If it is considered that the above product applies to this facility, it is not intended that customers engage either individually or directly with the product, however consideration will need to be given as to how such commercial matters are dealt with on behalf of distribution connected customers.

3. Post Fault Active Power Recovery

3.1. Background

The TSO have recognised a requirement to have active power following a system fault to help the mitigation of ROFOF values following a system fault

This requirement may form part of a grid code standard for connecting generation

3.2. Consideration

In the context of the above, the following consideration may apply

3.2.1. Power inception time

Providing this is maintained as a post fault condition and does not become fixed based on transmission protection clearance options this should not affect the power flow and fault measurement conditions applicable to distribution networks

4. Ramping Margin

4.1. Background

The TSO have recognised a requirement to have dispatchable MWs available in short time frames (up to 3 hours) which is flexible in operation, available and reliable.

4.2. Consideration

In the context of the above the following consideration may apply

4.2.1. Power Delivery Headroom

As with fast frequency response, it is not clear how this additional headroom will be managed. It is understood that it may called upon by the automatic removal of a previously applied instruction to reduce output. If so this would be a concern as the previously applied instruction may have been in place to prevent an over load condition occurring on the distribution and/or transmission system. The operation of this reserve in this manner may cause damage to the asset and cause addition system distress by un-expected tripping.

5. Steady State Reactive Power

5.1. Background

The TSO proposes that the reactive power product is re-structured in a way that incentivises reactive capability across the widest active power range.

5.2 Consideration

Whilst it is well understood why the TSO would wish to incentivise increased reactive capability, the scope for that increased capability to be exercised by distribution connected generation would be of concern. This is due to the possible constraints imposed by the impedance of the distribution network and due to the need to be mindful of the presence of customers connected to the distribution network. In addition to potential constraints that could limit the exercising of capability there will need to be coordination between TSO and DSO when it is called upon to ensure that voltage performance on the distribution network is not put at risk.

6. Dynamic Reactive power

6.1. Background

The TSO have recognised a requirement to have a dynamic reactive response from wind generation to help maintain system stability post a transmission fault. This injection of Mvars must occur within 100mS of fault conception

6.2. Consideration

In the context of the above the following consideration may apply

6.2.1. Reactive power vs Reactive Current

During a system fault there is a natural change in the reactive impedance within a syn generator to a transient impedance value. This produces a change in the reactive current flows to a fault and goes toward the production of fault currents and syn torque. It is unclear whether a change in reactive power would result in the same effect. This requires further clarification

6.2.2. Impact on Distribution Protection.

It remains unclear whether injections of this sort from multiple connected sources within a distribution system during a distribution fault would have a serious impact on fault discrimination within this system. This requires further study

7. Contractual arrangements

The proposal to offer contracts for aux. services directly to generators connected within a distribution network requires careful consideration, both in term of the expectation of the generator to be able to agree to the delivery of such services and the expectation of the TSO to have those services available when required. This is due to the possible constraints imposed by the impedance of the distribution network and due to the need to be mindful of the presence of customers connected to the distribution network. Whilst the consultation acknowledges this in stating that *"…at this time it is not clear that distribution-connected service providers can be utilised in respect of all system services"*, it needs to be recognised that the significant majority of non synchronous generation will be connected to the distribution network. That being the case, this issue needs to be considered as a priority.