

# **DS3 Advisory Council**

**30 May 2012**

**DSO update**

- 1. Voltage performance**
- 2. RoCoF**

- Two main considerations
  - Capability
  - Controllability
- Capability
  - Capability to produce and absorb reactive power over the range of the active power capability of the machine
  - Universal Windfarm Standards, have been broadly agreed among the TSOs and DSOs on the reactive power capabilities that windfarms should possess
  - Grid Code modifications will reflect these
  - Distribution Codes need to be updated to reflect DSO requirements
  - The D network will act as a constraint on the full application of this reactive capability
    - Still to be decided how this will be dealt with but this forms part of the controllability issue
    - Also consideration needs to be given to whether restrictions that limit full application of gen capability could result in the need for additional reactive support

# Voltage Performance

- Controllability
  - For D connected generation requirement for coordination between TSO and DSO
  - In theory two models
    1. TSO controls reactive output for T reasons & DSO controls for D reasons
    2. TSO defines total reactive requirements at a nodal level and the DSO controls on the D network
- TSO's and DSO's are in discussion on this

# RoCoF - background

- There is a requirement on DNO's to prevent islanding situations on their distribution networks
- Reasons include; reduction in fault level leading to compromising of protection operation, risk to safety, loss of control over voltage/frequency, loss of network earth, lack of resynchronising facilities
- Requirement is for immediate disconnection of DG units once they have become electrically disconnected from the grid
- The most common anti- islanding protection, due to its simplicity and cost, is one that measures Rate of Change of Frequency (ROCOF)
- This measurement is presently carried out by relays that directly calculate  $df/dt$  (RoCoF) or by vector shift (VS).
- The use of measurement techniques of this type can cause spurious operation for non – loss of mains events in particular generation short fall events

# RoCoF - Investigations

- To allow further penetration of DG onto the Ireland system there will be a requirement to desensitise the present LOM systems that use RoCoF or VS for their measurement.
- In order to understand whether these present systems will still act as robust LOM systems with higher settings a number of investigations have been commissioned
- NIE
  - Strathclyde University have been commissioned to carry out the studies for NIE.
  - This university has already carried out significant work in this area for the electricity industry in the UK.
- ESB
  - Investigations being carried out by ESB
  - Building on work previously carried out
  - The scope of the investigations is to determine the sensitivity and stability of LOM protection relays using RoCoF and VS algorithms up to and including frequency changes of 2hz/sec
  - NIE and ESB will review jointly their individual conclusions to seek to agree a common approach moving forward

# RoCoF - Investigations

- Investigations ongoing until September 2012
- Determination of change requirements to LOM protection systems – October 2012
- Interaction with Distribution Connected Generators – October 2012
- Determination of costs and impact on DS3 – December 2012