Consultancy/Research Proposals

Frequency Resilience of Distributed Generators at Stations of less than 5MW

Introduction

The system inertia and therefore the potential Rate of Change of Frequency (RoCoF) after the loss of an infeed or demand is likely to change given developments in the electricity supply system in Great Britain. The Grid Code Review Panel (GCRP) and the Distribution Code Review Panel (DCRP) has therefore been working on proposals for an appropriate RoCoF setting for protection against Loss of Mains and is developing proposals for a RoCoF "withstand" capability[1].

The Panels have established a joint workgroup. The workgroup now requires further information and assessment in order to develop proposals for generators at stations of a Registered Capacity of below 5MW.

Two projects are proposed. The objective of the first project is to establish a robust view of the distributed generation connected to the networks, how it is expected to behave in an island situation after a network fault, and what techniques are used to meet Loss of Mains protection requirements. The objective of the second package is to evaluate the risks of a change in RoCoF setting recommendations. This second project is dependant in part on the output of the first.

Project 1: Distributed Generation Operation in an Islanded Network (Generation at sites of <5MW)

The workgroup seeks proposals from organisations to investigate the characteristics and capabilities of generating facilities within Great Britain at sites with a registered capacity of less than 5MW. The workgroup seeks an independent assessment of the numbers and types of distributed generators in Great Britain, their ability to withstand a frequency deviation and their stability in islanded operation. The results of the investigation may inform a second package of work to assess the risks of implementing any proposed changes to RoCoF settings. Experience is required in small and micro-generation and its deployment in large scales across electricity networks.

Scope of Work

The project must deliver a technical report based on information provided by the workgroup, relevant technical reports, specifications and standards and published information from equipment suppliers. The technical report will be published on the National Grid and Distribution Code website and should cover the following areas:

1. The numbers, capacities and types of distributed generators in Great Britain at sites of less than 5MW in capacity;
2. With respect to the types of distributed generators identified in 1:
    a. The general characteristics of the technologies deployed;
    b. The behaviour of the technologies deployed in a desynchronised island situation both individually and as part of a mix of multiple generators;
    c. The expected capability of the technologies deployed to withstand variations in frequency;
    d. The Loss of Mains protection techniques used and in particular whether RoCoF based techniques are used;
    e. The actions and costs to implement a new minimum RoCoF withstand performance requirement;

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1 http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/workinggroups/Frequency+Changes+during+Large+System+Disturbances/

3. Relevant international experience in anti-islanding protection for generators at sites of capacity of less than 5MW and of changing protection settings and/or withstand capability for future and existing installations.

Items 1-3 are the high level objectives of the technical report.

Organisations interested in this research project are therefore requested to provide a "formal proposal" including the milestones, and cost associated with each item. The expected completion date for the project is end of December 2013.

Project 2: Risk Assessment of a RoCoF Protection Setting Change (Generation at sites of <5MW)

The workgroup seeks proposals from organisations to investigate the risks of changing RoCoF related Loss of Mains protection and control arrangements for small and micro scale generation . The workgroup seeks an independent assessment of the impact of a change to the settings of any Rate of Change of Frequency (RoCoF) based protection. The type and scale of generation under investigation means that this project will need to account for the dynamic effects of multiple generators of differing technologies interacting within a small island.

Scope of Work

The research project must provide a technical report based on appropriate simulation and testing. The technical report will be published on the National Grid and the Distribution Code website and available to all parties. The report shall include:

1. An evaluation of the risk to distribution networks, user equipment and all personnel of change to RoCoF based protection settings from the current settings to a range of up to $1Hzs^{-1}$, over a period of 500ms; and
2. An evaluation of the risk of adopting plant type specific guidance.

Items 1-2 are the high level objectives of the technical report.

Organisations interested in this research project are therefore requested to provide a "formal proposal" including the milestones, and cost associated with each item. The expected completion date for the project is end of February 2014.

Workgroup Resource

Successful delivery of the projects will require technical input and information from the electricity network licensees. It is proposed that existing workgroup members provide the lead contact. Active workgroup members are listed below.

Name	Role	Representing
Mike Kay	Chair	Electricity North West
Robyn Jenkins	Technical Secretary	National Grid
Joe Duddy	Member	RES (Generator)
Adam Dyśko	Technical Expert	University of Strathclyde
Joe Helm	Member	Northern Power Grid (DNO)
Andrew Hood	Member	Western Power Distribution
John Knott	Member	SP Energy Networks (DNO)
Martin Lee	Member	SSEPD (DNO)
Jane McArdle	Member	SSE (Generator)
Alan Mason	Member	REPower (Manufacturer)
Paul Newton	Member	EON (Generator)
Brian Roberts	Member	National Grid
Graham Stein	Member	National Grid
Julian Wayne	Authority Representative	Ofgem

Recommendation

The ENFG is asked to

1) APPROVE the proposed scope of work for the two projects outlined above
2) APPROVE the contribution of the network licensee representatives within the workgroup
3) APPROVE that the projects are procured and delivered via the ENA