Registered Power Zone Annual Report

Scottish Hydro Electric Power Distribution

Southern Electric Power Distribution

for period 1 April 2007 to 31 March 2008

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1. Executive Summary

One RPZ scheme was registered in the Scottish Hydro Electric Power Distribution (SHEPD) area in 2005/06. Additional potential schemes have been considered in 2006/07 and 2007/08 and further work is continuing on evaluating these opportunities.

2. Introduction

As part of the recent Distribution Price Control Review (DPCR) effective from 1 April 2005, Ofgem (the regulatory body for the energy industry) introduced two new incentives: the Innovation Funding Incentive (IFI) and Registered Power Zones (RPZ). The primary aim of these two incentives is to encourage the distribution network operators to apply innovation in the way they pursue the technical development of their networks. A Good Practice Guide (Engineering Recommendation G85) has been produced by the DNOs that is available free of charge via the Energy Networks Association's website: www.energynetworks.org.

RPZs are focused specifically on the connection of generation to distribution systems. The estimates made by distribution network operators as part of the DPCR process indicated that some 10GW of generation could be connected in the next five years. This generation could connect at all distribution voltage levels bringing new system design and operating challenges.

RPZs are therefore intended to encourage distribution network operators to develop and demonstrate new, more cost effective ways of connecting and operating generation that will deliver specific benefits to new distributed generators and broader benefits to consumers generally. The RPZ incentive applies from April 2005 and, at present, this excludes DG applications processed prior to this date.

This report covers activities in the period from 1 April 2007 to 31 March 2008. It will be published on SSEPD's website www.ssepd.co.uk along with SSEPD's IFI report. The reports will also be available on Ofgem's website www.ofgem.gov.uk

3. Scope

This document covers the two electricity distribution licensees within SSE Power Distribution (SSEPD):

Scottish Hydro Electric Power Distribution plc (SHEPD) and
Southern Electric Power Distribution plc (SEPD).

The SHEPD area is seeing a higher level of distributed generation activity and is consequently more active in developing innovative solutions in this field. As there is no completed or current RPZ development activity in the SEPD licence area, there is no report for the SEPD area in this reporting period.

4. Current Registered Power Zones

Earlier work with the University of Strathclyde resulted in Ofgem registering our application for the Orkney network in 2005/2006 as SSEPD's first Registered Power Zone.

The considerable renewable energy resource on the Orkney Isles has attracted significant levels of wind farm and marine development such that the connection of further renewable energy generation output is constrained by the capacity of the distribution network. The active network management scheme, developed by SSEPD and the University of Strathclyde, will make better use of the existing infrastructure thereby providing a lower cost alternative to network upgrading and reinforcement works. The active management scheme is expected to realise a total of 62MW or more of generator connected capacity onto the Orkney network. Currently 47MW is already contracted on a firm or non-firm basis and a further 15MW of new non-firm generation output could be allowed onto the network by the active management scheme.

This concept is being developed as an IFI project and closed loop trials were run on the Orkney distribution network during 2006. Significant information was gained from the trials and the results analysed. The key outcomes from this analysis were the verification of the control logic and an understanding of the response of the participating distributed generation. Additional analysis of wind farm behaviour on Orkney has been carried out by the University of Strathclyde to further develop the design of the scheme. Other key outcomes during 2006/07 were the development of logic design rules for the full active network management scheme and creation of a generator constraint analysis tool - Gen CAT – to calculate the expected curtailment of new non-firm generation connecting to the scheme. This tool has been used to analyse each potential new non-firm generation connection to provide an indication of the level of curtailment the applicant would experience if they were the first new non-firm generation to be connected under the scheme. Further studies will be carried out as willing generators commit to connect to the active network management system.

During 2007/08, contracts were placed for the development of the necessary software and hardware systems. These systems have been fully developed and are in the final assembly stages. Handover is imminent followed by further testing before installation of the system on Orkney. The installation is planned to be completed by the end of December 2008 with the full operation of the scheme being dependant upon the readiness of participating renewable energy developments.

We have been disappointed by the very slow take-up of capacity by developers under RPZ . This is primarily due to the time involved in the developers obtaining full planning consent for their proposals, and not in any way related to the readiness of the active network management systems. It is hoped that further schemes will be consented and progressed during 2008/09.

Although further work will be carried out to commission the full active network management scheme on Orkney, the key outcomes of the work to date represent significant progress in this field. It is planned to repeat the principles of this innovation in other locations and to evaluate the development of variations based on the Orkney active network management scheme.

5. Potential Registered Power Zones

We have completed our assessment of the potential for introducing an RPZ on Shetland, which was under consideration and reported in previous years.

This involved a detailed technical study by the University of Strathclyde with the aim of determining the level of new non-firm generation, if any, which could be connected. The results of this study have concluded that it will not be viable to develop an RPZ at this time that will allow the connection of large volumes of generation in the short term. However, we are actively exploring further options and will continue to review the viability of any innovative solution on the Shetland Isles network.

SSEPD has future plans to install a sub-sea DC link from the Shetland Isles network to the UK mainland. This High Voltage DC link is associated with the development of large scale renewable generation on Shetland. The impact of this mainland link would radically change the characteristics of the network and the expectation would be that the voltage, frequency and energy balancing issues would be eliminated at this time.
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Detailed consideration is being given to establishing a RPZ for the Western Isles, Skye and Lochalsh distribution networks. This network consists of Lewis, Harris, the Uists, the Isle of Skye, and part of the surrounding mainland network area. The Western Isles are connected to the transmission system via two separate 33kV sub sea cables. This interconnection, commissioned in 1990, was designed to meet customer demand and reduce the dependency on diesel generation rather than to cater for the present challenge of exporting large amounts of generation to the mainland. The connection of generation to these networks requires consideration to be given to four significant aspects: thermal rating of the circuits; voltage rise; voltage step changes; and the effects of machine starting currents. Due to the length of the circuit connecting the Western Isles to the transmission system, relatively small changes in demand or generation levels can cause noticeable changes to voltage levels.

Currently, two significant transmission schemes are under consideration which will affect these networks: a high capacity DC link to the Western Isles and a second 132kV circuit to Skye from the mainland.

Both these transmission reinforcements will provide scope for connecting further renewable generation but due to the scale of these projects they will take a significant amount of time to construct and local distribution network constraints may also restrict the commercial viability or capacity of Distributed Generation connections. As this situation is similar to the Orkney Isles the work on the Orkney RPZ active management system is being used to inform consideration of the development of a scheme which takes account of the critical aspects of the Western Isles, Skye and Lochalsh network. As the design challenges are different from those presented by the Orkney network; the Western Isles, Skye and Lochalsh development work will be the subject of a separate IFI project.

Further technical studies are currently being carried out and it is anticipated that we will be seeking Ofgem approval for an RPZ in this area during 2008/09.

Elsewhere in the SHEPD area, considerable amounts of renewable generation are in the process of being connected to our network. However, network constraints have become apparent in many geographic areas which currently limit the amount of generation we can connect until extensive transmission reinforcements are completed. SSEPD are progressing solutions to reduce the impact of these constraints.
We believe innovative methodologies, such as active network management systems and dynamic line rating, can be developed to allow more generation to be connected to the existing infrastructure.

Section 6

Scottish Hydro Electric Power Distribution

RPZ Report

for period

1st April 2007 – 31st March 2008

Scottish Hydro Electric RPZ Report April 2007 – March 2008

Name of RPZ	Orkney Active Distribution Network Management
DG Capacity	Expected to be about 15 MW (0 MW connected in 2007/08)
Starting Year	2005/06
Description of project and technical details.	New generators accepted under the RPZ scheme will be instructed to limit their output to match the available export capacity to the mainland grid. Available capacity will be derived from real time network measurements and will depend upon the level of Orkney demand and output of existing generation
Expenditure for financial year	£78,900
Type(s) of innovation involved	Radical
Status (planned, under construction, operational) and operational starting year	Under construction – expected to be operational in 2008/09, dependant upon availability of participating developers
Connection cost	Of the order of £200,000 is expected
Expected benefit to customers when project was registered	Ability to connect an additional 15 MW of new renewable generation to the Orkney Distribution network