

The Highland Council, Cairngorms National Park Authority & Scottish Natural Heritage Undergrounding of Extra High Voltage Transmission Lines

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Introduction

In anticipation of significant new renewable energy generation development in the Highlands and Islands of Scotland, Scottish Hydro Electric Transmission Limited (SHETL) is proposing to upgrade the electricity transmission network in the Highland area and then southwards to Denny (near Falkirk). At present, the key proposal is to replace the existing 132kV double circuit overhead power line between Beauly and Denny with a 400kV double circuit overhead line. After this, other overhead lines that may be constructed or upgraded include:

- Ullapool - Beauly - no circuits exist at present
- Dounreay - Beauly
- Beauly - Keith

To date (late 2004) there have been two rounds of public consultation on the proposed new Beauly – Denny line and it is understood that SHETL aims to submit a formal application to Scottish Ministers to build the line under Section 37 of the Electricity Act 1989 early in 2005. The Highland Council (THC), Scottish Natural Heritage (SNH) and The Cairngorms National Park Authority (CNPA) will be statutory consultees of Scottish Ministers upon any such application by SHETL.

Without prejudice to any formal consideration of SHETL's proposals at the statutory consultation phase, there is a view within THC that serious consideration should be given by the Transmission Network Owner (TNO) to the undergrounding of parts of the Beauly - Denny line and any Western Isles to Beauly line.

In order to inform their views in this area, this report has therefore been commissioned by THC and its associates, SNH and CNPA, so that they may be adequately and objectively briefed in advance of this consultation. The briefing is to provide information on the relative cost and environmental impact of Underground Cable (UGC) when compared with Overhead Line (OHL) and on technical and environmental issues surrounding the two approaches.

A further objective of the study is to understand the issues associated with the undergrounding of two "case-study" sections of the route, one near Beauly and the other in the Dalwhinnie area. These case study sections of the route were chosen as being representative of two different environmental habitats along the route, thereby providing a vehicle whereby some of the issues associated with OHL and UGC might be explored more fully.

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This report therefore covers the following areas:-

1. Review of the Issues

This section introduces the electrical power transmission technologies available, reviews the SHETL proposals for the Beaulay - Denny transmission line and offers comment on two earlier reports on the costs of undergrounding when compared with the overhead option and on recent Extra High Voltage (EHV) underground cable schemes.

2. Generic Life Cycle Costs

Estimates of comparative life cycle costs for cabled and overhead transmission circuits are provided giving consideration to: capital costs, transmission losses, maintenance costs, reliability and availability (including climate and its effect on fault incidence) and decommissioning requirements.

3. Environmental Impacts

Consideration is given to the environmental impact of undergrounding EHV transmission circuits under the following headings: land use, geology and soils, water resources, ground restoration, ecology and nature conservation, landscape and visual impact, cultural heritage, traffic and noise, air quality and recreation, community and tourism, and film and media.

Efforts have also been made to identify examples of ground restoration following the installation of similar EHV cable systems in comparable habitats to those which would be encountered along the proposed Beaulay - Denny transmission line route.

4. Case Studies

Two contrasting sections of the Beaulay - Denny line have been chosen as case studies for the purposes of estimating the capital and whole life costs and environmental impacts of undergrounding in a practical situation. One case study focuses on a lowland habitat, considering a 7km section of the Indicative Proposed Route between the planned new 400kV substation at Beaulay and the village of Eskadale. The other is an upland case habitat covering a 2km section of one of the Indicative Proposed Route options in the Dalwhinnie area.

Additional Information

In addition, in the original proposal submitted by Jacobs Babbie, a commitment was also given to provide comment on the Regulatory perspective on the proposed transmission line upgrade and on bird strike issues.

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During the course of this commission, requests have also been received from interested parties for the study to address a range of wider issues relating to the proposed Beauly - Denny development and also to the possible Ullapool - Beauly route. Comments on such issues, which include the application of HV DC power transmission technology, are included in the relevant sections of this document.

What this report does not address

This report sets out to provide an objective briefing on the issues as defined under the Terms of Reference. It does not seek to offer comment on the merits, or otherwise, of the renewable energy schemes which the proposed transmission line is being developed in response to. Neither does it seek to offer comment on the proposed route for the transmission line.

Furthermore, the report does not address any aspect of the debate on the potential, or otherwise, for OHL or UGC to cause adverse effects on health. It is noted that, whichever transmission method were adopted for the Beauly - Denny line, the installation would be expected to meet the National Radiological Protection Board (NRPB) advice document NRPB Vol 15, No 2, 2004 – Advice on Limiting Exposure to Magnetic Fields (0-300GHz).

It should also be noted that this has been a “desktop” study only and the depth of assessment and information provided reflects this limitation. It is nevertheless hoped that it provides an objective introduction to the issues surrounding this important topic.

Sources of Information Consulted

Within the constraints imposed by a limited duration desktop study, efforts were made to obtain information from a wide range of sources including: EHV cable and overhead line manufacturers and installers, various transmission network operators, the DTI, Ofgem, The Health & Safety Executive, THC, the Scottish Environment Protection Agency (SEPA), Cairngorms National Park Authority, SNH, representatives of the Eilean Aigas Estate, the Snowdonia National Park Authority and The Highlands & Islands Film Commission.

Information specific to the design requirements for the proposed Beauly - Denny OHL was obtained from direct discussions with SHETL. This information was summarised into a letter, a copy of which is included at Appendix 1.

In addition, information was sourced from a variety of reports and documents in the public domain through: the World Wide Web, academic library sources, trade journals, professional institutions and various trade associations.

The authors wish to express their thanks for the assistance and support provided by these organisations. Particular thanks is extended to Andrew Brown of the Highland Council who kindly took photographs of the sections of the proposed Beauly - Denny route immediately to the south of Beauly which assisted greatly in the case study assessment.