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Date: 12 June 2007

Dear Colleague

Open consultation letter: separation of TIRG expenditure for B5 boundary works on Scottish Power Transmission Ltd's network

Purpose of this letter

Under the terms of the System-Operator Transmission-Owner Code (STC), a party to the code may at any time submit a Planning Request for a change to a Transmission Owner's investment plans. On 7 December 2006, National Grid Electricity Transmission (NGET) submitted to Scottish Power Transmission Ltd (SPTL) a Planning Request (reproduced in appendix 2) in accordance with the provisions of the STC.

The Planning Request relates to SPTL's planned Transmission Investment for Renewable Generation (TIRG) works on the Main System Boundary 'B5' (see appendix 1) designed to increase thermal capability and release system capacity. The works identified by NGET relate to the Easterhouse and Clyde's Mill switchgear replacement and the relocation and installation of a series reactor at Windyhill. These works were originally incorporated in the main Beauly-Denny upgrade project due to timing reasons envisaged during the original scheme design. As a result, delays to the Beauly-Denny project are also delaying the B5 boundary works, despite the latter not being dependent on planning consents. At the time the projects were included in the licence, it was not envisaged that Beauly-Denny would be delayed, and therefore the linkage was not expected to be an issue.

Following receipt of the Planning Request from NGET, SPTL has conducted economic analysis in accordance with the STC (reproduced in appendix 3) and intends to de-link the works from the Beauly-Denny programme, and bring them forward[1]. Given the proposed advancement of the B5 boundary works constitutes a change to SPTL's investment plans, it considers that it would require its licence to be amended. In each licensee's transmission licence, Schedule C to special condition J3 (Restrictions of Transmission Charges: Transmission Investment for Renewable Generation) (abbreviated to 'Schedule C'), sets out a range of parameters, including expenditure profiles, for each of the projects that are within the TIRG mechanism. As such, to give

[1] In reality, the works would not be brought forward, rather they would be prevented from being pushed back.

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effect to the advancement, this part of SPTL's transmission licence would need to be modified to reflect a revised expenditure profile.

The purpose of this letter is to seek views from the industry on whether it is appropriate to allow the separation and advancement of the expenditure, before initiating a formal licence consultation process in accordance with section 11 of the Electricity Act 1989 in due course.

Background

NGET's Planning Request

In response to the level of generation constraints being incurred to ensure the transmission system in central Scotland is operated in accordance with the GB Security, Quality and Supply Standards (GB SQSS, or SQSS), NGET, as System Operator, has submitted to SPTL a Planning Request in accordance with the STC. In the period 01 April 2006 to 19 November 2006, NGET procured constraint volumes exceeding 389GWh in Scotland to ensure that the Main System Boundary 'B5' SPT North to SPT South (see appendix 1) was operated in accordance with the SQSS. The constraint volumes have been calculated over a 233 day period, during which the constraint was active for 73 days for both outage and intact conditions (31% of the time). NGET's analysis assumes that the cost of constraints is around £30/MWh, and as such the ongoing cost is around £0.8 million per week when the constraint is active (for 31% of the time), and £0.35 million per week assuming the constraint is always active. Based on the assumption that the constraint is always active, and therefore costs £0.35 million per week, the annual ongoing cost of constraints across the B5 boundary is forecast at around £18.2 million. For more information on NGET's analysis, see appendix 2.

SPTL will be investing in the Main System Boundary B5 SPT North to SPT South under the direction of Associate Works of the Beauly-Denny reinforcement to increase thermal capability, thus releasing system capacity for user connections. The work is currently planned to commence in Year 1 of the Beauly-Denny programme of works, where Year 1 is the assumed year of consents. However, with Beauly-Denny currently the subject of a public inquiry, it can not be assumed with any certainty when works will commence. The issue is compounded by forecasts of a substantial increase in contracted generation within the constrained area in the next few years, potentially resulting in a substantial increase in the costs of constraint management.

NGET considers that the system can be operated more economically if works to replace switchgear at Easterhouse and Clyde's Mill as well as the relocation and installation of a series reactor at Windyhill are progressed as soon as possible. These works are already scheduled to take place, and NGET does not consider that additional costs would be incurred, except those for bringing the works forward. NGET believes that whilst these upgrades will not completely eliminate constraints on the B5 boundary, it will increase the transfer capacity to around 3.67GW, and therefore reduce constraint volumes. As a result of the analysis that it has carried out, NGET has proposed that SPTL carries out an Economic Analysis in accordance with the STC to identify if there is economic justification for de-linking the Easterhouse and Clyde's Mill switchgear replacement and the Windyhill series reactor installation from the Beauly-Denny works, or if deemed appropriate, an alternative investment proposal.

SPTL's Economic Analysis

SPTL has conducted a cost-benefit analysis of various scenarios using what it and NGET consider to be a conservative assumption of the cost of constraints (£30/MWh). Building on NGET's analysis, SPTL's analysis states that the constraint on the B5 boundary was

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active on 73 weekdays during the 233 day period, normally for a 14 hour period. Typically, this equates to a constrained generation capacity of around 380MW north of the B5 boundary. While the constraint was active in both intact and outage conditions, the majority of constraints were incurred when either the Longannet-Clyde's Mill or Longannet-Easterhouse circuits were out of service. SPTL considers that a conservative estimate of ongoing constraint costs when the constraint is active is £0.8 million per week. To normalise the annual cost of constraints on this part of the line, SPTL considers that annual maintenance is restricted to a one-week period per circuit per year, equating to an ongoing constraint cost of £1.6 million per year.

SPTL's economic analysis uses a methodology that is consistent with the TIRG final proposals. In applying the methodology, SPTL has produced comparative analysis of three scenarios, option (a), option (b) and option (c) as follows:

(a) Advance the B5 boundary works, so that they commence in 2007/08.
(b) Undertake the B5 boundary works as part of the main Beauly-Denny project assuming no further delays in planning consent, starting in 2010/11.
(c) Do nothing except for replacing switchgear at Clyde's Mill at a later date (2012/13) based on asset condition.

The costs associated with option (a) total £11.2m[2] for a three year work programme commencing in 2007/08, in which £1.6m is incurred per year in constraints, until the final year in which the project is built. The total costs of the project, including constraints during the period sum to £14.4 million. In present value terms, the costs of option (a) are £12.4 million[3] including constraints during the build programme.

Option (b) is based on there not being any works on the project until 2010/11, working on the assumption that Beauly-Denny has already been consented, and again assumes a three year build programme. As with option (a), the cost of the works sums to £11.2 million, but the cost of constraints assumed along the boundary sum to £9.6 million. The combined cost of the project and constraints is £20.8 million. In present value terms, the cost of the project and constraints associated with option (b) is £14.7 million.

Option (c) assumes that Beauly-Denny is not built, and that the Clyde's Mill works are progressed due to asset replacement beginning in 2012/13. The cost of option (c) is around £64 million for ongoing constraints of £1.6 million a year[4], and around £5.3 million for the project works. This sums to £69.3 million in total, which in present value terms is £20.7 million. The present value discounting period used by SPTL in this option is 40 years.

Options (a), (b) and (c) are set out in table 1 below:

[2] In all places where the costs of the B5 boundary works are cited as £11.2 million, the value is in 2006/07 prices, equating to £10.6 million in 2004/05 prices, as per the TIRG allowance. Similarly, in all places where the original costs of the B5 boundary works are cited as being £22.2 million for the purposes of the transmission licence, this value is also in 2006/07 prices, equating to £21.2 million in 2004/05 prices (which is the value in the licence).
[3] All present value calculations use a discount rate of 8.8%.
[4] In 2006/07 prices.

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Table 1 – comparison of options for B5 boundary works (2006/07 prices)

Option	Description	Constraint costs	Build costs	Total Costs
Option (a)	Advance B5 boundary works and undertake independently of Beauly-Denny	£3.2 million (PV £2.8 million)	£11.2 million (PV £9.6 million)	£14.4 million (PV £12.4 million)
Option (b)	Undertake B5 boundary works as part of the main Beauly-Denny project	£9.6 million (PV £7.2 million)	£11.2 million (PV £7.5 million)	£20.8 million (PV £14.7 million)
Option (c)	Do nothing, and assume that the switchgear at Clyde's Mill is replaced due to asset condition in 2012/13	£64.0 million (PV £17.6 million)	£5.3 million (PV £3.1 million	£69.3 million (PV £20.7 million)

Notes: for more details of the calculations please see appendix 3

In summary, in present value terms, the cost of option (a) is £2.3m lower than option (b) and £8.3m lower than option (c). However, all three options do not include:

- Constraints on the intact system – only outage constraints are incorporated;
- Outage constraints other than of the Longannet-Clyde's Mill 275kV and Longannet-Easterhouse 275kV circuits;
- Transfer increases arising from an increase in connected renewable generation above the 627MW already within SHETL's area;
- Any increase in Longannet's load factor as a result of installation of flue gas desulphurisation, and
- Any indexation of prices, which in the case of constraints could make a substantial difference, particularly in the case of option (c).

The conclusion of SPTL's analysis is that option (a) should be adopted, and £11.2 million should be separated from the Beauly-Denny project funding, and advanced for the B5 boundary works. The original cost of the works, as included in the current version of the licence, makes provision for £22.2 million in 2006/07 prices (equivalent to £21.2 million of expenditure in 2004/05 prices) over a three year period. Recent cost estimates of the works on the B5 boundary have fallen to around £11.2 million, in part because of more accurate cost forecasts being available, and also due to rationalising scheme design. SPTL is therefore requesting that £11.2 million of expenditure associated with the B5 boundary works is advanced and allowed to progress independently of the main Beauly-Denny project.

Licence modification approach

In the event that SPTL's request for advancement is considered appropriate, to give effect to the proposal would require a licence modification. The initial estimated cost of the B5 boundary works as included in SPTL's transmission licence in Schedule C of special condition J3, is £22.2 million. This would need to be revised to reflect the revised expenditure profile of the B5 boundary works as, at present, it is included within the allowance for Beauly-Denny. If it is considered appropriate to revise the licence,

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there are two main options. Firstly, the existing costs of the Beauly-Denny project could be adjusted to reflect the new expenditure profile of £11.2 million, rather than the original £22.2 million. This is the least change option, but would create difficulties with the functioning of the provisions of the transmission licence, as the B5 boundary works are in practice unrelated to the Beauly-Denny project, but for the purpose of the licence, the costs would remain linked.

An alternative approach to modifying the transmission licence would be to separate out the costs associated with the B5 boundary works, inserting these costs into a new table in the licence, and revising the costs of the Beauly-Denny works. This would effectively de-link the Beauly-Denny project from the B5 boundary works. An example of how this approach might be reflected in the licence is provided in appendix 5.

Consultation questions

We are keen to obtain industry and consumer views on the proposed advancement of the B5 boundary works. Appendix 2 and 3 provide non-confidential versions of the information that has been made available to Ofgem to justify NGET's Planning Request and SPTL's subsequent request for expenditure advancement. It is open for respondents to comment on any of the issues raised in this letter, but in particular we consider the following issues merit consideration:

- Do you agree with SPTL's proposals for advancing the B5 boundary works?
- Are there any factors or evidence other than that provided by SPTL which you think Ofgem should take into account in deciding whether to modify the licence to allow the advancement of the works?
- In the event that the proposed advancement is considered appropriate, in what way should SPTL's transmission licence be amended to reflect the changes? For instance, what are your views on:
    - Revising the Beauly-Denny 'Pre construction, contingency and construction costs' table in Schedule C by splitting out the B5 boundary works costs from the main Beauly-Denny table and inserting the B5 boundary work values into a separate table (as illustrated in appendix 5).

Next steps

We would like to hear the views of any interested parties regarding the issues raised in this letter. Responses should be made on or before 26 June 2007 to:

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Senior Manager – Electricity Transmission Policy
Office of Gas and Electricity Markets
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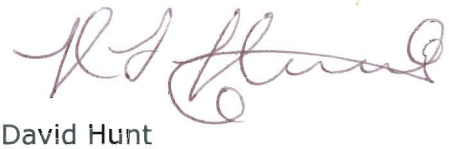
London SW1P 3GE

or by email to david.hunt@ofgem.gov.uk.

Following closure of this open letter consultation, and careful consideration of respondents' views, we intend to consult formally on this issue in June 2007.

Yours faithfully,



David Hunt
Senior Manager – Electricity Transmission Policy

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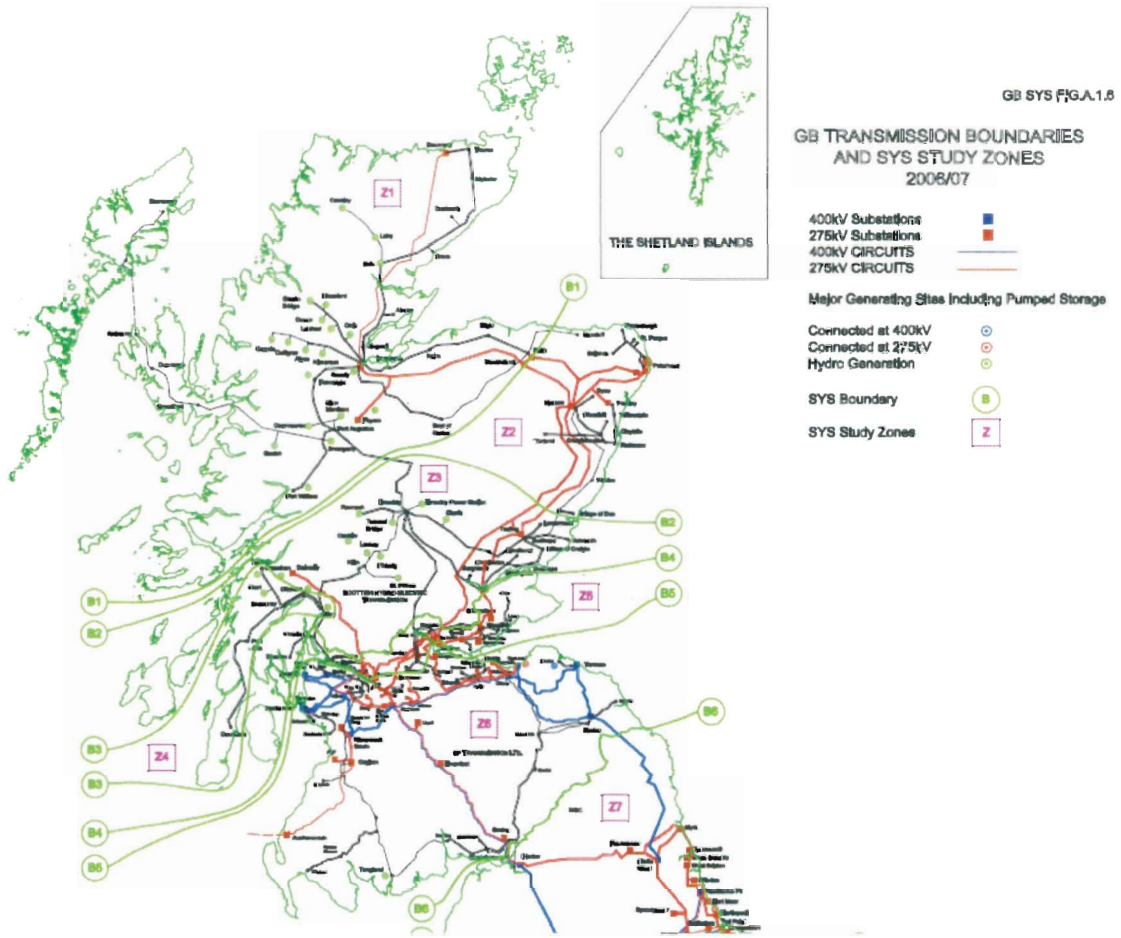
Appendix 1 – Map of the Scottish transmission system boundaries and Seven Year Statement study zones 2006/07



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Appendix 2 – NGET Planning Request

Planning Request NGET 2006/003

Requesting Party:

NGET

Party to whom request is being made:

SPT

Date Request made:

7th December 2006

Reason for the Planning Request:

Constraint costs:

In the period 01/04/2006-19/11/2006 NGET procured export constraint volumes exceeding 389GWh in Scotland to ensure that the Main System Boundary 'B5' SPT North to SPT South was operated within the criteria and methodologies defined by the Security and Quality of Supply Standards. The constraint volumes have been calculated based on a total of 233 days where the constraint was active for 73 days (31% of time) for both outage and intact conditions. NGET have used an indicative constraint price of £30/MWhr for evaluating constraint costs in this request and assumed the constraint is active only for weekdays. Note this figure is a conservative estimate for the purpose of economic assessment for investment. Using this data provides a minimum ongoing annual constraint cost of £0.8m/week[5] for when the constraint becomes active. If we dilute the costs and assume the constraint was active for all of the 233day period this gives an ongoing annual constraint cost of £0.35m/week[6]. Based on these figures the expected annual constraint cost would be approximately £18.2m

Proposed Reinforcements:

Under the direction of Associate Works of the Beauly-Denny reinforcement, SPT will be investing in the Main System Boundary 'B5' SPT North to SPT South to increase thermal capability thus releasing system capacity for User connections. These Users include those currently awaiting Beauly–Denny along with a number of other projects only requiring the 'B5' reinforcement. The work is currently planned to commence in Year 1 of the overall Beauly-Denny programme of works, where Year 1 is the assumed year of consents (to be adjusted as required pending timing of consents). In the period 01/04/2006-19/11/2006 NGET have seen constraint volumes of 26.6GWh[7] per week for periods where the constraint is active for outage and intact conditions. With >1500MW of contracted generation due to connect within the constraint area prior to Year 1 of Beauly-Denny programme (circa 2008/9) the constraint management costs will increase and become more uneconomic and inefficient for the industry.

Proposals:

It is believed that the system can be operated more economically if SPT were to progress the works associated with SP-PLD-001 (Beauly – Denny TOR) that are not depend on the consents for Beauly-Denny over head line, i.e. the Easterhouse and Clyde's Mill switchgear replacement and the relocation/installation of a series reactor at Windyhill. That is de-linking and acceleration of already planned SPT investment works. It is believed that the only additional costs will be those for advancement which can be considered to be conservative in comparison to the overall cost of the works.

[5] Based on (389GWh of volume / 73 days)*(5days a week)*(£30/MWhr) = £0.8m/week
[6] Based on ((389GWh of volume / (233 days/(5/7)))*(5days a week)*(£30/MWhr) = £0.35m/week
[7] Based on 389GWh of constraint volume active for 73 days on a 5day/wk basis

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When these system upgrade works are complete, the resulting transfer capacity across B5 boundary of 3.67GW will not totally eliminate constraints under outage conditions but will reduce overall constraint management costs to the industry. This is especially vital as further extensive outages are required on the B5 boundary for the installation of Denny substation. The future release of 900MW of system capacity as a result of Beauly-Denny and the increase in constraint management costs will be something that has been identified but will require future works and agreement between SPT and NGET on the way forward. The de-linking of works from Beauly-Denny should not incur considerable increased costs for SPT as it is already included in their Project Listing and Price Control Review. The de-linking of these works is believed to be the most economic and efficient solution to the enduring system issue given the uncertainty on consents being granted for the Beauly-Denny line.

NGET would therefore like to propose that SPT carry out an Economic Analysis in accordance with STCP 16-1 to identify if there is economic justification for de-linking of the Easterhouse and Clyde's Mill switchgear replacement and the Windyhill series reactor installation from the Beauly-Denny line works or, if deemed appropriate, an alternative investment proposal.

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Appendix 3 – SPTL Economic Analysis

1. SCOPE

In response to the level of generation constraints being incurred to ensure the transmission system in central Scotland is operated in accordance with the SQSS, NGET as GB System Operator and in accordance with the SO-TO Code, has submitted to SPT Planning Request ref. NGET 2006/003. NGET request that SPT consider progressing the TIRG approved reinforcement works on Boundary B5 independently of the main Beauly-Denny works.

This document has been prepared in response to Planning Request ref. NGET 2006/003. It sets out the results of a cost-benefit assessment of delivering the TIRG B5 works independently of the main Beauly-Denny works. The analysis uses a methodology consistent with that used by Ofgem in its TIRG Final Proposals.

Cost-benefit analysis has been carried out against various scenarios using conservative assumptions around constraint value (£30/MWh). These are: a) advance the TIRG B5 works; b) undertake the works as part of the main Beauly/Denny project assuming no further delays in planning consent; and c) do nothing. The NPV cost of advancing the works (Option A)) is some £2.3m less that the NPV costs of undertaking the works as part of the main Beauly/Denny project (Option B)) and £10m less than the do nothing option (Option B)). Further delays are expected to the main Beauly/Denny project as a result of the ongoing public inquiry. This would further increase the cost of Option B relative to Option A. It is therefore concluded that the most economic alternative is delivery of the TIRG B5 works independent of the main Beauly-Denny project.

The purpose of this paper is therefore to request that £11.2m of expenditure associated with the TIRG B5 works be advanced and allowed to progress independently of the main Beauly/Denny project. Earliest completion for these works is July 2009. This is contingent on contracts being placed in early June 2007 requiring a decision by end of May.

2. INTRODUCTION

Background

Ofgem's TIRG consultation began in October 2003. The process was initiated in recognition of the need for transmission investment to proceed without delaying the construction of new renewable generation or causing substantial increases in constraint payments to generation connected to the existing system. The TIRG Final Proposals (the Final Proposals) were published in December 2004 and proposed a funding mechanism for those projects that were categorised as 'baseline' i.e. those where the benefits provided by the upgrade exceeded the capital costs.

To accommodate increased north to south power flows through central Scotland arising from new renewable generation connections in the north of Scotland, reinforcement of the transmission system in central Scotland is required. In view of the planned 2008/09 completion of the Beauly-Denny scheme at the time of the TIRG assessment, these 'TIRG B5 works' were integrated into the main Beauly-Denny project and classified as baseline in the Final Proposals.[8]

The Public Inquiry in respect of the Beauly to Denny 400kV overhead line commenced in February 2007. It is estimated that the main Beauly/Denny reinforcement will not be completed prior to 2012. It is anticipated that a significant volume of renewable generation, up to a maximum of 1,550MW,

[8] The TIRG B5 works form the first stage of reinforcement on Boundary B5. The second stage of reinforcement on Boundary B5 was included in SPT's December 2005 TPCR submission.

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will connect to the north of Scotland transmission and distribution networks in advance of the Beauly-Denny scheme project being completed.

The GB System Operator (GBSO), National Grid Electricity Transmission (NGET), has advised SP Transmission Ltd (SPT) that a significant volume of export constraints have been procured to date to ensure the central Scotland network, specifically Boundary B5, is operated in accordance with the GB Security and Quality of Supply Standard (SQSS). NGET has requested that SPT consider progressing the TIRG reinforcement works planned on this boundary independently of the main Beauly-Denny project.

Purpose of this Document

This document has been prepared in support of a request that funding be made available for the TIRG reinforcement of Boundary B5 to proceed without delay. This document considers the analysis of the costs and benefits of the upgrade based on the most up to date generation constraint information from NGET.

Structure of this Document

The remainder of this document is structured as follows:

- Section 3 summarises the constraint costs incurred by NGET to ensure that Boundary B5 is operated in accordance with the SQSS;
- Section 4 details the Users dependent on the TIRG B5 works;
- Section 5 provides a description of the TIRG B5 works;
- Section 6 summarises the results of cost-benefit analysis using a methodology consistent with that used by Ofgem in the Final Proposals; and
- Section 7 sets out the key dates to facilitate an accelerated delivery of the TIRG B5 works.

3. NGET PLANNING REQUEST

In accordance with Section D Part One, Paragraph 2.4.2 of the SO-TO Code, the GBSO has submitted to SPT Planning Request ref. NGET 2006/003, requesting that SPT consider a change to its Transmission Investment Plan.

Planning Request ref. NGET 2006/003 is based on the volume of export constraints procured to ensure that the transmission network in central Scotland, specifically Boundary B5, is operated in accordance with the SQSS.

The existing SPT system is shown schematically in Appendix A. The 'SPT North to SPT South' Boundary B5 is a main system boundary defined by three double circuit overhead line routes, as detailed in Table 1.

OHL Route	Western Circuit	Eastern Circuit
XF	Windyhill to Devol Moor 400kV	Windyhill to Neilston 275kV
ZC(N)	Longannet to Easterhouse 275kV	Longannet to Clyde's Mill 275kV
XD and XN	Kincardine to Currie 275kV	Kincardine to Grangemouth 275kV

Table 1 – Definition of Boundary B5

In the period from 1st April 2006 to 19th November 2006, NGET procured export constraint volumes exceeding 389GWh in Scotland to ensure that Boundary B5 was operated in accordance with the SQSS. This constraint volume was independent of the status of Hunterston B Generating Station. NGET advise that an indicative constraint price of £30/MWhr represents a conservative estimate for

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the purpose of economic assessment for investment. A conservative estimate of the constraint cost incurred in the period from 1st April 2006 to 19th November 2006 is therefore in excess of £11.67m.[9]

Of the 233 day period from 1st April 2006 to 19th November 2006, the constraint was active on 73 week-days, normally for a fourteen hour period per day. This indicates a typical constrained generating capacity of approximately 380MW to the north of Boundary B5.[10]

While the constraint was active for both intact and outage conditions, the majority of constraints are incurred with either of the Longannet-Clyde's Mill 275kV or Longannet-Easterhouse 275kV circuits out of service.[11] Outages on other circuits on Boundary B5 tend to be less onerous in terms of generation constraints. A conservative estimate of ongoing constraint costs when the constraint is active is £0.8m/week.[12]

4. USER CONNECTIONS

At 31st October 2006, a total of 627MW of renewable generation was connected in the north of Scotland. Up to 1,550MW of renewable generation can be accommodated in the Scottish Hydro-Electric Transmission Ltd (SHETL) area in advance of Beauly-Denny and major reinforcement of the SHETL and SPT networks.

The TIRG approved Beauly-Denny project is described in Transmission Owner Reinforcement Instruction (TORI) SPT-RI-001, upon which a significant number of new renewable connections in the north of Scotland are dependent.

As the main Beauly-Denny works and associated works on Boundary B5 are TIRG approved, they have been reflected in SPT's Transmission Owner Construction Agreements with NGET as Wider Transmission Reinforcement Works (H2 Works). Security for these works has not been requested from Users to date.

In view of their geographical location (and timing of application for connection), a number of renewable generation projects in the north of the SPT area and south of the SHETL area are dependent upon the TIRG B5 works detailed in SPT-RI-001 but not the main Beauly-Denny reinforcement. The connection capacity of these generation projects totals approximately 208 MWs.

5. DESCRIPTION OF TIRG B5 WORKS

Scope of Works

The TIRG upgrade works on Boundary B5 are summarised as follows:

- Replace switchgear and connections at Easterhouse 275kV substation, delivering a 1500MVA capability on the Longannet-Easterhouse 275kV circuit;
- Replace two bays of switchgear and associated connections at Clyde's Mill 275kV substation, delivering a 1500MVA capability on the Longannet-Clyde's Mill and Easterhouse-Clyde's Mill 275kV circuits; and
- Relocate 275kV 1000MVA series reactor from Smeaton 275kV substation and install at Windyhill 275kV substation on the Neilston circuit. Replace the associated 275kV switchbay at Windyhill 275kV substation. The series reactor improves post-fault load sharing on the Windyhill-Devol Moor 400kV and Windyhill-Neilston 275kV circuits.

[9] 389GWh of volume x £30/MWh conservative cost = £11.67m (current cost understood to be in range £40 - £120MWh)
[10] 389GWh of volume / (73days x 14hhours per day) = 380.6MW
[11] These circuits form part of the main power corridor from Longannet Generating Station to Strathaven 400/275kV substation, the northern end of the west coast interconnector.
[12] (389GWh of volume / 73 days) x (5days per week) x £30/MWh conservative cost = £0.8m/week

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The capability of Boundary B5 to accommodate transfers from north to south is sensitive to the generation pattern in Scotland. Power system analysis studies on a range of generation schedules indicate the works above to enhance boundary capability by 500-600MW on an intact system, and by approximately 600MW with the Longannet-Clyde's Mill 275kV circuit out of service pre-fault. The results of these studies are summarised in Appendix B.

The enhancement in boundary capability is in excess of the typical constrained generating capacity of 380MW to the north of Boundary B5. The TIRG B5 works are therefore expected to alleviate the constraints presently being incurred to ensure compliance on Boundary B5 and provide headroom to accommodate an increase in renewable generation in the north of Scotland without an associated increase in constraint volume.

TPCR Allowed Works at Clyde's Mill

As set out above, the TIRG B5 works include replacement of two bays of 275kV switchgear at Clyde's Mill substation. Given the condition of the remaining switchgear, funding was allowed for replacement under the TPCR, commencing 2011/12. It is therefore considered that the replacement of the two bays associated with the TIRG works will require to be undertaken in 2012 regardless of the progress of Beauly/Denny.

Indicative Cost of Works

Tenders have been received for the various elements of works. The forecast cost of the works is £11.2m. As set out in out TIRG submission to Ofgem of February 2006, this represents a reduction of around £11m compared to the costs allowed under the TIRG Final Proposals.

Delivery Timetable

The original delivery programme for the TIRG B5 works was integrated into the programme for delivering the main Beauly-Denny reinforcement.

A revised two-year delivery programme is set out below:

- Longannet-Easterhouse/ Clyde's Mill 275kV circuits upgraded by October 2008;
- Series reactor commissioned in Windyhill-Neilston 275kV circuit March 2009; and
- Easterhouse-Clyde's Mill 275kV circuit upgraded by July 2009.

The main outages on the heavily loaded Longannet-Easterhouse/ Longannet-Clyde's Mill 275kV corridor will be confined to the 2008 outage season, during which generation is expected to be constrained due to outages on the Scotland-England interconnector.

6. COST-BENEFIT ANALYSIS

This section sets out cost-benefit analysis undertaken by SPT. The analysis uses a methodology consistent with that used by Ofgem in its Final Proposals and is based on constraint data provided by NGET in Planning Request ref. NGET 2006/003.

Incidence of Capital Expenditure

An indicative incidence of expenditure, based on advancing the TIRG B5 works is set out in Table 3 below.

2006/07	Total	07/08	08/09	09/10

Values	(£m)	(£m)	(£m)	(£m)
TIRG B5 Works	11.2	3.3	6.4	1.5

Table 3 – Incidence of Expenditure

Cost-Benefit Results

Both the Longannet-Clyde's Mill 275kV and Longannet-Easterhouse 275kV circuits were out of service for a number of weeks during the period 1st April 2006 to 19th November 2006 for overhead line refurbishment works. It is therefore appropriate for the purposes of this cost-benefit assessment to normalise the annual maintenance to a one-week period per circuit per year. This gives rise to conservative estimate of annual constraints of £1.6m per annum.[13]

The following simplifying assumptions make this assessment a particularly conservative estimate of the benefit in progressing the TIRG B5 works independently of the main Beauly-Denny works:

- Constraints on the intact system are ignored;
- Constraints during outages other than of the Longannet-Clyde's Mill 275kV and Longannet-Easterhouse 275kV are ignored;
- No consideration of increasing volumes of renewable generation north of Boundary B5. As the 627MW presently connected in the SHETL area increases towards 1,550MW in the period prior to the main Beauly-Denny connections being delivered, it will give rise to increased constraint volumes on both an intact and depleted system;
- No consideration of any increase in load factor at Longannet Generating Station, which may result from installation of Flue Gas Desulphurisation (FGD) technology;
- Conservative cost of constraints of £30/MWh employed (current level of constraints cost understood to be between £40 and £120MWh)); and
- Discount rate of 8.8% employed. PB Power employed 6% in cost-benefit analysis in their Final Draft Report for Ofgem entitled 'Technical Evaluation of SPT Forecast Capital Expenditure Programme for the Period 2005/06 to 2011/12', dated July 2006.

The present value of capital and constraint costs of three alternative options have been considered:

- Option A - Advance the TIRG B5 works and undertake independently of Beauly/Denny.
- Option B - Undertake the TIRG B5 works as part of the main Beauly/Denny project, assuming completion in 2012.
- Option C – Do nothing (i.e. Beauly/Denny does not get planning consent.) Assumes that switchgear replacement at Clyde's Mill will be undertaken due to asset condition.

The present value cost of option A is summarised below.

2006/07 Values	07/ 08 (£m)	08/ 09 (£m)	09/ 10 (£m)	Total (£m)	PV (£m)
Constraint Cost	1.6	1.6	0	3.2	2.8
Cost of Works	3.3	6.4	1.5	11.2	9.6
Total	4.9	8.0	1.5	14.4	12.4

Table 4 – PV Cost Summary Option A

The present value cost of option B is summarised below.

2006/07 Values	07/ 08 (£m)	08/ 09 (£m)	09/ 10 (£m)	10/ 11 (£m)	11/ 12 (£m)	12/ 13 (£m)	Total (£m)	PV (£m)

[13] 1 week per circuit x 2 circuits x £0.8m per week (from Section 6) = £1.6m per annum.

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Constraint Cost	1.6	1.6	1.6	1.6	1.6	1.6	9.6	7.2
Cost of Works	0	0	0	3.3	6.4	1.5	11.2	7.5
Total	1.6	1.6	1.6	4.9	8.0	3.1	20.8	14.7

Table 5 – PV Cost Summary Option B

The present value cost of option C is summarised below.

2006/07 Values	07/ 08 (£m)	08/ 09 (£m)	09/ 10 (£m)	10/ 11 (£m)	11/ 12 (£m)	12/ 13 (£m)	13/14 (£m)	46/47 (£m)	Total (£m)	PV (£m)
Constraint Cost	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	64.0	17.6
Clyde's Mill	0	0	0	0	0	2.6	2.7	0	5.3	3.1
Total	1.6	1.6	1.6	1.6	1.6	1.6	4.3	1.6	69.3	20.7

Table 6 – PV Cost Summary Option C

It can be seen from this analysis that option A is the most economic (present value cost £2.3m less than option B and £6.3m less than option C). If the analysis is carried out with a constraint cost of £60/MWh then the present value cost is £6.8m less than option B and £19.8m less than option C. Further delays are expected to the main Beauly/Denny project as a result of the ongoing public inquiry. This would further increase the cost of Option B relative to Option A.

7. TIMING AND DELIVERY

Decision Deadline

Significant progress has been made on the pre-construction work associated with the TIRG Beauly-Denny project and tenders have been received for various aspects of the project.

Completion of the TIRG B5 works is not dependent on delivery of onerous consents for new substation sites or overhead lines, as the scope of work is restricted to existing transmission substation sites.

Consequences of Delays

In the absence of the TIRG B5 works being progressed independently of the main Beauly-Denny works and delivered as soon as possible, constraint management costs will increase as new renewable generation continues to connect north of Boundary B5. These constraint management costs will become more uneconomic and inefficient for the industry.

8. CONCLUSION

It is concluded that delivery of the TIRG B5 works independent of the main Beauly-Denny works is the most economic alternative. These works should be progressed without delay.

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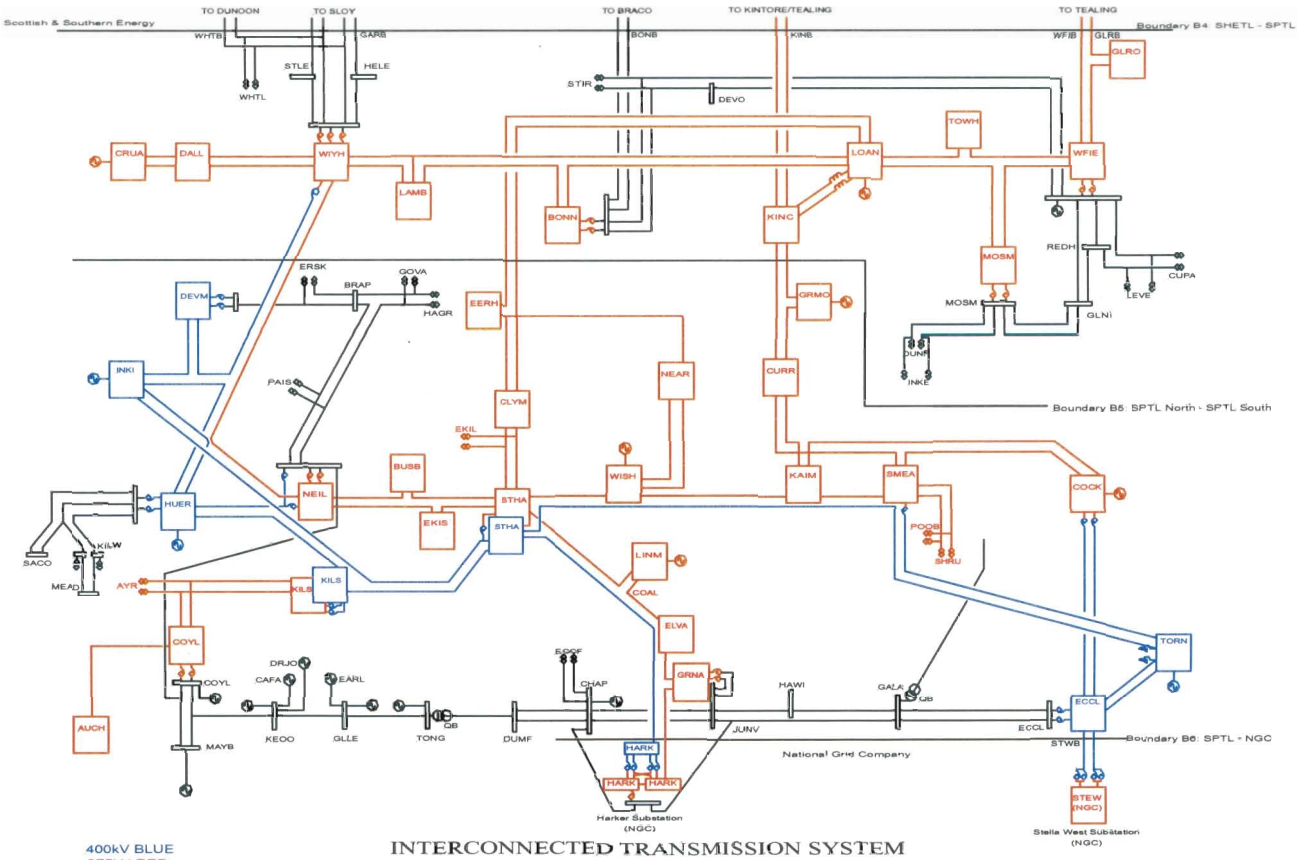
APPENDIX A

Schematic Diagram of SPT Network



INTERCONNECTED TRANSMISSION SYSTEM
SPTL Transmision Boundaries and SYS Study Zones, 2006/07

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APPENDIX B

Results of Power System Analysis

Security assessment for thermal and voltage limits has been completed on the 2008/09 GB network under three alternative generation schedules in the Scotland.

The boundary capability on an intact system is summarised in Table A1.

The boundary capability, with the Longannet-Clyde's Mill 275kV circuit out of service pre-fault is summarised in Table A2.

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Boundary Capability	Generation Schedule								
	1			2			3		
	MW	LIMIT	N-D OUTAGE	MW	LIMIT	N-D OUTAGE	MW	LIMIT	N-D OUTAGE
Base Capability	2936	NEIL-WIYH	LOAN-EERH	2860	NEIL-WIYH	LOAN-EERH	2849	NEIL-WIYH	LOAN-EERH
Post TIRG Upgrade	3471	STHA4-STHA2	KINC-GRMO	3487	LAMBT-LOAN	LOAN-EERH	3401	STHA4-STHA2	KINC-GRMO
Incremental Capacity	535			627			552		

Table A1 - Boundary B5 Capability, Intact System

Boundary Capability	Generation Schedule								
	1			2			3		
	MW	LIMIT	N'-D OUTAGE	MW	LIMIT	N'-D OUTAGE	MW	LIMIT	N'-D OUTAGE
Base Capability	1785	LOAN-EERH	KINC-GRMO	1861	LOAN-EERH	KINC-GRMO	1903	LOAN-EERH	KINC-GRMO
Post TIRG Upgrade	2429	LOAN-EERH	KINC-GRMO	2496	LOAN-EERH	KINC-GRMO	2510	LOAN-EERH	KINC-GRMO
Incremental Capacity	644			635			607		

Table A2 - Boundary B5 Capability, Longannet-Clyde's Mill 275kV Out of Service Pre-Fault

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Appendix 4 – Current Beauly-Denny 'Pre construction, contingency and construction costs' table

SCHEDULE C: SUPPLEMENTARY PROVISIONS TO SPECIAL CONDITION J3 (Restriction of transmission charges: Transmission Investment for Renewable Generation)

Beauly-Denny

Pre construction, contingency and construction costs

project costs (£ 000) 2004 prices	**t=p**	**t=-1**	**t=0**	**t=1**	**t=2**	**t=n**
Forecast pre-construction and contingency costs	2,900	1,600	n/a	n/a	n/a	n/a
Forecast Construction Costs			18,700	26,400	22,200	5,900
Average asset value during construction period ($FTIRGC_t^i$)	n/a	n/a	9,350	31,433	54,138	65,378
Depreciation during Construction ($FTIRGDepn_t^i$)				935	2,255	3,365

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Appendix 5 – Illustration of separating out the B5 boundary works from the Beauly-Denny 'Pre construction, contingency and construction costs' table

Please note that only the 'Forecast Construction Costs' have been amended for the purposes of this example. The remaining values have not been recalculated and have therefore been removed.

SCHEDULE C: SUPPLEMENTARY PROVISIONS TO SPECIAL CONDITION J3 (Restriction of transmission charges: Transmission Investment for Renewable Generation)

Beauly-Denny

Pre construction, contingency and construction costs

project costs (£ 000) 2004 prices	t=p	t=-1	t=0	t=1	t=2	t=n
Forecast pre-construction and contingency costs						
Forecast Construction Costs			18,700	20,000	11,100	2,200
Average asset value during construction period ($FTIRGC_t^i$)						
Depreciation during Construction ($FTIRGDepn_t^i$)						

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B5 Boundary

Pre construction, contingency and construction costs

project costs (£ 000) 2004 prices	**t=p**	**t=-1**	**t=0**	**t=1**	**t=2**	**t=n**
Forecast pre-construction and contingency costs						
Forecast Construction Costs				3,100	6,100	1,400
Average asset value during construction period ($FTIRGC_t^i$)						
Depreciation during Construction ($FTIRGDepn_t^i$)						

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