



---

*Promoting choice and  
value to customers*

All Interested Parties

Your Ref:  
Our Ref:  
Direct Dial: 020 7901 7074  
Email: amrik.bal@ofgem.gov.uk

31 October 2005

Dear Colleague,

**Transmission Investment for Renewable Generation - Scottish Power Transmission Limited's Submission to Ofgem to Upgrade the Scotland / England Interconnector**

Ofgem has received a submission from Scottish Power Transmission Ltd (SPTL) requesting that funding is made available for an upgrade of the Scotland / England interconnector in line with the conclusions of '*Transmission investment for renewable generation, Final Proposals*', December 2004, Ofgem.

This letter sets out the background to the proposed Transmission Investment for Renewable Generation (TIRG) revenue allowance; the basis on which funding for an upgrade of the Scotland/England Interconnector would be permitted under TIRG; and invites views from all interested parties prior to the Authority deciding the extent to which funding should be permitted for the Scotland/England Interconnector upgrade under TIRG.

**Background**

The TIRG consultation process began in October 2003. This process was intended to consider the investment issues faced by the three licensed transmission operators as a result of an increase in the demand for transmission capacity from renewable generators.

As explained in the Final Proposals document, it had not been practicable to make allowances in the last price controls (1999 for SPTL and SHETL and 2000 for NGC) or establish incentive arrangements for any associated investment due to the significant uncertainty of both the likely level and pattern of emerging renewable generation. However, the Final Proposals document made clear that since those price controls, and in response to obligations placed on electricity suppliers by the Government<sup>1</sup>, there had been an increase in the demand for transmission capacity from renewable generators.

---

<sup>1</sup> The Renewables Obligation Order 2002 and the Renewables Obligation (Scotland) Order 2004 placed an obligation on suppliers to supply an increasing proportion of electricity from renewable sources or face financial penalties.

Consequently, if the funding of transmission investment was not addressed before the next main price controls in 2006, this could hamper transmission investment required to meet this demand. A subsequent delay in the connection of new generation to the transmission and distribution networks could result in an increase in the costs of constraining new or existing generation plant off the system. This would not be in the interests of consumers who would ultimately pay these costs.

Ofgem commissioned an independent engineering assessment to help determine whether each of the investment projects put forward by the transmission licensees could be justified in terms of reducing the cost of network constraints and transmission losses. Subsequently, the various transmission investment projects were categorised as follows:

- 'Baseline' – these were projects which appeared to be clearly justifiable in terms of savings and constraint and other costs;
- 'Incremental' – these were projects where there was some uncertainty regarding the savings; and
- 'Additional' – these were projects where there was significant uncertainty in terms of savings and high probability that the investment could be stranded.

Baseline projects would be funded through the TIRG revenue allowance arrangements described in the Final Proposals document. Incremental and additional investment, however, could be considered at the next transmission price control review in 2006.

### **Basis of Funding for Scotland / England interconnector upgrade under TIRG**

The Scotland/England interconnector upgrade was classified as baseline investment in the TIRG Final Proposals document. However, the Final Proposals document made clear that this classification was dependent on either the Beaulieu-Denny reinforcement project receiving planning consent or additional connection activity in western Scotland triggering the need for substantial works on the western circuit of the England-Scotland Interconnector.

Either of the above would affect the level of constraint costs, and hence the economic justification for the upgrade.

Ofgem has recently published a notice under section 11 of the Electricity Act 1989 setting out its intention to modify each of the transmission licences to introduce a TIRG revenue allowance which would provide funding for the baseline TIRG projects<sup>2</sup>.

Under the proposed licence conditions the TIRG revenue allowance for each baseline project will generally be made up of a preconstruction and contingency allowance, a construction revenue allowance, an incentive revenue allowance and a regulated asset value revenue allowance.

However, as indicated in the Final Proposals document, under the proposed licence conditions the TIRG revenue allowance for the Scotland/England interconnector project will be restricted to

---

<sup>2</sup> [http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/12698\\_235\\_05a.pdf?wtfrom=/ofgem/index.jsp](http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/12698_235_05a.pdf?wtfrom=/ofgem/index.jsp)  
[http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/12697\\_235\\_05c.pdf?wtfrom=/ofgem/index.jsp](http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/12697_235_05c.pdf?wtfrom=/ofgem/index.jsp)

a preconstruction and contingency allowance unless either one of the following two preconditions are satisfied:

- (a) planning consent is granted for reinforcement of the NTS between Beaulieu and Denny;  
or
- (b) the Authority is satisfied that sufficient additional requests for connection to the NTS have been made in western Scotland to justify a need for substantial works on the western circuit of the England-Scotland Interconnector which is independent of the proposed reinforcement of the NTS between Beaulieu and Denny.

Where either precondition is satisfied, the Scotland/England interconnector upgrade will receive the standard TIRG revenue allowance in line with the other baseline investment projects.

### **Views Invited**

SPTL has submitted its views on a number of issues concerning how the Scotland/England upgrade should be treated under TIRG. These are attached as Appendix 1<sup>3</sup>.

Ofgem would welcome views from all interested parties on SPTL's submission. In particular, on whether either precondition for the Scotland/England interconnector upgrade receiving the standard TIRG revenue allowance, as set out in the proposed licence conditions, has been satisfied.

Any responses should reach me by 18 November. It is anticipated that Ofgem will publish its decision shortly thereafter on whether it is satisfied that the preconditions to the Scotland/England interconnector upgrade receiving the standard TIRG revenue allowance have been met.

This letter is entirely without prejudice to the Authority's decision in relation to whether the transmission licences should be modified so to insert the proposed TIRG licence conditions.

Yours sincerely



Amrik Bal  
**Head, Transmission Policy**

---

<sup>3</sup> SPTL has also forwarded to Ofgem some confidential information which it is not possible to make public.



# **SP Transmission**

**Transmission Investment for Renewable Generation**

**Scotland – England Interconnector Upgrade**

**Submission to Ofgem to Demonstrate Justification for Upgrade**

**7<sup>th</sup> October 2005**

## EXECUTIVE SUMMARY

This document has been prepared by SP Transmission to request that funding be made available to allow the upgrade of the Scotland-England interconnector (the upgrade) to proceed without further delay.

This request is in line Ofgem's Final Proposals of the Transmission Investment for Renewable Generation (TIRG) of December 2004. These proposals assessed the economics of the upgrade and, while concluding that it is economically justified, specified that funding would only be made available if the Beaully-Denny reinforcement were to gain planning consent or if there was significant transmission connection activity on the western circuit of the interconnector.

This document presents the following conclusions based on our updated analysis.

- The conditions set out in the TIRG Final Proposals, in terms of volumes of generation independent of Beaully - Denny and connection activity necessitating work on the western circuit of the interconnector, have been met.
- Completion of the upgrade has already been delayed from 2008 until 2010 as a result of the requirement for the Beaully-Denny upgrade to be granted planning consent before funding will be provided.
- Further delays are likely as the Beaully-Denny upgrade progresses through the planning process. This will result in more unnecessary constraint costs and stranded investment costs associated with the significant connection activity that has materialised around the western circuit of the interconnector.

***The Beaully – Denny dependency should therefore be removed to enable construction to progress at the earliest opportunity.***

Further information on the various issues is provided below.

### **Level of Generation to Justify Upgrade**

We have carried out an updated evaluation of the costs and benefits of the upgrade. The major differences from the previous analysis are:

- a significant increase in the amount of generation that has contracted to connect to the transmission system in Scotland and which can connect without Beaully-Denny; and
- consideration of the significant costs that will be incurred if the upgrade does not proceed.

Ofgem's TIRG proposals concluded that the upgrade would be justified with between 4 GW and 5 GW of wind generation in Scotland. There is currently 4.4 GW of wind generation that has contracted to connect in Scotland and can connect without Beaully-Denny. ***On this basis the upgrade is justified now and no further analysis is required.***

Our updated analysis, using the same methodology as Ofgem, and a prudent generation scenario indicates that the upgrade is justified between 1.7 GW and 2.3 GW. The 4 - 5GW threshold set out in the TIRG Final Proposals was based on a very pessimistic generation scenario and did not take sufficient account of the full costs and benefits associated with the upgrade.

***It is clear from our updated analysis that the upgrade is justified now regardless of progress on Beaully – Denny.***

### **Cost of Delays**

The linkage with Beaully-Denny has already resulted in delays to the upgrade with completion of the full upgrade now delayed from 2008 to at least 2010. We have mobilised a substantial team to progress the pre-construction work on the upgrade and are now in a position to let contracts for detailed engineering design and, subject to planning consent, construction. Unless we are able to let contracts by the end of this year then there is a genuine risk that we will be unable to meet the 2008 completion date for the west coast works resulting in at least a one - year delay to completion of the full upgrade.

The amount of generation that will connect in Scotland will increase over time. As a result, delays to the upgrade will increase the levels of pre-upgrade constraints and constraints during construction. The cost of these constraints will be significant. We estimate that a one-year delay from the current programme would cost of the order of £20m.

***The upgrade should therefore be allowed to progress without further delay.***

### **Compliance with License Security Standards**

The GB Security and Quality of Supply Standard (SQSS) requires an interconnector export capability of 3 GW by the winter of 2005. Compliance with this standard is a licence obligation on SP Transmission and the interconnector upgrade is essential to delivering the required increase in export capability. The current non-compliance has been recognised by Ofgem and derogation has been granted until 2007.

***We believe that this document clearly demonstrates the justification for the upgrade. We therefore request that this matter be considered at the earliest opportunity and that the Beaully-Denny dependency is removed to allow the upgrade to progress without further delay.***

***It must be emphasised that such a decision is entirely consistent with the TIRG Final Proposals and with the TIRG licence modifications that are in the final stages of drafting.***

# **1. INTRODUCTION**

## **1.1 Background**

1.1.1 Ofgem's TIRG consultation process 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.

1.1.2 Although the interconnector upgrade was classified as baseline, the Final Proposals specified that funding would only be made available if planning consent was granted for the Beaulieu-Denny upgrade or if requests for transmission connections triggered the need for substantial work on the western circuit of the interconnector. The basis for the introduction of the funding dependency was stated as being that the increasing energy flows arising following completion of the Beaulieu-Denny upgrade would contribute towards the constraint costs associated with the interconnector. It was therefore considered that the economics of the upgrade could be undermined if Beaulieu-Denny was not granted planning consent.

## **1.2 Purpose of this Document**

1.2.1 This document has been prepared to request that funding be made available for the interconnector upgrade to proceed without further delay. The document considers the analysis of the costs and benefits of the upgrade based on the most up to date position in terms of generation activity. In addition it presents analysis of the costs of further delays.

1.2.2 The cost benefit analysis presented is based on a methodology consistent with that used by Ofgem in its TIRG proposals and is based on constrained energy calculations provided by Ofgem's TIRG consultants, Sinclair Knight Mertz (SKM).

## **1.3 Structure of this Document**

1.3.1 Section 2 of this document provides an overview of Ofgem's TIRG conclusions and the associated analysis, including our observations on the assumptions underlying the analysis. Section 3 presents our updated analysis while Section 4 assesses some of the timing and delivery issues.

## 2. OVERVIEW OF OFGEM ANALYSIS

### 2.1 Background

- 2.1.1 Ofgem and its consultants, SKM, carried out a technical and economic review of investment proposals presented by the three transmission licensees. Ofgem concluded the upgrade was justified ‘with about 4 GW to 5 GW of wind generation in Scotland’.
- 2.1.2 The cost benefit analysis on which the proposals were based evaluated the capitalised costs of the upgrade against the capitalised costs of the saved energy constraints following completion of the upgrade. The principle behind this analysis is that constraint management costs will increase as new generation connects in advance of the upgrade and that these costs will be reduced once the upgrade is completed and additional transmission capacity is provided. The analysis was presented in graphical form in Figure 5 of the Final Proposals (see below).

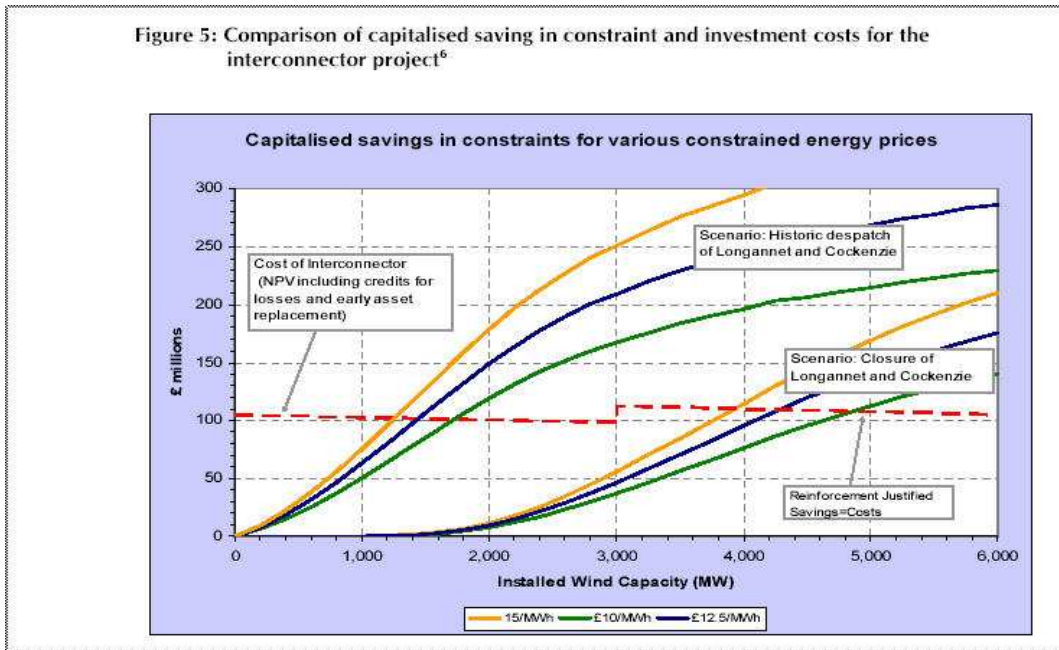


Figure 2.1 Graph of Cost Benefit Analysis from TIRG Final Proposals

### 2.2 Generation Scenarios

- 2.2.1 The Final Proposals considered two generation scenarios, described in the proposals as “plausible”. The first, where the existing coal plant in Scotland was despatched at historic levels for the 40 year life of the upgrade, and the second, where this plant was closed for the life of the upgrade. The capital cost of the upgrade was reduced for the purposes of the analysis to include credits for early replacement of the overhead line conductor on the east coast circuit (which would require to be replaced in 2014) and reductions in electrical losses resulting from the upgrade.

2.2.2 It can be seen from the graph that the upgrade is justified (i.e. the benefits exceed the costs) when:

- under the historic despatch scenario, between 1.4 GW and 1.6 GW of generation is connected; and
- under the scenario with existing coal plant closed for the lifetime of the upgrade, between 4 GW and 5 GW of generation is connected.

2.2.3 The Final Proposals used the scenario with the existing coal plant closed for the 40-year lifetime of the upgrade as the basis for its conclusions. Given that the generation threshold under this scenario was broadly consistent with SKM's assessment of the amount of generation likely to connect, the upgrade was regarded as justified and classified as baseline investment.

### **2.3 Categorisation as Baseline**

2.3.1 While the upgrade was categorised as baseline, funding was ultimately linked to the progression of the Beaulieu-Denny project as it was considered that the increased energy flows arising following the completion of Beaulieu-Denny would contribute towards the constraint costs associated with the interconnector.

2.3.2 In view of the significant connection activity around the west coast circuit of the interconnector the proposals recognised the benefits of co-ordinating this work with the upgrade and stated that funding should be provided if this connection activity necessitated substantial work on the interconnector.

### **2.4 Observations on Analysis**

2.4.1 The following text provides a number of observations on the following key aspects of Ofgem's analysis:

- whether increased energy flows arising following completion of Beaulieu-Denny are required in order for the interconnector upgrade to be justified;
- the appropriate generation background including the operating regime of the existing coal plant; and
- the costs that will be incurred if the upgrade does not progress.

#### *Energy Flows Following Completion of Beaulieu-Denny*

2.4.2 The Final Proposals stated that the increasing energy flows that would be provided for by the Beaulieu-Denny upgrade would contribute towards the constraint costs associated with the interconnector. This was the reason given for the linkage between funding of the upgrade and Beaulieu-Denny gaining planning consent.

- 2.4.3 While energy flows will undoubtedly increase significantly following the completion of Beaully-Denny, hence its baseline categorisation, the Final Proposals did not appear to give due consideration to the level of generation that could connect in advance of completion of Beaully-Denny. In addition the proposals did not appear to give consideration to the fact that delays to Beaully-Denny could accelerate the development of generation in the SP Transmission area.
- 2.4.4 1.55 GW of generation can be connected in the SSE area in advance of Beaully-Denny. SSE has contracted with generation significantly in excess of this level (i.e. connection offers have been accepted). As far as the SP Transmission area is concerned, around 6 GW of applications have been received. This generation can connect without Beaully-Denny and, as a result of the BETTA transitional access arrangements, in advance of any interconnector upgrades. Activity is intense and, to date, we have contracted with over 2.83 GW of generation. We expect this figure to continue to increase as we progress connection offers for the remainder of the 6 GW.
- 2.4.5 There is therefore close to 4.4 GW of contracted generation that can connect in Scotland without Beaully-Denny. This meets the threshold established in the TIRG Final Proposals and, on this basis, the upgrade is justified now and no further analysis is required.

#### *Generation Background*

- 2.4.6 The two scenarios presented by Ofgem were historic levels of despatch of existing coal plant (presented by Ofgem as the high case) and closure of existing coal plant (presented as the low case). While the historic despatch scenario could present a plausible high case scenario in terms of volume of constrained energy, the low case scenario, which assumes that the coal plant is closed for the lifetime of the upgrade, is considered to be extremely unlikely given the fact that, even if it is opted out of LCPD<sup>1</sup>, the existing coal plant can operate until 2015.
- 2.4.7 Given that there is potentially a significant difference between the justification thresholds for the high and low cases, it is appropriate to settle on a central scenario on which a decision should be based. We believe there is a strong likelihood that existing capacity will be replaced and that it is therefore reasonable to use a central scenario that includes an element of re-planting. Under this scenario we have assumed re-planting of capacity equivalent to the capacity of Longannet by 2020. The rationale behind this assumption is set out in paragraph 2.4.3 of Appendix 2.

---

<sup>1</sup> The LCPD specifies emission limit values (ELVs) for large combustion plants including power stations. Operators of such plant can be exempted (opt out) from compliance with ELVs by undertaking that the plant will not be operated for more than 20,000 hours between 1<sup>st</sup> January 2008 and 31<sup>st</sup> December 2015.

### *Costs That Will Be Incurred If Upgrade Does Not Progress*

2.4.8 This section considers the costs that would be incurred if the upgrade did not progress. The analysis underlying the Final Proposals gave some consideration to these costs but did not consider all such costs. This had the effect of overstating the incremental cost of the upgrade.

2.4.9 These ‘do nothing’ costs can be split into three categories:

- those associated with replacement of the existing interconnector assets;
- those associated with the significant transmission connection activity around the western circuit of the interconnector; and
- those that would be required under some of the more pessimistic generation scenarios in order to increase the Scottish import capability.

### Connection Activity

2.4.10 There is significant connection activity in the south of Scotland adjacent to the west coast interconnector. The Final Proposals recognised this as an issue by stating that funding should be provided if this activity initiated significant work on the west coast circuit but did not consider the costs of these works or the increased costs that would be incurred if the upgrade works were not co-ordinated with the connection works. These costs are significant and relate to a large demand connection and a number of large windfarm connections.

### Asset Replacement

2.4.11 NGC have previously advised that replacement of the east coast interconnector overhead line conductor will be required in 2014. Ofgem’s analysis calculated a present value benefit from this early replacement. We agree with this assumption.

### Increasing Import Capability

2.4.12 In conventional generation scenarios involving the closure of existing coal plant, there will be a requirement to support increased imports to Scotland. The upgrade has been shown to avoid the need for approximately 350MVA<sub>r</sub> of reactive compensation to provide voltage support in Scotland in such a ‘no coal’ scenario, thereby increasing the import capability. This will reduce the level of reactive compensation required under such generation scenarios.

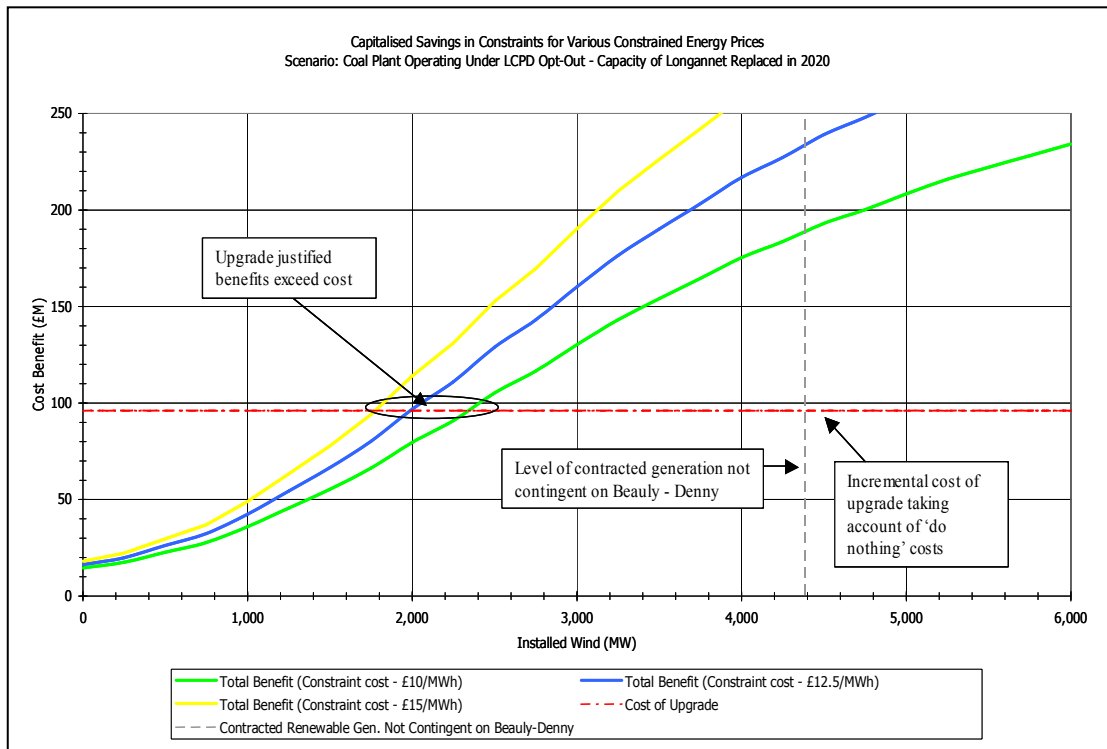
2.4.13 It is therefore reasonable to consider this as a benefit arising from the upgrade under scenarios where significant levels of existing generation in Scotland are closed. Ofgem’s analysis did not consider this benefit.

### 3. UPDATED COST BENEFIT ANALYSIS

#### 3.1 Analysis using Central Generation Scenario

3.1.1 This section sets out the updated analysis carried out by SP Transmission. This analysis uses a methodology consistent with that used by Ofgem in its Final Proposals and using constrained energy volumes provided by SKM.

3.1.2 Figure 3.1 below shows the central generation scenario (coal plant operating under LCPD opt out with the capacity of Longannet replanted in 2020) against the three levels of constraint costs (£10/MWh, £12.5/MWh and £15/MWh) used in Ofgem’s analysis. The cost line is our updated estimate of the present value cost of the upgrade (£10m higher than originally modelled in the Final Proposals) adjusted to take account of the costs that would be incurred if the upgrade was not progressed. The vertical dotted line shows the current level of contracted generation that can connect without Beauly-Denny.



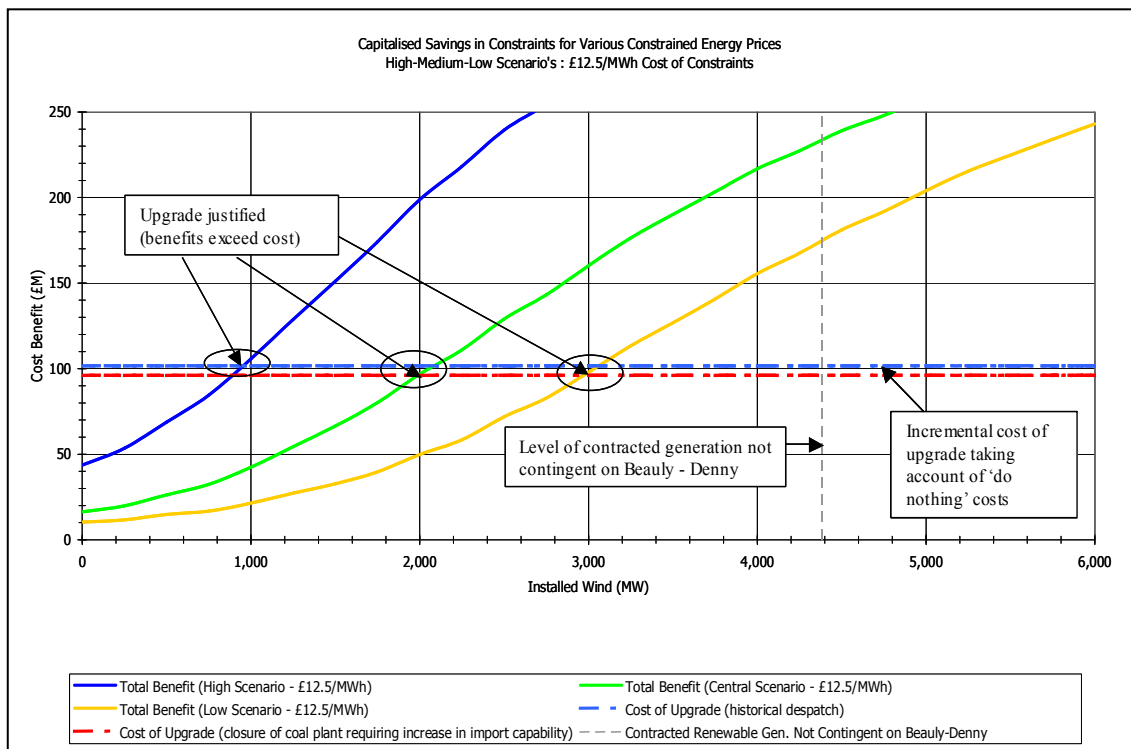
**Figure 3.1 Updated Cost Benefit Analysis using Central Generation Scenario**

3.1.3 It can be seen that, on the basis of this analysis the upgrade is justified between 1.7 GW and 2.3 GW of generation. This is considerably less than the current level of contracted generation. On this basis, the benefits of the upgrade considerably outweigh the costs and the upgrade should therefore be allowed to progress regardless of Beauly-Denny.

### 3.2 Sensitivity to Other Generation Scenarios

3.2.1 As previously discussed, the cost benefit analysis is sensitive to assumptions around the operation of the existing coal plant in Scotland. In our view it is entirely appropriate for the justification threshold to be based on a central scenario. However, in order to ensure that the analysis is sufficiently objective, it is necessary to consider the sensitivity to other scenarios.

3.2.2 Figure 3.2 below shows the energy constraint high (historic despatch), central and low (LCPD opt out, no replanting) cases for a single constraint cost of £12.5/MWh (single cost used to simplify the graph). It should be noted that there are two cost lines on the graph. The lower cost line (shown in red at just below £100m) applying to scenarios where some or all of the coal plant is closed, and there is therefore a benefit from increases in import capability. The higher cost line (shown in blue at just over £100m), applying to the scenario where coal plant remains operational and hence there is no benefit from increases in import capability.



**Figure 3.2 Cost Benefit Analysis Showing Sensitivity to Generation Scenarios**

3.2.3 It can be seen from this graph that the justification threshold is between 1GW and 3GW. Even under the low case, the threshold of 3GW is well below the current level of contracted generation of 4.4GW. The upgrade is therefore justified under all likely scenarios.

## **4. TIMING AND DELIVERY ISSUES**

### **4.1 Introduction**

4.1.1 This section discusses the timetable for the construction of the upgrade and how delivery has been impacted by delays caused by the Beaulieu-Denny dependency. It also sets out how delivery will be impacted by further decision delays and the consequences of further delays.

### **4.2 Timetable**

4.2.1 The original delivery programme was 4-years with work commencing in 2005. This remained viable until early 2005 when, following the publication of the TIRG Final Proposals in December 2004 and the introduction of the funding dependency on Beaulieu-Denny, the companies informed Ofgem that this timetable was no longer achievable.

4.2.2 The revised timetable now requires construction to commence early in 2006 to enable completion of the full upgrade and release of the additional capacity by 2010. In view of the significant connection activity around the west coast circuit and obligations on SP Transmission in terms of connection dates, this programme provides for the west coast works to progress in advance of the east coast works.

### **4.3 Decision Deadline for 2010 Completion**

4.3.1 We have made significant progress on the pre-construction work associated with all of the TIRG baseline projects involving expenditure by SP Transmission. As far as the interconnector upgrade is concerned, this is the most straightforward of the projects from a planning perspective as it involves work on existing overhead lines rather than new overhead lines.

4.3.2 We anticipate being in a position to commence construction early in financial year 2006/07. In order to ensure that the works are on schedule we require to be in a position to let contracts for detailed engineering design and, subject to planning consent, construction by the end of December, requiring a decision to remove the Beaulieu-Denny dependency by the end of November. Unless we are able to let contracts by the end of December then we are likely to be unable to take outages during 2006 resulting in at least a one-year delay in completion of the full upgrade.

#### **4.4 Consequences of Further Delays**

4.4.1 It can be seen from the above that an early funding decision is required if we are to meet the revised completion date of 2010. In summary the main consequences of further delays are:

- an increase in total costs, stranding of investment and unnecessary outages due to connection activity around the west coast interconnector requiring work to commence in advance of the upgrade (estimated to be of the order of £10m); and
- an increase in the level of constraint costs as the amount of renewable generation connected in Scotland increases (costs of one-year delay estimated to be of the order of £20m).