nationalgrid

CONSULTATION DOCUMENT

GB ECM-20

Charging for Island Connections

November 2009

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1 Executive Summary

The Scottish islands do not currently have sufficient transmission connections with the mainland which would allow them to harness the significant levels of renewable resource that they possess on a large scale. The construction of subsea cables and associated plant would be required to provide this, and the cost of such transmission infrastructure would need to be recovered from users through a transportation tariff.

The arrangements for constructing and operating offshore transmission networks will be implemented from June 2010, and the charging methodology has been updated to provide tariffs for these networks. Offshore links to generation situated on islands does not currently fall within the remit of the OFTO arrangements however, and the current charging methodology does not provide any clarity as to which methodology (onshore or offshore) island connections would be subject to.

Island connections and offshore transmission networks are likely to be technically very similar, with long subsea cables connecting intermittent generation. National Grid would therefore expect island transmission links to be treated in the same way as offshore transmission assets unless there are substantive differences between the two. National Grid is therefore proposing to extend the existing offshore tariff calculation methodology to cover such links. The main area of uncertainty for National Grid with extending the existing charging methodology is the different potential methods for the determination of recoverable revenue from the island links. The method used will be dependent upon Ofgem's decision on whether it is more economic to introduce competition in the provision of future links or allow existing TOs to fund them through their price controls, however this will not impact on end consumer charges and National Grid believes that both paradigms would be adequately catered for within the current methodology.

National Grid is therefore proposing to modify the Statement of the Use of System Charging Methodology to extend the existing arrangements for determining TNUoS offshore tariffs to include transmission links to island users. The modification would facilitate the inclusion of licensed island connections by introducing arrangements to recover the costs of such assets through TNUoS and connection charges.

Responses and queries should be sent to adam.sims@uk.ngrid.com no later than Friday 15th January 2010. This report has been published on the National Grid charging website:

http://www.nationalgrid.com/uk/Electricity/Charges/modifications/uscmc/

2 Introduction

As the transmission licensee, authorised to co-ordinate and direct the flow of electricity onto and over the transmission system within Great Britain, National Grid has duties under the Electricity Act to develop and maintain an efficient, co-ordinated and economical transmission system and to facilitate competition in generation and supply.

Along with these high level duties, National Grid is obliged under its transmission licence:

- to keep the Use of System Charging and Connection Charging Methodologies at all times under review
- to make such modifications of the Use of System Charging Methodology as may be requisite for the purpose of better achieving the relevant objectives, which are:
    a. to facilitate effective competition in generation and supply;
    b. to result in charges which reflect, as far as reasonably practicable, the costs incurred by transmission licensees in their transmission businesses;
    c. in so far as is consistent with a) and b) above, as far as reasonably practicable, to properly take account of the developments in transmission licensees' transmission businesses.

In addition to the relevant objectives above, the transmission licence also prohibits National Grid from discriminating against any User or class of Users unless such different treatment reasonably reflects differences in the costs of providing a service.

The purpose of this consultation document is to describe a proposed extension to the charging methodology with a view to better meeting the relevant Transmission Licence objectives set out above, and invite industry views on the options presented.

3 Background

There are a number of developments in renewable generation, especially wind power, which are currently being considered for areas of the UK with abundant natural resources. Due to geographical location and prevailing climate Scotland is suited to host a large number of such renewable projects, and the islands of Shetland, Orkney and others are especially well-provisioned with the necessary resources. The majority of Scottish islands do not currently have sufficient transmission connections with the mainland however, and so harnessing these resources on a large scale will require the construction of subsea cables and associated plant. The cost of this transmission infrastructure will need to be recovered from users through a transportation tariff.

The arrangements for constructing and operating offshore transmission networks will be implemented from June 2010, and the charging methodology has been updated to provide tariffs that include for the cost of constructing and operating offshore transmission infrastructure. These tariffs will be based on information to be provided periodically by the offshore transmission owners (OFTOs) on their allowed revenue. For generation sites that are situated offshore, therefore, the methodology for determining TNUoS is already in place. Offshore links to generation situated on islands does not currently fall within the remit of the OFTO arrangements, and so the current charging methodology does not provide any clarity as to which methodology such generation would be subject to.

This lack of assurance over what tariff a new island generation site would be subject to once it was connected to the UK transmission system was discussed as part of ECM-08 “Charging Arrangements for Offshore Transmission Networks”[1]. Through this proposal and the corresponding industry feedback it was determined that it would be imprudent to decide upon a methodology for charging for island connections before more detail was forthcoming on the eventual framework for offshore transmission. Now that more clarity is available and the regulatory options have been further developed, the appropriate methodology for calculating TNUoS tariffs for any island can be progressed with a greater degree of confidence.

[1] http://www.nationalgrid.com/uk/Electricity/Charges/modifications/uscmc/

4 Charging Proposal

National Grid is proposing to modify the Statement of the Use of System Charging Methodology to extend the existing arrangements to include transmission links to island users, as detailed in Appendix 1. Island connections and offshore transmission networks are likely to be technically very similar, with long subsea cables connecting intermittent generation. National Grid would therefore expect that island links be treated in the same way as offshore transmission assets unless there are substantive differences between the two.

The modification is required because there is currently no clarity on what charging arrangements apply for transmission assets other than those of the current three licensees or future OFTOs. The modification would therefore facilitate the inclusion of licensed island connections by introducing arrangements to recover the costs of such assets through TNUoS and connection charges. In addition, this modification would provide one consistent methodology for all island connections independent of who owns the transmission assets. National Grid's views on the main issues of island charging and the rationale for our proposals are set out below.

Q1)	Should island links should be treated in the same way as offshore transmission assets?

4.1 Offshore Expansion Factor

One issue with extending the existing charging methodology to include island links is the different available methods for the determination of recoverable revenue and how this is . Which process is used will be dependent upon Ofgem's decision on whether or not it is economic to introduce competition in the provision of island links, however National Grid believes that both paradigms are adequately catered for within the current methodology.

In order to convert the marginal kilometres figure derived from the transport model into a £/kW signal, the expansion constant, expressed in £/MWkm, is used. The expansion constant represents the annuitised value of the transmission infrastructure capital investment required to transport 1MW over 1km. The magnitude of the expansion constant is derived from the projected cost of 400kV overhead line (OHL), including an estimate of the cost of capital, to provide for future system expansion.

In order to ensure that the cost of network expansion with different circuit types (e.g. cable) and voltages (e.g. 275kV and 132kV) is taken into account, Circuit expansion factors are derived. Circuit expansion factors are calculated by deriving individual expansion constants for the various types of circuit, following the same principles used to calculate the 400kV overhead line expansion constant. The factors are then derived by dividing the calculated expansion constant by the 400kV overhead line expansion constant. For offshore circuits, these expansion factors will depend upon the OFTO's agreed revenue stream rather than the historical cost of constructing similar assets, however this has not been finalised in the case of island links.

Ofgem recently agreed[2] to SHETL's request to modify its price control allowance to fund the proposed links to the Western Isles and Shetland directly, though it also stated that it remains committed in principle to using a competitive process for significant new transmission investment where practical and where the cost savings outweigh the risks. In the event that competition is introduced and links are funded through revenue streams agreed with the regulator, National Grid believes that the

[2] Connecting the Scottish Islands: Western Isles Decision – 20/09
http://www.ofgem.gov.uk/Networks/Trans/ScottishIslands/Documents1/090225_OpenletterWIConclusions_LN%20(2).pdf

process for obtaining revenue information from OFTOs would be sufficient to derive expansion factors for island link operators as well.

Without competition a project-specific approach may be required, where the revenue is determined in advance and then added to the TO's asset base through the price control. This is likely to be undertaken through an annual data request process, where the relevant TO provides the forecast outturn cost of the link which National Grid can then use to calculate an expansion factor and hence a TNUoS tariff.

Whichever concept is used for future connections, the expansion factors derived from information gained through one of the above methods can then be included in the DCLF ICRP model and used to derive a £/kW locational signal to reflect the costs of the network.

The proposed changes to the charging methodology detailed in Appendix 1 have been written to cover both competitively and non-competitively tendered island connections. Future developments are likely to clarify which scenario should operate, and therefore National Grid anticipates that a minor housekeeping change may be required at some point to remove the references to the inactive process.

Q2)	Is the proposal sufficient to calculate tariffs regardless of whether island links are funded by competitive tender or through expansion of an existing TO's network?

4.2 Local Security Factor

The Local Security Factor is a term in the calculation of a generator's Local Circuit Tariff that ensures that any redundancy built into the local circuit is accounted for within the revenue recovered by the tariff. This is separate to the Locational Security Factor, which is included within the wider tariff to recover the costs of ensuring that the network can cope with peak demand under various SQSS (Security and Quality of Service Standard) contingency conditions.

For local circuits, if the loss of any one of the circuits would result in loss of access to the network then the Local Security Factor applied is 1.0, i.e. there is no partial redundancy in the connection and therefore there is no increase in local circuit tariff to cover it. For those instances where the loss of any one circuit would not result in a complete loss of access to the network, the Local Security Factor will be equal to the GB average Locational Security Factor value, currently 1.8.

Q3)	Are the assumptions on the local security factors for island links suitable?

The SQSS does not require offshore networks to have partial redundancy as it would be uneconomic and inefficient to connect intermittent generation to the network via long double circuits of expensive cable. National Grid considers that there are obvious parallels with island connections and therefore similar arrangements should apply, however it should be borne in mind that National Grid would treat the link in the same way as any other single-fault connection. This would mean that there would be no firm guarantee of access to the wider system and generators behind the boundary would not receive compensation for constraints, however they would receive a reduced TNUoS charge.

4.3 Interaction with Anticipatory Investment

In the event that generation signals the requirement for an island connection, the TO may consider forecast future development on the island sufficient to increase the capacity of the link beyond that which is required for the planned generation project. This discretionary work would be classed as anticipatory investment, and Ofgem

have been consulting on the incentive mechanism for remunerating TOs for such investment through the TAR - Transmission Investment Incentives consultation (ref. 110/09)[3]. Whilst the initial proposals have focused on maintaining the existing incentive arrangements until the results of the RPI-X@20 review are known[4], in the consultation documentation Ofgem noted that it is of the view that TOs should earn a rate of return on anticipatory investments that varies dependent upon whether the investments are timely, sufficiently utilised and cost efficient.

If this concept is taken forward during TPCR5, National Grid would look to include such variable rates of return through the calculation of a separate annuity factor[5] specifically for each subsea link. The annuity factor introduces the TO's rate of return into the expansion constant, which is then used to derive the expansion constants for the various types of circuit. The proposal is to split the calculation for island links prior to the inclusion of the annuity factor rather than afterwards so that the different rate of returns can be factored in; this is not anticipated to affect the expansion factors of existing circuits.

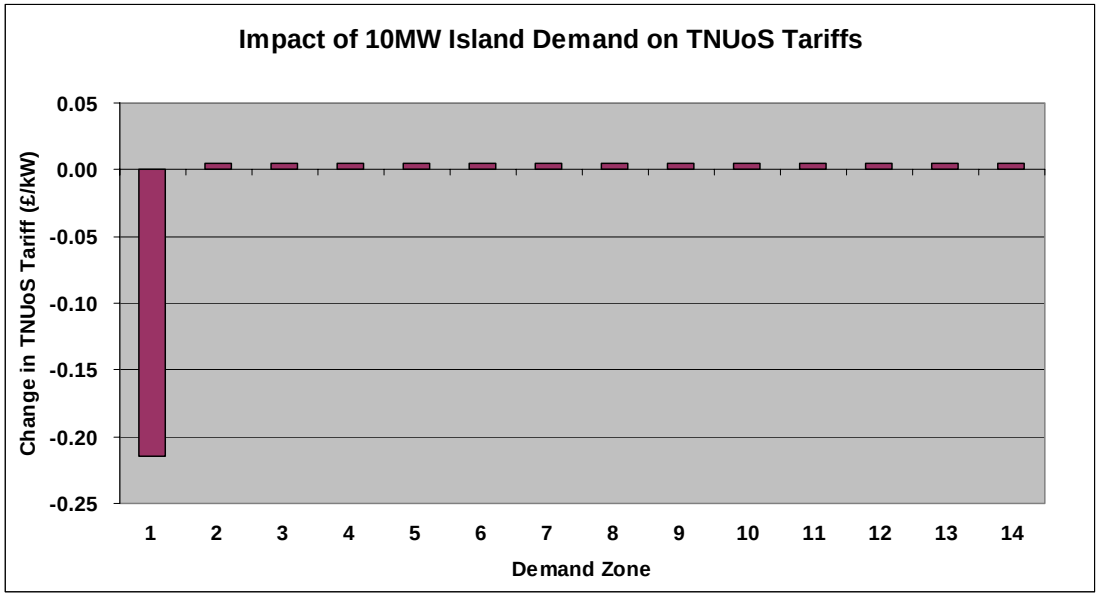
Q4)	Is changing the annuity factor the best way to account for different rate of returns for anticipatory investment?

4.4 Effect of Island Demand on Weighted Average Zonal Charge

Due to the distance from the mainland, island demand is likely to exacerbate the difference in demand tariff between the zone that the island is connected to and the average. In the north of Scotland this is likely to result in a noticeable reduction in the tariff and, in the event that demand growth on the island outstrips generation, could ultimately reduce the requirement for a subsea cable as the net flow tends to zero. This being the case, it may be necessary to introduce a level of user commitment to reduce the risk of asset stranding, however this is currently more appropriately taken forward as part of the DECC consultation on transmission access.

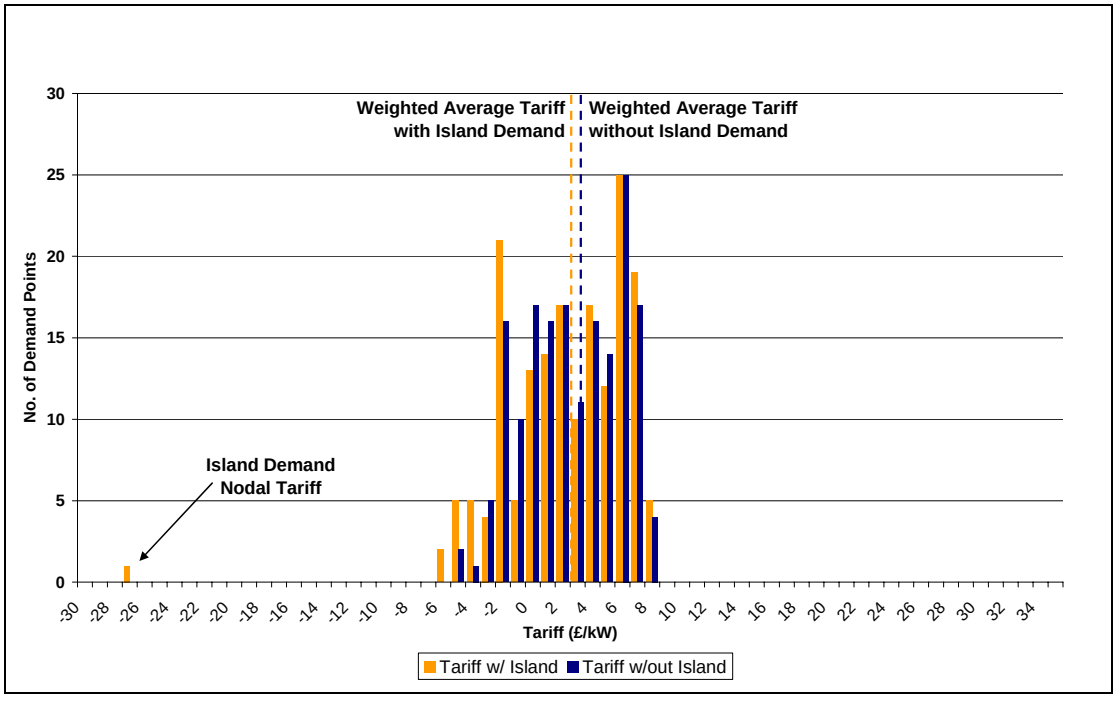
Analysis was undertaken to quantify the impact that the introduction of a small island demand would have on tariffs. Assuming an island demand of 10MW, and a 275kV subsea cable of 50km with 100MW of generation connected, the Transport and Tariff model was run to assess the impact on demand tariffs. As shown in Graph 1, the addition of the island demand decreases the tariff in zone 1 by £0.22/kW to £3.07/kW, and the remaining tariffs increase slightly to ensure the same level of cost recovery.

[3] http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents1/September%20Consultation_090908.pdf
[4] http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents1/20091103_TOincentives_initial_proposals.pdf
[5] Statement of the Use of System Charging Methodology Chapter 2, paragraph 2.36



Graph 1: Impact of Island Demand in Zone 1 on Tariffs

Whilst this initially appears to be a significant shift, when the flow weighting is taken into consideration the impact of island demand is substantially reduced. Indeed, it is only the relatively small electricity demand in Zone 1 that allows the impact of an island demand to appear at all. Further analysis was undertaken on the above scenario to show the spread of nodal tariffs for each site in zone 1 for scenarios with and without the island demand (Graph 2). This graph indicates that the introduction of an island demand only shifts the final weighted average zonal tariff by a very small amount, relative to the estimated island nodal tariff of around -£27/kW.



Graph 2: Frequency of Nodal Tariffs in Zone 1 with and without Island Demand

Introducing a new zone for island demand would remove this direct effect, however it would instead result in re-basing all existing zonal tariffs to avoid the new island zone having a negative demand tariff. There would also be a large implementation cost as Elexon would have to manually transfer the Meter Point Administration Numbers (MPAN) for all meters on the island into the new zone. National Grid therefore

believes that the benefits of creating a new zone are not sufficient to make it worthwhile to progress.

Q5)	Is there merit in pursuing the creation of new demand zones for islands?

5 Assessment Against Charging Objectives

As noted previously in Section 2 of this consultation, National Grid has an obligation to make such modifications to the Use of System charging methodology as may be requisite for the purpose of better meeting the relevant transmission Licence objectives: to facilitate competition, for charges to be cost-reflective, and for charges to take into account developments in the transmission business.

In setting and reviewing Use of System charges, National Grid has a number of further objectives contained in the Statement of Use of System Charging Methodology. These are to:

- offer clarity of principles and transparency in the methodology;
- inform existing Users and potential new entrants with accurate and stable cost messages;
- promote the optimal use of, and investment in, the transmission system by charging on the basis of services provided and incremental rather than average costs; and
- be implementable within practical cost and time-scales.

The proposal to extend the existing offshore TNUoS tariff methodology to island links has been assessed by National Grid against these objectives as follows:

Option	**Facilitates Competition**			**Cost Reflectivity**			**Developments in the transmission business**
	Transparency	Predictability	Stability	Services provided	Incremental	Practical cost	
Extend Existing Offshore Arrangements	✓	✓	✓	✓	✓	✓	✓

5.1 Impact on Other Industry Documents

It is not considered that the proposed modification will require amendments to any other industry documents, however National Grid would welcome any industry views on this.

5.2 Implementation Date

The implementation date for the proposed change will be 28 days after furnishing the conclusions report to the Authority, subject to non-veto. National Grid currently anticipates that the conclusions report would be issued in Q1 2010.

6 Responses

Comments and views are invited on all of the issues raised in this consultation document. To ensure that your comments and views are considered as part of National Grid's consultation report, responses must be received by close of business on Friday 15th January 2010.

Comments are particularly welcome regarding:

Q1) Whether island links should be treated in the same way as offshore transmission assets

Q2) Whether the proposed changes to the methodology are sufficient to calculate tariffs regardless of whether island links are funded by competitive tender or through expansion of an existing TO's network

Q3) Whether the assumptions on the local security factors for island links are suitable

Q4) Whether changing the annuity factor is the best way to account for different rate of returns for strategic investment

Q5) Whether there is merit in pursuing the creation of new demand zones for islands or are the existing zones still appropriate

Q6) Whether the methodology changes as described in Appendix 1 are appropriate

If you wish to provide comments on this consultation document, responses are preferred via email to: adam.sims@uk.ngrid.com. Alternatively, Users can send their comments in writing, addressed to:

Adam Sims
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National Grid House
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If you have further queries, please do not hesitate to contact Adam Sims on 01926 655292 or Hêdd Roberts on 01926 655385.

7 Appendices

Appendix 1 - Proposed Changes to the Statement of Use of System Charging Methodology

Additional and amended text for Chapter 2 of The Statement of the Use of System Charging Methodology. To be inserted starting at 2.5 and replacing existing text 2.5, 2.10, 2.33 to 2.34, 2.37, 2.42 to 2.43, 2.50. Changes have been highlighted in red.

2.5 The transport model requires a set of inputs representative of peak conditions on the transmission system:

- Nodal generation information
- Nodal demand information
- Transmission circuits between these nodes
- The associated lengths of these routes, the proportion of which is overhead line or cable and the respective voltage level
- The ratio of each of 132kV overhead line, 132kV cable, 275kV overhead line, 275kV cable and 400kV cable to 400kV overhead line costs to give circuit expansion factors
- 132kV overhead circuit capacity and single/double route construction information is used in the calculation of a generator's local charge.
- Offshore and island connection transmission cost and circuit/substation data
- Identification of a reference node

2.10 The transport model employs the use of circuit expansion factors to reflect the difference in cost between (i) offshore and onshore cabled routes and overhead line routes, (ii) 132kV and 275kV routes, (iii) 275kV routes and 400kV routes, and (iv), uses 400kV overhead line (i.e. the 400kV overhead line expansion factor is 1). As the transport model expresses cost as marginal km (irrespective of cables or overhead lines), some account needs to be made of the fact that investment in these other types of circuit (specifically 400kV cable, 275kV overhead line, 275kV cable, 132kV overhead line and 132kV cable) is more expensive than for 400kV overhead line. This is done by effectively 'expanding' these more expensive circuits by the relevant circuit expansion factor, thereby producing a larger marginal kilometre to reflect the additional cost of investing in these circuits compared to 400kV overhead line. When calculating the local circuit tariff for a generator, alternative 132kV and offshore expansion factors to those used in the remainder of the tariff calculation are applied to the generator's local circuits.

2.33 The transmission infrastructure capital costs used in the calculation of the expansion constant are provided via an externally audited process. They also include information provided from all onshore Transmission Owners (TOs) and owners of non-competitively tendered island connections. They are based on historic costs and tender valuations adjusted by a number of indices (e.g. global price of steel, labour, inflation, etc.). The objective of these adjustments is to make the costs reflect current prices, making the tariffs as forward looking as possible. This cost data represents National Grid's best view; however it is considered as commercially sensitive and is therefore treated as confidential. The calculation of the expansion constant also relies on a significant amount of transmission asset information, much of which is provided in the Seven Year Statement.

2.34 For each circuit type and voltage used onshore and for non-competitively tendered island connections, an individual calculation is carried out to establish a £/MWkm figure, normalised against the 400KV overhead line (OHL) figure, these provide the basis of the onshore and island connection circuit expansion factors discussed in 2.35. In order to simplify the calculation a unity power factor is assumed, converting £/MVAkm to £/MWkm. This reflects that the fact tariffs and charges are based on real power.

2.37 The Weighted Average Cost of Capital (WACC) and asset life are established at the start of a price control and remain constant throughout a price control period. The WACC used in the calculation of the annuity factor is the National Grid regulated rate of return, this assumes that it will be reasonably representative of all licensees. The asset life used in the calculation is 50 years; the appropriateness of this is reviewed when the annuity factor is recalculated at the start of a price control period. In the event that a variable rate of return has been included for an island link as an incentive for strategic investment, a separate annuity factor will be factored into the calculation which may include a different asset life. These assumptions provide a current annuity factor of 0.066.

2.42 Base ~~onshore~~ expansion factors for onshore and non-competitively tendered island connection circuits are calculated by deriving individual expansion constants for the various types of circuit, following the same principles used to calculate the 400kV overhead line expansion constant. The factors are then derived by dividing the calculated expansion constant by the 400kV overhead line expansion constant. The factors will be fixed for each respective price control period.

2.43 In calculating the onshore cable factors, the forecast costs are weighted equally between urban and rural installation, and direct burial has been assumed. For non-competitively tendered island connections, the cable factors are calculated for each link individually. The operating costs for cable are aligned with those for overhead line. An allowance for overhead costs has also been included in the calculations.

Offshore Circuit Expansion Factors

2.50 Offshore expansion factors and expansion factors for competitively tendered island connections (£/MWkm) are derived from information provided by OFTOs for each offshore circuit. Offshore expansion factors are OFTO and circuit specific. Each OFTO will periodically provide, via the STC, information to derive an annual circuit revenue requirement. The offshore circuit revenue shall include revenues associated with the OFTO's reactive compensation equipment.

End of proposed changes.

Appendix 2 – Example Generation Tariffs

Analysis of a 100MW generator on a 50km 275kV island link connecting at Dounreay in Scotland (generation tariff zone 1) gives the following tariffs. As a result of the requirement to ensure that nodal costs are within ±£1/kW across each generation zone[6], the new island is assumed to be in a new zone due to the significantly higher nodal tariff it will attract.

This data is provided for illustration only, and should not be taken as a guarantee of future tariffs.

Generation Zone	Zone Area	Current Wider Generation Tariff (£/kW)	Wider Generation Tariff w/ Island Link (£/kW)
New	Island	-	50
1	North Scotland	21.588654	25.288
2	Peterhead	20.318087	20.501
3	Western Highland & Skye	21.104228	21.356
4	Central Highlands	16.871037	17.081
5	Argyll	13.993686	14.160
6	Stirlingshire	14.479695	14.669
7	South Scotland	13.601728	13.790
8	Auchencrosh	11.243738	11.432
9	Humber & Lancashire	6.142320	6.330
10	North East England	9.853652	10.042
11	Anglesey	6.872452	7.061
12	Dinorwig	6.189823	6.378
13	South Yorks & North Wales	4.197861	4.385
14	Midlands	2.110543	2.299
15	South Wales & Gloucester	-1.603175	-1.415
16	Central London	-6.977964	-6.789
17	South East	0.254498	0.443
18	Oxon & South Coast	-1.386678	-1.516
19	Wessex	-3.282014	-3.093
20	Peninsula	-6.683832	-6.495

[6] Statement of the Use of System Charging Methodology Chapter 2, paragraph 2.26(i)