CONSULTATION DOCUMENT

For the charging arrangements associated with SQSS design variations based on customer requests

October 2006

Table of Contents

1. Executive Summary

This consultation document sets out National Grid's proposals for modifying the Transmission Network Use of System (TNUoS) charging methodology to provide a mechanism by which the capital savings associated with SQSS connection design variations arising from customer requests are passed through to customers.

The document has been published on the National Grid charging website at the following address:

www.nationalgrid.com/uk/electricity/charges

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:

(i) to keep the Use of System Charging Methodology at all times under review;

(ii) 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 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, 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.

Before making a modification to the Use of System Charging Methodology, National Grid is also required by the transmission licence to consult with CUSC Users on the proposed modification and allow them a period of not less than 28 days within which to make written representations.

An industry pre-consultation document[1] was published in August 2006 identifying the main options available for modifying the charging and / or access arrangements associated with Security and Quality of Supply Standard (SQSS) design variations that arise from customer requests.

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

The purpose of this document is to set out for consultation National Grid's formal proposal to modify the Use of System Charging Methodology to allow the capital savings associated with connection design variations arising from customer requests to be passed through to customers.

3. Background

The GB Security and Quality of Supply Standard includes criteria for variations to connection designs. The criteria allow generators or demand customers to choose a standard of connection which is higher or lower than the specified standard (e.g. a single circuit connection rather than a double circuit connection), provided this does not, either immediately or in the foreseeable future:

(i) reduce the security of the main interconnected transmission system below the minimum planning criteria specified in the standard;

(ii) result in additional investment or operational costs to any particular customer or overall, or a reduction in the security and quality of supply of the affected customers' connections to below the planning criteria in the standard, unless specific agreements are reached with affected customers; or

(iii) compromise the Transmission Licensees (TL) ability to meet other statutory or licence obligations.

For the example of a single circuit connection to a generator, in order to comply with the GB SQSS the generator would have to accept uncompensated access restrictions in the event that the single circuit is unavailable as a result of a fault outage or maintenance outage in order to meet these conditions. Without these arrangements, other customers would be exposed to additional operational (compensation) costs as a result of the single circuit connection and condition (ii) above would not be met.

The criteria for variations to connection designs also state that should system conditions subsequently change, for example due to the proposed connection of a new customer, such that either immediately or in the foreseeable future, the conditions described above are no longer satisfied, then alternative arrangements and/or agreements must be put in place such that the standard continues to be satisfied.

This represents a significant risk to customers that choose single circuit design variation connections, since the connection may be modified to a double circuit connection in the future for reasons completely beyond their control.

Prior to the implementation of the plugs 'shallow' connection charging methodology on 01 April 2004, many of the assets associated with generation connection were classified as 'connection'. Consequently, a customer choosing a lower standard of connection design had the capital savings directly reflected in its connection charges. The customer was able to compare the savings with the loss of revenue caused by the associated access restrictions and choose the most efficient connection design.

Following the implementation of the plugs methodology, some assets for connecting generation have been reclassified as 'infrastructure' and since infrastructure assets are funded from use of system rather than connection charges, the savings are no longer passed through directly to the generator.

3.1. Application

There are three scenarios in particular in which design variation connections are either currently an issue or are anticipated to be one in the future:

(i) Scottish island generation connections;

(ii) Scottish highland generation connections;

(iii) Offshore generation connection;

For the Scottish island connections and offshore transmission connections, the costs associated with the provision of additional circuits is so high that a single circuit connection may be the most efficient solution. For the highland onshore connections, the circuit cost is not as significant, but the difference in substation cost between the provision of a double and single circuit solution is significant.

Clearly, the proposals must be applicable to the whole of the GB system, where there is a connection remote to the main interconnected transmission system, as well as the specific areas listed above.

4. Industry responses to pre-consultation document

National Grid has consulted the industry at the CISG (Charging Issues Standing Group) and TCMF (Transmission Charging Methodologies Forum) during May and June and a pre-consultation document was published in August 2006. The document invited the industry's opinion regarding several potential options, in order to establish the appropriate way forward. These options are listed below:

- Maintain the status quo and accept that the benefits associated with the shallow connection charging methodology, in particular shielding generators from the impact of design decisions made by the TL for wider system reasons, outweigh the disadvantage of a reduced incentive for generators to consider single circuit connections;
- SQSS change to replace design variations with an option for the TL to design to a standard lower than the deterministic criteria where there is an economic justification;
- Change to the connection charging methodology to move to a deeper connection boundary for generation connections;
- Change to the Use of System Charging Methodology to reflect the savings associated with single circuit connections through to generators.

Responses were requested by 8th September and have been posted on National Grid's website at the following address:

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

Ten responses were received from a cross-section of the industry. The overwhelming consensus was in favour of the option to amend the Use of System Charging Methodology. There was limited support and rejection of the remaining three options. Consequently, National Grid is proposing the implementation of the Use of System Charging Methodology amendment described in Section 5 of this consultation.

The main industry views expressed are summarised together with National Grid's response below:

4.1. Status Quo

It should be noted that any solution that reflects the capital efficiencies associated with a lower standard of connection in reduced charges will inherently expose that customer to the effect of future TL decisions. This is a significant risk as the customer has no influence over TL decisions, for example, to accommodate other user's connections or system reinforcement. This introduces significant uncertainty with respect to future charges.

The current methodology is based upon the assumption that the benefits associated with the move to a shallow connection charging methodology, in terms of shielding generation from design decisions made by the TL for wider system reasons, outweigh the disadvantage of a reduced incentive for generators to consider single circuit connections.

4.1.1 Respondents' Views

Five respondents specifically remarked that the current charging arrangements do not provide a financial signal for customer choice design variations and may result in inefficient capital expenditure.

A user stated that a GB SQSS compliant system is a key foundation for providing adequate reserve and firm access for all generation. Any amendments that result in a large number of users adopting connections below the SQSS, may lower the security of supply of the system, which may result in an associated increase to System Operator (SO) costs. Although the reduction in local access is managed through use of non-firm access, substantial generation on single circuits may result in the SO balancing the system with less economic plant due to reliability of connection.

Many respondents noted that any change must be applied GB-wide to both new and existing users in order to avoid undue discrimination.

4.1.2 National Grid Response

National Grid agrees that a double circuit connection as specified in the GB SQSS and its associated firm access is appropriate for the majority of large transmission connected power stations. However, this is not necessarily the case for small, remote power stations. National Grid believes that current design variation arrangements specify that any generation applying for a design variation connection must accept liability for any additional system balancing costs.

National Grid believes that it is appropriate to provide a cost reflective signal to generators to consider single circuit connections and that this should result in more efficient outcomes. Consequently, National Grid does not believe the current arrangements are robust and therefore should be changed.

As described above, design variations that arise as a result of a customer request are only allowed if the varied design satisfies particular GB SQSS criteria. These criteria include that the varied design must not, either immediately or in the foreseeable future, result in additional operational costs to any particular customer or overall. Typically, this means that agreements for single circuit connections include access restrictions however, if a particular single circuit connection caused an increase in response and reserve costs, then this would not meet the GB SQSS

criteria, unless the additional costs are picked up by the customer requesting the design variation.

National Grid is not seeking to change these criteria and therefore does not agree that any change to the charging methodology will result in additional operational costs.

National Grid agrees that any change should be applied GB wide to both existing and new users.

4.2. SQSS Modification

This option allows Transmission Licensees to design to a standard lower than the deterministic criteria providing there is an economic justification. Generators would be given full access rights whether connected by double or single circuit, therefore the additional compensation costs associated with the single circuit connection would be factored into the TL's economic analysis.

4.2.1 Respondents' Views

General
A respondent remarked that the lack of financial signal for customer choice connections does not stem from the GB SQSS, which contains arrangements for both single circuit and compliant connections but from the depth of the connection charging boundary.

Economic assessment
Several respondents agreed that the difficulties associated with the economic assessment by the TL and the required financial incentive to reflect system operation costs are significant.

One respondent considered that the TL is the correct party to assess the economic case for a single circuit connection, through knowledge of reliability factors and available market data, whereas another respondent queried whether a TL is able to determine the most economic design as the contractual arrangement is between the GBSO and generator. The respondent considered that without correct information provision, the TL would have to produce the design options with National Grid deciding on the 'most economic' of them.

Four respondents stated that it would be difficult for the TL to accurately assess additional constraint costs as a result of a single circuit connection, over the entire life of a generator. Generators set their own 'bid price' through the Balancing Mechanism, which may result in unlimited compensation for loss of access. This would preclude meaningful assessment of constraint costs, without capping of compensation to the market rate. It was suggested that the need to define a market rate added further uncertainly, as it could be viewed as subjective. Several respondents thought that this would prohibit the TL from making the 'economic case' judgement at all.

Two respondents specified that the connectee is in the best position to assess the commercial risk from a non-SQSS standard connection and therefore this option should not be followed. Several respondents noted that the generator must be able to dictate the standard of connection and consequential commercial risk to which they are exposed, rather than this being enforced by the relevant TL. One of the users

believed that economic compensation may not be an adequate substitute for firm access and therefore unilateral decisions by the TL would not be acceptable.

One respondent did not agree that the calculation of marginal system constraint costs was sufficiently problematic to prohibit this option.

One respondent stated that this option discriminates in favour of the minority of generators connected by single circuits, who would receive substantial bid payments funded from across all Balancing Mechanism participants and the view was expressed by two parties that it would be discriminatory to 'cap' any generation compensation for single circuit connected users.

A hybrid option was proposed by a respondent, whereby the TL judges the 'economic case' and the single circuit customer qualifies for capped compensation and reduced TNUoS charges.

4.2.2 National Grid Response

General
National Grid agrees that currently the GB SQSS does allow single circuit connections but there is no existing mechanism to reflect the associated capital savings to the customer, which could lead to inefficient outcomes.

Economic assessment
This option is reliant on the TL being able to perform a cost benefit analysis to compare the capital and future operational costs associated with a single circuit and a double circuit connection in order to determine an economic justification.

National Grid agrees that a model where the capital savings associated with single circuit connections are retained by the TL, with the SO being exposed to the associated balancing costs does not in itself preclude this option, but arrangements would be required to incentivise parties to make efficient decisions.

National Grid agrees that the current market arrangements make an accurate assessment of the future operational costs associated with single circuit connections very challenging. Whilst the TL could calculate the volume of future access restrictions associated with a generator connected by a single circuit, the costs could effectively be set by that generator.

National Grid believes that the only way to overcome this problem is to 'cap' the compensation payable to generators connected by a single circuit. This way, the operational cost associated with a single circuit connection could be estimated by multiplying the volume of the restriction by the capped compensation cost.

National Grid agrees that capped compensation payments for generators connected by a single circuit would be discriminatory. The particular generator may value their access at a level which is above the cap determined. Under these circumstances, the generator would be at a competitive disadvantage as a result of a TL decision to connect them by a single circuit. The hybrid option suggested by one respondent still relies on capped compensation payments and therefore National Grid considers that this would also be discriminatory.

National Grid believes that with the current market arrangements, the generator is the appropriate party to determine the value of access and therefore National Grid is not proposing to move forward with this option.

4.3. Deeper Connection Boundary

A deeper connection boundary would be established for all GB generation connection assets, with generator substation and spur circuits being charged as connection assets. Any savings associated with a single circuit connection would be consequently passed through to the customer.

4.3.1 Respondents' Views

General
Eight users believe that there are significant drawbacks to a deeper connection boundary as explained in the pre-consultation paper. That withstanding, three respondents agreed that the theoretical 'deep connection boundary' model is the most cost reflective, but current regulatory and energy policy makes it unworkable.

One respondent stated that historically the application of deeper connections was seen as detrimental to competition and the industry's willingness to return to deeper connection charges so soon after 'plugs' implementation was questioned. The comment was made that this option does not necessarily imply that the previous England and Wales arrangements would have to be wholly re-established.

One user postulated that previously deeper connection boundaries were successful in Scotland in incentivising efficient connection asset investment but given where the industry is, a return to deep connection charging would be problematic, especially concerning generation remote from the transmission network.

Uncertainty
A respondent stated that this option is complex to administer and can expose certain customers to the risk of unpredictable step changes to connection charges. A question was raised to why an existing customer should be exposed to the cost of connecting subsequent generators.

One respondent remarked that a reintroduction would lead to uncertainties for generators, additional complexity in the charging arrangements and numerous legacy issues to resolve.

4.3.2 National Grid Response

General
National Grid agrees that a reintroduction of deeper connection boundaries away from shallow 'plugs' would be problematic. The definition of a consistent boundary between connection and infrastructure assets is difficult given the variety of existing and proposed connection designs. This is likely to lead to complex arrangements that lack transparency.

Uncertainty
As described above, any arrangements that pass savings associated with single circuit connections through to generators, expose those generators to the effect of future TL decisions, for example due to the proposed connection of a new user.

With a deeper connection boundary, generators are always exposed to TL decisions made for wider system reasons. For example, when considering the generator spur assets required to accommodate a new generator, a TL may choose to install more than the minimum required in order to accommodate future generation connections. With a deeper connection boundary, these assets would be charged as connection

assets and therefore the new generator would be exposed to the costs. This problem was solved by the shallow connection boundary introduced in 2004 and National Grid continues to believe that this is an appropriate solution.

As a result of these issues, National Grid is not proposing to move forward with this option.

4.4. TNUoS Methodology Change

The TNUoS charging methodology would be changed to include a discount for users that elect a single circuit connection. The discount is designed to reflect the cost savings associated with a single circuit connection and will include both a circuit and substation element.

4.4.1 Respondents' Views

General
Eight respondents stated that this option is the correct way forward. One party supported this way forward but was yet to be convinced that the need for change exists. Another agreed that either this option or the SQSS amendments could be implemented.

A respondent agreed that the TNUoS amendment was transparent although commented that it may add to the complexity of the Use of System Charging Methodology and that this may require guidance for developers in order to assess the impact of Nodal Security Factors and Substation Discount.

A response supported the TNUoS Methodology amendment with the caveat that generators must not be forced to take this option (i.e. it must remain customer choice).

Discount appropriateness, tolerance criteria and cost reflectivity
Currently, substation costs are apportioned across all connectees using a non-locational residual split between generation and demand by the ratio of 27:73. It was deemed appropriate by a respondent that any capital efficiencies should be passed through in the same ratio.

A respondent agreed it was correct to pass through the full cost saving associated with the lower standard of connection but suggested an annual rebate equal to the annualised savings from avoided capital, finance and maintenance costs as an alternative methodology.

An observation was made that although the methodology is a pragmatic solution, it is only likely to be economic for onshore 33/66kV and offshore generation connections. It is estimated that a 100MW 33kV connected wind farm would qualify for a discount equal to five days of lost access.

In the pre-consultation paper a tolerance criteria of +/-£1 /kW was proposed, which equates to around 50km of 132km OHL, and one respondent suggested this would generate an inappropriate step change in TNUoS charges. The user estimated that the proposed discount for a long offshore single circuit connection would be around 40% and that this was appropriate.

It was noted that the application of a nodal security factor is logical and a threshold of +/-£1/kW is consistent with the tolerances currently used for charging zones. It was

also noted that without seeing the supporting data it was not clear whether the substation discount was proportional.

A response contained a possible scenario for connection of a Northern Scotland generator, with parameters chosen that produce the minimum discount. The respondent considered that this was an insufficient signal to incentivise a single circuit connection, especially with the associated forfeiting of full access rights. The respondent also deemed that this was not wholly reflective of the lower capital costs.

Future connections
Two parties questioned why a generator connected by a single circuit should lose the TNUoS discount if another party connects at the substation and requests a SQSS compliant connection. It was suggested that the additional capacity, or security, requested by the second user should be funded solely by this party.

Further illustrations
A respondent requested an illustration of the treatment of a multiple cable connections without additional redundancy, with support from another response for an approach similar to single cables, with multiple cable expansion factors. A respondent also commented that the SECULF programme may have to be made available to enable users to replicate and validate the Nodal Security Factors.

One response questioned how clustered connections with parallel connection spurs would be handled, especially if security levels differed. Another respondent also requested clarification of how this amendment will interact with Offshore Transmission Expert Group (OTEG).

A respondent proposed that the amendments should include a GB SQSS change allowing the TL to unilaterally determine the 'economic justification' for the standard of connection design, ensuring that the security and system operation are not affected. The TL would not be exposed to SO costs.

An alternative suggestion
An alternative methodology was proposed, by a respondent, for the handling of system security which is based on a number of assumptions. It was stated that the Investment Cost Related Pricing (ICRP) approach is taken to ensure the system satisfies the SQSS for changes to generation or demand. A single circuit was identified as not being GB SQSS compliant, specifically because there would be a loss of generation infeed following the loss of the transmission spur. This test was identified as correct for a large thermal plant but inappropriate for a smaller, intermittent generator, the loss of which would not destabilise the system.

For this reason, it was argued that the primary principles of the SQSS exist to protect customers from widespread loss of supply rather than ensuring that generators have uninterrupted access, although this may be an indirect consequence of doing so. Consequently, it was stated that generators should not fund the security element of the tariffs and therefore, a locational security factor of one should be applied to all generation connections. All generators would have a default minimum level of service with those requiring higher security in order to provide secure supply being funded through demand side tariffs.

4.4.2 National Grid Response

General
National Grid believes that this option provides the correct balance between complexity and cost reflectivity. National Grid believes that the concerns expressed with respect to the complexity of proposed arrangements are largely due to the interaction with the zoning criteria, which is discussed further below.

Discount appropriateness, tolerance criteria and cost reflectivity
Whilst the total tariff revenue is apportioned to generation and demand in the ratio of 27:73, the locational tariff differentials are cost reflective in order to incentivise and ensure that the most efficient decisions are made. National Grid believes that a signal which is cost reflective of the capital savings associated with single circuit connections is also required in this case in order to achieve efficient outcomes. If the savings associated with a single circuit connection are scaled down to 27%, the cost benefit analysis performed by the generator to compare the tariff savings with the loss of revenue associated with the access restrictions would not result in the most efficient outcome. Whilst the overall income is split 27:73 the locational signal is based solely on the cost of incremental capacity. This ensures the methodology is fully cost reflective.

National Grid believes that an annual rebate calculated from the perceived capital savings would greatly reduce the transparency and simplicity of the methodology and inhibit the estimation of an expected discount. The circuit and substation discount are intended to be simple rules that can easily be applied by the developer when assessing options.

Given the requirement to provide a cost reflective signal, National Grid is sensitive to the concerns expressed regarding the appropriateness of both the tolerance criteria and the cost reflectivity of the discount. For the circuit element, National Grid has performed further analysis on the impact of only applying this discount to nodes that are in their own TNUoS zone. This analysis has shown that single circuit spurs connected to main interconnected transmission nodes at the lower marginal km end of a TNUoS zone would have to have a significant length in order to receive any discount. This is not consistent with the aim of providing a cost reflective signal, and therefore National Grid is now proposing that the circuit element of the discount is always applied, subject to a deminimus circuit length of 2km. As demonstrated in Section 5 below, this approach also considerably simplifies the calculation of the discount and therefore addresses the responses regarding the complexity of the proposed arrangements.

For the substation element, the figures presented in the pre-consultation were based on cost assessments performed by National Grid. Given the concerns expressed regarding cost reflectivity, National Grid submitted an information request under the SO / TO Code and has now received information from all the TLs. This information has been used to update the figures as described in section 5.

Future connections
In the event of an application from a second user seeking to connect at a site, where an existing user has opted for a design variation, but who requires a SQSS compliant connection, the customer choice procedure dictates that the second circuit and associated substation plant would be constructed.

The GB SQSS eligibility criteria for a customer choice design variations are not proposed to change, namely the connection must not now or in the foreseeable future:

(i) reduce the security of the main interconnected transmission system below the minimum planning criteria specified in the standard;
(ii) result in additional investment or operational costs to any particular customer or overall, or a reduction in the security and quality of supply of the affected customers' connections to below the planning criteria in the standard, unless specific agreements are reached with affected customers; or
(iii) compromise the Transmission Licensee's ability to meet other statutory or licence obligations.

Consequently, if a generator has accepted a single circuit connection and an additional user applies to connect at the busbar/ substation, option (ii) is no longer met and alternative arrangements are required i.e. a second circuit must be constructed. Upon construction, the original generator would benefit from increased security and firm access rights and therefore must be subject to the full TNUoS charge, to allow cost reflectivity and avoid discrimination. As design variation connections are only available if other users are not affected, now and in the foreseeable future, and the user has chosen this, it is appropriate that this user is exposed to the risk of future connections, rather than this risk being socialised.

The principle that two generators both connected at the same point, with equal levels of security would be subject to different levels of TNUoS charges because of historic connection charges is not consistent with National Grid's licence requirement to not discriminate between users. The charges must be cost reflective and non-discriminatory.

National Grid agrees that the decision to request a, single circuit connection should be with the generator.

Further illustration
An example was presented at the CISG meeting of the 27th October 2006 comparing the connection of a generator with multiple and single circuit connections, both without redundancy. It was shown that the proposed methodology was cost reflective for both examples.

It is unlikely that a scenario would develop in which clustered island connections would be connected by both a double circuit and a customer choice single circuit connection, as proposed.

The circuit discount associated with a single circuit connection can be calculated without reference to the Secured DC Load Flow (SECULF) model as demonstrated in Section 5 below. There would be cost associated with providing the model to all industry participants, with training requirements and issues with maintaining a current circuit fault list to ensure repeatable results.

In response to the concerns expressed about the link to offshore transmission, National Grid believes that if single circuits are used to connect offshore generation, the proposed TNUoS methodology amendment could be used to provide a cost reflective discount.

Alternative suggestion
A fundamental principle behind the ICRP methodology is that users are subject to a tariff that has a marginal element that signals the additional transmission assets required to transmit the output of the generator from any location. If generators were not subject to the locational security factor, this cost reflection would be diluted resulting in reduced efficiency in the locational signals provided to generators.

National Grid agrees that the effect on the stability of the system of the loss of a small intermittent generator is far less than a large, base load thermal plant. That withstanding, design variations based on a customer request provide a means to allow generation to perform a cost benefit analysis which should result in an efficient outcome.

5. Proposed modification

5.1. Description of proposed modification

National Grid is proposing to modify Chapter 2: Derivation of the Transmission Network Use of System Tariff, of the Statement of the Use of System Charging Methodology to include a mechanism by which a discount can be applied to TNUoS tariffs to reflect the capital efficiencies associated with single circuit connections. The proposed Statement of Use of System Charging Methodology drafting for this modification is included in Appendix 2.

The modification proposed includes both the implementation of the circuit and the substation discounts.

Design variation circuit discount
The circuit discount is a nodal specific £ /kW tariff reduction from the TNUoS charge for the relevant zonal value. The discount reflects the capital efficiencies from constructing a single overhead line or cable as compared to a double. The circuit discount can be expressed as:

Circuit discount (£/kW) = circuit marginal length x expansion constant x 0.001

Appendix 1 shows the derivation of the methodology for the circuit discount.

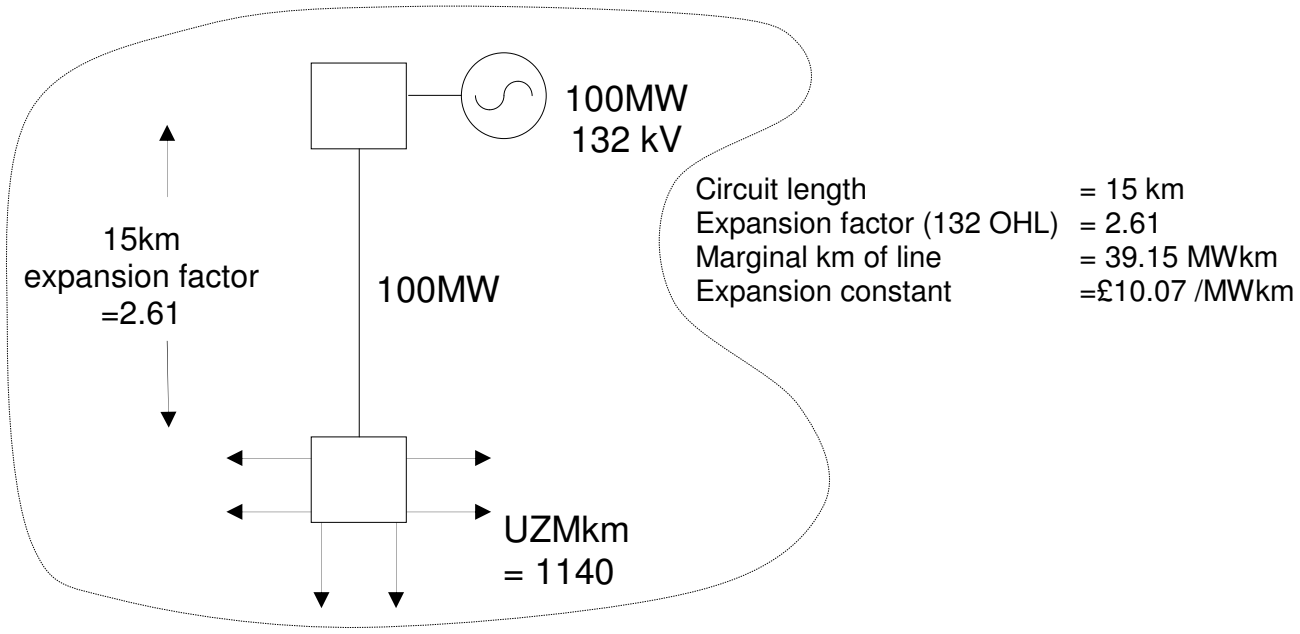
Design variation substation discount
A substation discount is proposed to reflect the savings associated with the reduced substation asset requirements associated with a single circuit connection design. National Grid proposes to reflect these savings with a £/kW discount to the residual tariff, this approach prevents the introduction of inappropriate negative generation charges for small generators in Scotland. Generic cost analysis has been performed to compare the substation costs associated with single circuit and double circuit connection designs.

	Tariff substation discount (£/kW)
33kV connection	3.12
132kV connection	1.05
400kV connection	0.65

The substation discount levels would be reviewed at the Price Control Review and subject to an annual RPI increase during the price control period.

The calculation of the deign variation discount in accordance with these proposals is illustrated in the examples below for a Highland connection:

Example 1: Highland generator single circuit spur



Marginal km x Expansion constant x 0.001 = Circuit discount for single circuit connection (£/kW)

39.15 x 10.07 x 0.001= £0.39 / kW

Zonal Tariff	=	£21.00 / kW
Circuit discount	=	- £0.39 / kW
Substation discount	=	- £1.05 / kW
Discounted tariff	=	£19.56 / kW

5.2. Justification for proposed modification

The proposed application of a nodal security factor together with a substation discount in the use of system charging methodology provides a transparent signal which reflects the capital efficiencies associated with single circuit design variations.

The signal produced may not cover all feasible design variation examples and clearly there is a trade off between the accuracy of the design variation signal and the transparency of the methodology. However, National Grid believes that the combination of the nodal security factor and substation discount will cover a sufficient number of design variations.

National Grid believes that this option does have advantages, such as reflecting the savings associated with design variations through to customers so that cost benefit analysis comparing the these savings with the loss of revenue associated with the

uncompensated access restrictions can be performed, which should result in efficient transmission investment. National Grid also believes that this option has advantages over other options in terms of simplicity and transparency and facilitates competition in generation.

Circuit discount
Presently the network required to provide adequate security is accounted for using a locational security factor. This security factor is derived using the SECULF model.

The SECULF programme is a separate self-contained application that uses the same network and nodal data as the DCLF transport model. In the same way as the DCLF transport model produces a marginal cost for each node for the intact system, the SECULF programme additionally calculates the marginal cost for each node taking into account the requirement to be secure against a set of contingencies. The programme does this by identifying the worst contingencies in terms of maximum flows for each circuit. The secure and intact marginal costs are compared on a nodal basis and a "least squares fit" employed to derive the GB security factor. The GB security factor is calculated at each Price Control Review and is currently 1.8.

To reflect the capital efficiencies of constructing a single circuit as compared to a double, a weighted average nodal security factor is to be used instead of the global security factor of 1.8. The single circuit spur has a security factor of 1.0 and therefore this is average with the locational security factors based upon the marginal length of the spur and the zonal marginal length for the relevant generation zone.

To ensure cost reflectivity and non-discrimination the nodal security factor is applied to all single circuit connected nodes.

National Grid believes that the full cost saving must be passed through to ensure that the cost benefit analysis performed by the generator leads to the most economic solution.

Substation discount
Since the publication of the pre-consultation, National Grid has issued an information request to the Scottish TLs under the SO/TO Code arrangements. In response to this request, the Scottish TLs have provided their assessment of the cost differential between substations constructed to achieve single and double circuit connections. These figures, have been averaged and are shown in the table below.

	33kV substation (£k)	**132kV substation (£k)**	**400kV substation (£k)**
Average cost differential (Capital)	1,900	1,400	4,700
Average cost differential (Annual)	156	115	387

As described in the pre-consultation, National Grid believes that the substation discount must be applied on a £/kW basis in order to avoid the possibility of an inappropriate negative signal, in the event of a generator locating in a negative charging zone. In order to determine a £/kW figure, a typical power station size must be determined for each connection voltage.

For the pre-consultation, National Grid used 70MW as a typical power station size for a 33kV connection, 200MW for 132kV and 600MW for 400kV.

The power station size that can be accommodated by a single circuit connection at each connection voltage is limited by the appropriate technology. Further analysis of the technology used by the three TLs suggests that the typical power station sizes and associated tariff discounts shown in the table below should be used.

	Typical power station size (MW)	**Tariff substation discount (£/kW)**
33kV connection	50	3.12
132kV connection	110	1.05
400kV connection	600	0.65

5.3. 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 will be seeking to implement the modification proposal prior to the publishing of the indicative 2007/8 TNUoS charges in December 2006. If the proposal is not vetoed, the design variation discounts will be applied from 1 April 2007.

5.4. Impact on other industry documentations

It is not anticipated that the proposed modification will require modifications to any other industry documents, although National Grid welcome the views of the industry on this.

6. Responses to this consultation

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 Conclusions Report to the Authority, responses must be received by close of business on Friday 3rd November 2006.

If you wish to provide comments on this consultation document, responses are welcome via email to: Thomas.Ireland@uk.ngrid.com

Alternatively, users can send their comments in writing, addressed to:

Tom Ireland
Electricity Charging & Access Development
National Grid Electricity Transmission plc
National Grid House
Warwick Technology Park
Gallows Hill
Warwick
CV34 6DA

If you have any further queries, please do not hesitate to contact Tom on 01926 656152.

Appendix 1 - Calculation of circuit discount

The methodology outlined below produces the circuit discount to be applied to the final TNUoS tariffs.

Circuit discount

- GB TNUoS tariffs are calculated using the existing methodology
- The nodal specific discount is calculated for each applicable connection
- The discount is applied to the corresponding TNUoS tariff
- The discount can be calculated as function of the marginal length of the spur:

Circuit marginal length x expansion constant = circuit discount (£ /MW)

Derivation of circuit discount

Tariff = Security Factor x Marginal km of connecting circuit x Expansion Constant

$$\text{Tariff @ gen A} = \frac{(1.8X + 2Y)}{(X + Y)} * (X + Y) * EC$$

$$= (1.8X + 2Y) * EC$$

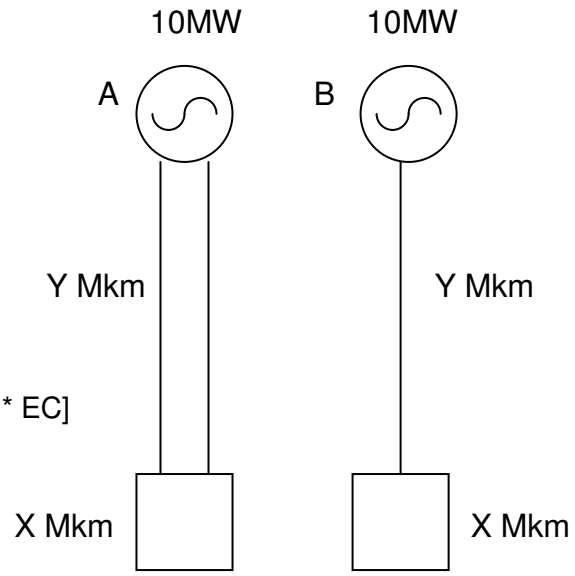
$$\text{Tariff @ gen B} = \frac{(1.8X + Y)}{(X + Y)} * (X + Y) * EC$$

$$= (1.8X + Y) * EC$$

Therefore differential/ discount = tariff A – tariff B

$$= [(1.8X + 2Y) * EC] – [(1.8X + Y) * EC]$$

$$= Y * EC$$



Appendix 2 – Proposed drafting of the Statement of Use of System Charging Methodology

Deriving tariff discounts for customer choice design variations

2.21 Generators connected by a single circuit under a SQSS design variation qualify for application of a circuit discount and a substation discount. The circuit discount reflects the reduced asset requirements of a single circuit.

2.22 The magnitude of the substation discount is dependant on the operating voltage of the connection. The substation discount is applied to the final zonal TNUoS tariff for the spur's zone. An illustration of the substation discounts calculated for 2007/8 are:

	Typical power station size (MW)	Tariff substation discount (£/kW)
33kV	50	3.12
132kV	110	1.05
400kV	600	0.65

2.23 The circuit discount can be calculated by:

Circuit discount (£ /kW) = L_{SC} x EF x EC x 0.001
Length of single circuit x expansion factor x expansion constant x 0.001

Where
L_{SC} = Length of single circuit (km)
EF = Expansion Factor
EC = Expansion Constant

2.24 The circuit discount and substation discount are applied to all customer choice SQSS design variation single circuit generator connections.

2.25 The combined discount, in £ /kW, is applied to the final tariff for the zone to which the node is situated as under existing zoning criteria. The discount per node will be published in the **Statement of Use of System Charging**.

2.39 The total revenue to be recovered through TNUoS charges is determined each year with reference to the Transmission Licensees' Price Control formulas less the costs expected to be recovered through Pre-Vesting connection charges. Hence in any given year t, a target revenue figure for TNUoS charges (TRRt) is set after adjusting for design variation discounts and any under or over recovery for and including, the small generators discount is as follows:

$$TRR_t = R_t + D_{DV} - PVC_t - SG_{t-1}$$

Where
TRR_t = TNUoS Revenue Recovery target for year t
R_t = Forecast Revenue allowed under National Grid's RPI-X Price Control Formula for year t (this term includes a number of adjustments, including for over/under recovery from the previous year). For further information, refer to Special Condition AA5A of National Grid's Transmission Licence.

D_{DV}	=	The total discount for Design Variation connection for year t
PVC_t	=	Forecast Revenue from Pre-Vesting connection charges for year t
SG_{t-1}	=	The proportion of the under/over recovery included within R_t which relates to the operation of statement C13 of the National Grid Transmission Licence. Should the operation of statement C13 result in an under recovery in year t – 1, the SG figure will be positive and vice versa for an over recovery.