Questionnaire: Intermittent Generation

Name of Respondent:	**Gayle Cairns**
Company:	**BE Power and Energy Trading**
Responding on behalf of:	**British Energy Group**

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	The term intermittent generation is meaningless without further definition. The intent is to use a generic term to capture plant where the technology drives the operating pattern not commercial decisions. All forms of generation are intermittent. Some forms of generation are limited by factors such as availability of water, tidal movements or weather conditions. Other technologies have operating patterns, which are dictated by the need to refuel, inspect or maintain. Attempting to distinguish on grounds of an arbitrary definition of intermittence is unhelpful and potentially discriminatory.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No There is no justification for special arrangements for 'intermittent' generators. The current methodology uses TEC as the users right to export to the system at peak. This is correct as the peak drives costs and TEC gives everyone the same rights to access the system at that time.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	There should be no change to the model for generation deemed to be 'intermittent'. Scaling in the transport model would not reflect the rights of the generation to export at peak and would be discriminatory for plant not deemed to be 'intermittent'. NGC cannot arbitrarily pick a merit order to base charges on as the merit order is driven by commercial factors and can change throughout the year. As NGC themselves recognise costs on the network are driven by system peak and therefore charges must be related to the capacity not the commodity.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	See answer to Q 1.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	The arrangements for embedded generation should not be affected. However, the growth of embedded generation does need to be considered in the context of distribution use of system charging to ensure that such generation bears the costs it may impose on the system.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging

	methodology in this area?
	There should be no change in this area.
Q.7	Are there any other issues on intermittent generation you wish to be considered?

Questionnaire: Intermittent Generation

Name of Respondent:	Elaine Hanton
Company:	Highlands & Islands Enterprise
Responding on behalf of:	N/A

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	There are two aspects to intermittent generation which are relevant here – compared to some other plant, its relatively low load factor, and its relative variability of fuel source input leading to a variable output which is accepted as is (i.e. the output is not scheduled and controlled). This implies that National Grid's review should include all (renewable) technologies which do not have a constant "fuel" supply, and technologies such as CHP which do not have control over output in the way that conventional thermal plant do. Such definitions may also encompass more conventional plant where fuel supply and output can be unpredictable, e.g. certain types of hydro. HIE strongly opposes comments that nuclear generation should be included as its output is largely uncontrollable. HIE believes that the characteristics of nuclear generation (constant baseload) are more appropriate to the current modelling and charging practices and that it would be ludicrous to term it as intermittent. HIE believes that inclusion of nuclear for consideration is clearly not the intention of Ofgem in applying Condition 3 to National Grid.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	HIE believes the existing charging methodology should be modified to account for intermittent generators as it is clear that, • Intermittent generation is fundamentally different to other thermal plant. • Intermittent generation, notably wind, is expected to become a significant contributor to GB generation, and hence UoS charges, in the future.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	HIE believes it is important to recognise that the UoS charging practices and the physical modelling leading to charge setting are separate although not independent. HIE therefore outlines views on both aspects separately below. In addition, HIE believes that connection and use of system practice for intermittent generation in respect of system reinforcement and the GB SQSS need to be reconsidered. HIE considers that these issues follow naturally from considerations of modelling and UoS charging and HIE expands on these views in a third section in response to this question. **1. Modelling** Current NGT modelling practice uses the DC loadflow to examine the GB system at times of peak load and peak generation. A fundamental assumption of the approach is that all generation is on-line and contributing with contribution scaled according to TEC. HIE considers that the validity of this assumption is questionable for intermittent generation and probably the key issue within the modelling . HIE makes the following points with regards to intermittent generators which National Grid should consider in regards to revising the modelling:

Load factor
The resource is intermittent, variable and the generators cannot, subject to other availability considerations, guarantee generation at any one given time. This leads to typical annual load factors in the range 30-50%. This is quite different from thermal plant where fuel availability is not a problem in this way. It may therefore be inappropriate to assume that intermittent generators will be able to generate at maximum during system peaks along with thermal plant. HIE considers a modelling approach based on a statistical analysis of scaling according to load factor may be more appropriate. HIE notes that National Grid uses a Monte-Carlo type statistical analysis for examining power transfers between zones ("boundary conditions") within the Seven Year Statement and this may be worthy of consideration for UoS modelling.

Diurnal and seasonal characteristics
The GB system is a winter peaking system and many intermittent generators also have peak fuel resource availability during winter. It is therefore important to consider this in the modelling. In addition, many intermittent generators also show diurnal fuel availability characteristics. HIE believes a statistical approach based on load factor can reflect both the time of day and seasonal characteristics of intermittent generation within the modelling by adjusting the load factor appropriately. Operational metering will in the fullness of time give National Grid additional confidence in such an approach through the evidence of historical data.

Merit Order
HIE is opposed to a Merit Order approach as this requires National Grid second guessing the market. HIE believes this is not sufficiently transparent, may be controversial, and may be seen as discriminatory.

Diversity of location/load factor
Intermittent generators (will) tend to be generally much smaller, more numerous, and more widely dispersed than typical thermal plant. Diversity of location can be easily modelled in a load flow program but in the case of intermittent generators also means that not all intermittent generators will be operating at the same load factor at the same time. An additional diversity factor is therefore necessary and HIE believes this can best be represented through a statistical approach such as the Seven Year Statement's Monte-Carlo analysis.

Trading arrangements
The GB market operates via a system of bilateral trades. In the case of intermittent renewable generation, purchasers (suppliers) generally contract with generators on the basis to take all generation as and when it is generated, i.e. the intermittent generator generates according to the availability of its fuel resource and not in accordance with market factors. This should be considered within the modelling of intermittent generation such that scaling with other plant is not necessarily appropriate, but rather the statistical load factor based approach should be used for intermittent generation and would be the most reflective of its operation at times of peak system loading.

Generation dominance
Operating and development costs on some parts of the GB system will be led by demand and in other areas by generation. It is therefore important to reflect this in the modelling and setting of UoS tariffs. Periods of peak system demand will not necessarily result in peak system stress in areas where generation is dominant such as is currently the case in parts of Scotland.

Future uncertainties
There is a degree of uncertainty in future intermittent generator development due to various factors and the resultant demands it will place on the GB transmission system. HIE is therefore of the opinion that both the peak system modelling and UoS charging model structure needs to accommodate this uncertainty. HIE believes a statistical approach based on the items discussed above is better able to accommodate this uncertainty and will be less subject to yielding volatile results leading to large and undesirable changes in UoS charges year on year.

Worst case versus Statistical approach
Whilst HIE is strongly in favour of a more flexible and statistical approach, HIE acknowledges that with a statistical approach there will always be a small probability that actual peak conditions seen will lie outside the "statistical envelope" considered. However, HIE believes that this can be either side of the cases considered most likely and that in the longer term or over longer periods of high system stress this effect will average out. In addition, HIE believes that such issues are largely irrelevant as the objective is to set the most reflective UoS charges rather than identify system reinforcements which should be considered as part of generator applications rather than modelling aimed at tariff setting.

Taking these views further leads HIE to conclude that an integrated statistical approach to UoS charges and system development should be adopted, and that National Grid should therefore be considering these two items in new contexts. This will require new UoS charging products expanded upon below, and new physical methodologies to connection and Use of System which acknowledges that more intermittent generation capacity can be connected than would currently be allowed provided that constraint or other low probability contingency mechanisms are put in place. HIE expands further on these issues later.

2. UoS Charging

UoS charges are currently set according to model results and are fixed year on year based on TEC. HIE does not believe this is necessarily the best practice for either intermittent generators or National Grid. Current rules regarding Transmission Entry Capacity (TEC) allow intermittent generators to utilise their TEC to the full at any time but this is clearly not an appropriate guide for modelling their contribution and HIE has expanded upon this point above. There is clearly a difference between the right to fully utilise TEC and the capability to exercise that right. Unlike other generation plant intermittent generators are not capable of fully exercising their rights to export at TEC and are therefore penalised for their intermittent nature by the existing system which was not developed with traditional generation plant in mind. HIE is therefore of the opinion that the UoS charging modelling and "charging products" should be modified to reflect this.

Charging products
Current UoS charges are levied according to TEC. HIE does not consider this necessarily the most appropriate charging regime for intermittent generators where annual load factors are typically less than 50%. Although network costs are largely driven by capacity considerations it does not seem appropriate for an intermittent generator to pay for capacity that will only be utilised to the full for a small amount of time but utilised in part for much of the time. HIE considers that this is an important point in the modelling (and has already been discussed) but also in the setting of charges and how they are levied. HIE is of the opinion that NGT should consider options for UoS tariffs to reflect this low TEC utilisation and the following elements are worthy of consideration:

- Time dependency.
- Degree of capacity (TEC) utilisation rather than simply TEC magnitude based.

- Firm and non-firm TEC elements.
- "Ancillary service" clauses to reduce generation at certain times.
- Energy based charging elements rather than capacity.

HIE believes that such charging products can offer many benefits including:

- better economic operation for intermittent generators,
- improved cost reflectivity,
- more efficient use of the GB transmission system,
- more economic use of GB transmission assets,
- improved competition between generators,
- reduced risks of excessive reinforcements and stranded or poorly utilised assets through better use of existing and new build assets, provided appropriate constraint and other contingency mechanisms are in place. This is largely a follow on issue and HIE sets out views for National Grid on this in the third part of the response to this question.

Locational issues

It is not clear to HIE as to what extent locational factors are to be dealt with in this consultation. HIE has strong views on locational charging of generation and briefly sets these out below. HIE's is respoonsible for community and economic development across the Highlands and Islands of Scotland, an area which is at the extremity of the GB transmission system and currently subject to the most extreme UoS tariffs. HIE's area has the best wind and wave energy resources in the UK and is subject to a great deal of interest from developers of such generation projects. Current locational charging practice penalises generators for locating in the Highlands and Islands, and HIE is opposed to this for the following reasons:

- This does not encourage the best use of natural resources.
- This does not assist in meeting UK government and Scottish Executive targets for renewable energy.
- This does not assist with regional and rural development.
- National Grid's locational charging practice is not favoured by HIE but is imposed on the HIE area and HIE believes this is unfair and discriminatory.

HIE believes that locational charging elements should be removed from UoS tariffs or very heavily moderated.

3. Further Use of System considerations

HIE believes that when the above are fully considered that it is apparent that the transmission system can physically accommodate more intermittent generation than would be allowed under the current connection and use of system practices. That is, the existing system can accommodate more MW for MW intermittent generation than "conventional" generation because of its characteristics, making better use of the transmission assets both in terms of efficiency and economics. This implies that reinforcements may be deferred, more intermittent generation of a renewable nature can connect and quicker, assist in government and regional targets are easier met, and revenue streams for NGT and generators are improved.

Once accepted that the transmission system can sensibly physically accommodate more intermittent generation than conventional plant, the question arises as how to charge the intermittent generation for use of the system, and where to draw a line as to how much can be accommodated.

HIE has very briefly outlined some options for UoS charging which it believes may offer

	solutions to this issue and would be more cost reflective for low load factor intermittent generation where use of the system is not on a 100% or nothing basis, as is common with conventional plant, but is virtually always on a part load basis. HIE accepts that physically connecting more intermittent generation than would be allowed under the present system through considering its intermittent characteristics does rely on an acceptance of a statistical analysis and that as more intermittent capacity is connected over and above the absolute system capacity to accept it at full load all of the time there becomes an increased probability of constraint. HIE believes that the key question is how much "additional" capacity can be connected and how will the UoS charging and constraint management be framed to accommodate this. HIE is of the opinion that NGT should be examining these issues in this consultation and that there is a better, more economic, efficient, and environmentally beneficial way forward than the present TEC based maximum generation/maximum demand system with a firm connection only "invest then use" policy. HIE notes that other respondents have voiced similar views. HIE notes that the Republic of Ireland has recently introduced a system to allow intermittent generators to connect ahead of system reinforcements with constraint. HIE notes that there is also a growing concern regarding non-firm and other types of UoS products in other parts of the world such as the US.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	HIE believes that whatever changes National Grid adopts they must be fair and non-discriminatory. In regards to the modelling aspects HIE believes that it is appropriate to consider whether similar changes might be appropriate to other generators. However, this consultation regards intermittent generators and as such should remain firmly focused on how best to model them. As stated any further considerations in regards to other generators are best dealt with outside of this forum. In regards to the UoS charging aspects raised, HIE believes that any changes to UoS charging should be freely available or applied to all qualifying generators and sees no reason why this should not be the case.
Q.5	Do you think your proposal would have an impact on embedded generation, and why? Much of the intermittent generation this consultation concerns is embedded. It therefore follows that there will be a large impact on it. Intermittent generators are currently struggling financially due to the UoS burden placed upon them. HIE believes the proposals made within this document will, if implemented, • Reduce the UoS charge burden on intermittent generators by making the tariffs more cost reflective in regards to the burden intermittent generators put on the system. • Allow more intermittent generation to connect to the GB transmission system without necessarily having to wait for reinforcements. • Allow faster connection and use of system by intermittent generators.

Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area? HIE believes that National Grid must consider the context of the GB SQSS within any changes to the UoS charging methodology but should not necessarily wait (depending on GB SQSS review timescales). There are cases where application of the GB SQSS with intermittent generation appears to be inappropriate and brings neither benefit to the GB transmission system or connecting (intermittent) generators. Intermittent generators are largely willing to accept security and supply quality below the GB SQSS and have traditionally done so within distribution networks where single circuit non-firm connections and periodic constraints are common. HIE acknowledges that National Grid must also consider the above proposals and the GB SQSS in the context of other users of the system and the more general effects on the GB system security and quality of supply. However, it is HIE's view that simply continuing with current UoS practice and applying the full and current GB SQSS will not lead to the benefits HIE has outlined in this document and ultimately will result in more cost to intermittent generators, more cost to other system users, and an "unwieldy" and inefficient transmission system utilising archaic practices. HIE considers that one way forward would be to split GB SQSS and use of system considerations between the Main Interconnected Transmission System (MITS) and non-compliant parts of the system which may be "single circuit generation spurs" for example. As another example, HIE sees little relevance in a fully GB SQSS transmission system extension and interconnecting substation for a relatively small wind farm in a remote location where such a connection could be made much more economically without full GB SQSS application and at little detriment to the MITS and other users. HIE would be pleased to discuss such issues with National Grid further through appropriate channels.
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	HIE has covered the issues it wishes to in the above sections. Other issues such as allocation of access rights and capping of UoS charges on the islands are being dealt with through other forums.

Questionnaire: Intermittent Generation

Name of Respondent:	Shona Watt
Company:	RWE Npower
Responding on behalf of:	RWETrading, RWEnpower, npower ltd, npower commerical gas, Npower Direct, npower nothern ltd, npower northern supply ltd, npower yorkshire ltd, npower yorkshire supply ltd, npower cogen ltd, npower cogen trading ltd

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Intermittent generation should be defined as all generation that does not operate continuously (in effect, all generation).
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	All generation should be treated in a consistent manner. The methodology could be modified to reflect the fact that all generation is effectively intermittent.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	We would advocate a charging methodology that accurately reflects peak conditions. A scaling method in the DCLF model that produced generation inputs that more accurately represented peak conditions would produce more cost reflective charges. A scaling method that less accurately reflected peak conditions (for example by only scaling one type of generation in an arbitrary fashion unrelated to the costs imposed on the transmission system), would produce less cost reflective charges.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	The above proposal would apply to all types of generation.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	The above proposal would result in different generation values being used as inputs to the transport model, so would change the tariffs for both generation and demand. This would increase the value of emedded benefits in some areas of the network and decrease their value in other areas of the network.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	Any change in security standards should not be exclusively available to a

	narrowly defined subset of intermittent generators. However, the nature of wind farms in particular (remote locations, high captial cost) may encourage such customers to request connections that are currently perceived as non standard. This may or may not change the way such generators are seen by the Transmission system and hence the basis of charging. It may therefore be appropriate to await the outcome in terms of developments relating to security standards before implementing major changes in the way generators are charged for TNUoS.
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	The method for determining charges for embedded generation should be consistent with that for directly connected generation. Over the long term harmonisation of the calculation of DUoS and TNUoS charges is desirable to ensure consistency of charging across all voltages.

Transmission Network Use of System Charges

Questionnaire: Intermittent Generation

Name of Respondent:	Steve Drummond
Company:	EDF Trading Ltd
Responding on behalf of:	EDF Trading Ltd and EDF (Generation)

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Intermittent generation has been used to apply to a source of generation whereby the output becomes restricted for reasons other than market or system conditions. It could be applied to wind turbines because of the dependency on the wind, which is outside the influence of the operators and cannot be planned for. Likewise, it could be applied to hydro generators because of water restrictions, or solar powered generators and other renewable sourced generation. It could conceivably also be applied to other low load factor generation.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No. The charges relate to access to the system and the system has to be built to cater for the maximum amount that could be generated by that generator. To charge less would imply a lower standard of access or a lower level of access which would be discriminatory.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	I wouldn't, not unless you applied the same methodology for all generation sources, including imports through interconnectors.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	There should not be any changes in our view. To do so would be unduly discriminatory and, besides which, we need to have a period of charging certainty after so much change in the past.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	No. There are difficult issues associated with embedded generation which need consideration separately.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area? *Whereas we do not believe there should be any special treatment in any case, it shouldn't be looked at in isolation and it should await the outcome of the review.*
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	No.

Questionnaire: Intermittent Generation

Name of Respondent:	**Rekha Patel**
Company:	**ConocoPhillips**
Responding on behalf of:	**Immingham CHP**

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	We have not assumed any specific definition. Any revised transmission charge mechanism should not penalise high load factor plant by arbitrarily reducing charges to intermittent technologies. Any criteria for reducing charges should be unambiguous and related to physical operating characteristics on a site-specific basis, thereby ensuring consistency with licence objectives for cost reflectivity. The charging arrangements should also disincentive free-riding and recognise the cost of capacity provided on the transmission system irrespective of the level of connection.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No. If the existing charging methodology is modified for intermittent generators, this could lead to an unjustifiable dilution to the cost-reflectivity principle.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	We believe charging should remain capacity based.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	We believe the current charging methodology should continue for all types of generation including intermittent generation.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	Embedded generation above defined levels already pays transmission access charges, reflecting their impact on the transmission system. Any changes to the charging arrangements arising from this condition are likely to have consequential impacts on those paying TNUoS. Care is needed not to create perverse incentives', encouraging new connects to by pass the grid.
Q.6	Do you believe that National Grid should await developments in the review

	of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	Yes, as operational and charging parameters should where possible be consistent.
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	Alignment with distribution charges is a consideration.

Questionnaire: Intermittent Generation

Name of Respondent:	Elaine Greig
Company:	AMEC Wind Energy
Responding on behalf of:	AMEC Wind Energy

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	All generation is intermittent, but for different reasons. *In the context of this questionnaire the reference is to generation which has not got control over fuel availability (eg wind, solar and probably to some extent other sources such as sewage sludge) and therefore maximum output, although this can now be reasonably predicted over the half hour to gate closure. Other generation which has got control over the fuel, but is operated for other reasons (eg CHP – heat), and electricity is a by-product, may also be considered to be intermittent from an electricity perspective.* *Generation made up of multiple smaller units (eg wind) is perhaps more consistent in terms of availability than generation made up of fewer large units (eg coal) as maintenance is rolling, significant maintenance shutdowns would only occur for substation or line maintenance, and failures of individual units would not necessarily be seen by the operator.*
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	Yes. There are fundamental differences between the project finances of what is to become base load plant, peak lopping plant, plant which does not use the full capacity for other reasons (as described above) etc. Plant should be charged according to usage, as the current system is based on the assumption that electricity producers can, and will, generate up to full rated capacity as far as possible. Those who cannot, or for other reasons do not, do this are still charged as if they were, and therefore the costs to the project are proportionately greater.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	I would propose a method with a significant proportion of the TNUoS being based on the capacity factor of the plant, in addition to a simple 'right to remain connected' charge. Wind would therefore be lower, and nuclear higher. No plant would be 100%. This would ultimately be based on actual MWh exported. It could be done via a prediction, and then balanced at the end of each period, or retrospectively. *If this were to be adopted the definitions of load factor and capacity factor would need to be re-established for this purpose. NGC's definition relates the actual energy output to the name plate rating (where in the case of wind the factor becomes very low), rather than the available energy or fuel (as in other definitions of load factor, where wind obviously is much higher). The use of capacity factor, i.e. relating to name plate rating, is appropriate in this*

	application.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	As all generation is intermittent the same methodology should be applied to all generators. As renewable generation displaces fuel but not necessarily plant, it is only reasonable that conventional generators whose output has been displaced should make equivalent savings in system charges.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	Yes. There are changes proposed to both align the DNO charges with the TO charges, as well as reflecting transmission charges to exporting GSPs. The charging methodology should be consistent.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	No. These should be undertaken in parallel, and may inform each other to avoid re-review of either. *Designing and charging connections based on the expected capacity factor of the plant may lead to savings in infrastructure as it is cheaper to pay constraint charges for the small amount of time that such constraints are in place, than to pay for the increased installed capacity for a fully rated (n-1) connection. This is especially true of wind when consideration is taken of the normal outage period being in the summer, when the wind is normally low. The only likely time of constraint payment is for a fault in winter when there are also high winds (low probability multiplied by low probability equals very low probability). At most times, in case of an outage, the generation output would be expected to be less than the non-firm (n) capacity anyway, & then constraint payments are not made and charges remain the same.*
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	Connection arrangements based on the capacity factor, to align with new charging arrangements and revised SQSS – as described above.

Questionnaire: Intermittent Generation

Name of Respondent:	**Richard Ford**
Company:	**BWEA**
Responding on behalf of:	**BWEA**

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Clearly all generation is intermittent and the terminology currently used would benefit from agreed definitions. It is becoming increasingly common, worldwide, to use the term variable generation for technologies such as wind wave and tidal. Whilst neither term fully reflects the distinctions between, for example, wind and fossil fired generation BWEA believes that the term "variable" is an improvement on the term "intermittent" and would recommend its adoption. *For the purposes of this questionnaire, BWEA considers intermittent generation to be that which, in the absence of despatch instructions to modulate its output, provides a variable output between zero and full load depending on weather conditions (for example prevailing wind speed).* *BWEA would not class CCGTs to be intermittent even though their maximum output varies with air temperatures.* *Nor would we make a distinction between despatchable and non-despatchable generation since intermittent generation can also be despatched (for example, in the provision of frequency response).* *It is also worth noting that some generation technologies (for example some small hydro schemes) have some limited storage capacity and can choose to delay an amount of electricity generation in response to market conditions. Such generation is in effect "semi-intermittent"*
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	Yes! The existing charging methodology does not recognise the fundamental distinctions between intermittent and non-intermittent generators. The two major differences being that intermittent generation has a lower load factor than conventional generation and it cannot choose to generate at maximum capacity at times of peak demand or times of high prices.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	BWEA would propose two changes to the treatment of intermittent generation. *Firstly we propose that the annual capacity charge be scaled down to reflect the lower probability of maximum generation coinciding with maximum demand.* *In conjunction with this proposal, the access arrangements should be revised to allow increased capacities of intermittent generation to be*

	connected to the system than would otherwise be allowed for non intermittent generation. This would reduce the potential impact on NGC's cost recovery. For example, where 500MW conventional generation might be connected with a network charge of £20/kW pa, 1000MW of intermittent generation might be allowed with a network charge of £10/kW pa. In both cases NGC's revenue would be £10m pa. *Secondly we propose that network charges should contain both capacity charges (scaled as appropriate for intermittent generation) and usage charges. Usage charges should be applied on a MWh basis in every half hour as BSUoS charges already are. However the charge in £/MWh should be fixed in advance and should be constant i.e. it should not vary from half hour to half hour as BSUoS charges do.*
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	We don't believe that the scaling of capacity charges should apply to non intermittent generation (or rather that the scaling factor for such plant should be set to 1). However, the proposal to recover a proportion of network charges on a MWh basis should apply to all generators.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	These proposals should apply to all generation that pays Use of System charges some of which is embedded.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	No
Q.7	Are there any other issues on intermittent generation you wish to be considered?

Questionnaire: Intermittent Generation

Name of Respondent:	*Paul Jones*
Company:	*E.ON UK plc*
Responding on behalf of:	*E.ON UK plc*

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	All generation which is not running at baseload is intermittent generation. Definitions of intermittent tend to mention "stopping and starting at intervals". These could be regular or irregular intervals too. Therefore, any generator running less than 100% of the time could be regarded as intermittent.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No. The charging regime has never sought to identify the most likely plant to be operating at peak. To do so would introduce other problems into the charging methodology. The advocates of the proposal to treat intermittent generation differently tend to focus on wind generation. We believe that this should be treated in the same manner as any other low load factor generator.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	We do not believe any change should be made. A merit order approach would entail NGC making judgements on the relative economics of different stations which in reality would be driven by prevailing market conditions pertaining at the time. We do not see how such second guessing of the market could be any more accurate than the present approach and would lead to a reduction in the predictability of the results from the model for market participants.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	Not applicable.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	Presumably, this proposal has been suggested with the hope that it will result in suppressed locational signals in TNUoS charging. Therefore, if the methodology is changed in this way and signals are weakened then there will be an impact on all generation including embedded generation. Whether this is detrimental or beneficial will depend on the location of the generation. It is likely that generation in more appropriate locations on the system would be adversely affected by the proposal whilst plant in less appropriate areas will benefit.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of

	Supply Standards before proposing any change to the charging methodology in this area?
	If changes are to be made then it would be sensible to wait.
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	No.

Questionnaire: Intermittent Generation

Name of Respondent:	**Audrey Fogarty**
Company:	**AIRTRICITY**
Responding on behalf of:	

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	- ***It is misleading to ascribe the term "intermittency" solely to those classes of generators which produce variable levels of output over a fixed period of time. Lower-load generators, such as renewables, infrequently produce zero output, particularly as penetration increases, and intermittency is primarily due to periods of forced or unforced outages, as per all classes of generators.*** - ***For the purposes of this questionnaire however, we assume that the term Intermittent Generation applies to generation which produces a variable level of output between zero and its maximum capacity, over a fixed period of time and depending on prevailing weather conditions.***
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	- ***Yes. The existing methodology derives a set of charges based on the assumption that every generator is exporting to the full value of its TEC during peak demand conditions. This cannot be deemed an accurate representation of system power flows as it does not recognise the lower load factor of Intermittent Generation. This generation carries a lower probability of exporting to its maximum TEC level during system peaks, therefore the maximum TEC assumption across all forms of generation is flawed. The Charging methodology should be modified to more accurately reflect actual system conditions.***
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	- ***We advocate the introduction of a usage-based charging element for generators in the Charging Methodology. The current methodology does not distinguish between high/low load generators that will have different patterns of production over the system peaks that form the basis of the model. Consequently, UoS Charging costs fall disproportionately across different generators on a per unit basis. This disparity would be removed by applying a fixed per MWhr charge on all generators regardless of generation source*** - ***A reduction in the Intermittent Generation load factor assumed in the Charging Model would have a similar affect on reducing the above disparity between high/low load charging liabilities. A capacity factor could be applied to the allocated TEC for Intermittent***

	Generation using historical long-run performance data over high demand periods, or another such benchmark. Charging Intermittent Generation on the basis of this reduced TEC factor would more accurately reflect system usage by this type of generation, as opposed to the maximum export assumption currently employed.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	- ***Applying a proposal to charge all plant on the basis of expected or actual system usage would not discriminate against fully-dispatchable conventional plant which could expect to be maximising its output during system peak periods.***
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	- ***Smaller (<100MW) licence-exempt embedded generation does not currently fall within the Use of System charging base and as such would be unaffected this.*** - ***The proposal to modify the model to reflect system usage during peak demand conditions should apply equally to embedded plant which fall within the existing charging base.***
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	- ***Regardless of the outcome of any such review, it is necessary to address fundamental issues in the existing UoS Charging Structure, such as the concept of scaling capacity charges between higher and lower load generators and the potential for introducing a usage cost element into the Methodology.*** - ***As a general principle however, the Use of System charging methodology should not develop in isolation from other policy objectives and developments elsewhere in the electricity market. Assumptions regarding Intermittent Generation in terms of use of system liabilities should be consistent with the treatment of Intermittent Generation under planning standards.***
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	Further to the point above regarding the consideration of Charging rules in conjunction with developments in other areas, a key concern is that the UoS implications of other issues relating to Intermittent Generation in BETTA, such as Transmission Access, the treatment of EELPS etc. are not comprehensively addressed. We would urge that discussions on the Charging methodology as applied to Intermittent Generation take into full consideration these external issues. Uncertainty in this area makes it extremely difficult for developers to

	secure the necessary project-finance to progress with planned developments.

Questionnaire: Intermittent Generation

Name of Respondent:	Mike Harrison
Company:	ScottishPower Energy Management Ltd
Responding on behalf of:	ScottishPower Generation Ltd, ScottishPower Energy Retail Ltd, CRE Energy Ltd

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Intermittent generation is that generation which is subject to naturally occurring variations in the availability of its energy source over which the generator has no control.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	Yes. The current charging methodology assumes that all generators are equally able to utilise their full TEC at the time of system peak demand. Natural variation in the availability of their energy source means that intermittent generators cannot choose when to utilise their full TEC and are less likely to utilise it at the times of system peak demand than other forms of generation. This should be addressed by changing the treatment of intermittent generation within the transport model for calculating the locational element of TNUoS tariffs. *A separate issue relates to the structure of the generation TNUoS tariff. The current capacity-based tariff disadvantages not only intermittent generation but also all low load factor generation.*
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	The current transport model overstates the contribution from intermittent generation relative to conventional generation. SP's experience from its own windfarm portfolio is that the output shows no diurnal variation in winter, is not correlated with demand and is less likely to operate at full output at the times of peak demand than other forms of generation. The TEC of intermittent generation should be scaled down before it is entered into the transport model. We have previously suggested scaling factors of 0.43 (Electricity Act licensing exemption regulations) or 0.6 (Scottish TOs' planning assumptions). (We can provide more details of this analysis to NGC if required) *We have also previously suggested that only part of generation TNUoS should be charged on the basis of capacity with the remaining revenue recovered through a commodity charge. We believe that charging for both capacity and utilisation is a more appropriate basis for the recovery of NGC's costs and for reflecting differences in actual usage of the system*

	between different types of users.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	The change to the transport model proposed in answer to Q3, i.e., the pre-scaling of TEC before entry into the model, should apply only to intermittent generation as defined in the response to Q1. All other generation should be uniformly scaled. *Charging for use of system on the basis of both capacity and utilisation by the introduction of a commodity charge should apply to all generation.*
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	Whilst the amount of embedded generation which is netted off the DNO demand is at the discretion of the DNO, consistency of treatment suggests that the same intermittent generation pre-scaling factor should be used by the DNOs and NGC.
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	No. We believe that sufficient arguments have already been presented to justify different treatment of intermittent generation within the transport model. Furthermore, it is not clear that the intermittent generation issues being addressed in the GB SQSS review are the same as the intermittent generation issues in the charging methodology. We believe that pre-scaling of TEC as proposed in response to Q3 should be introduced into the charging methodology in April 2006. The factor can be reviewed in the light of any relevant findings of the SQSS review. *The introduction of a commodity charge is unrelated to the SQSS review. This change should be introduced in April 2006 and applied to all generators.*
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	Failure to adapt the charging methodology to accommodate the particular characteristics of intermittent generation could lead to a reduced amount of renewable generation connecting to the network due to excessive locational differentials and could jeopardise achievement of Government renewable energy targets.

Questionnaire: Intermittent Generation

Name of Respondent:	*Simon Lord*
Company:	Rugeley Power Ltd and Deeside Power Development Company Ltd
Responding on behalf of:	

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Generation whose output varies due to physical constraints.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No. The infrastructure needed for intermittent generation needs to cope with the possibility that it will be generating at full output at winter peak. The fact that at some times of the year full output is not achievable does not diminish the level of investment required.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	None. The current approach is appropriate. In the future a new access product could be developed allowing NGC to sell two parties mutually exclusive access rights with the full TEC cost shared by two parties.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	We think the current methodology is acceptable and do not advocate change.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	See Q 4
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area? We believe that TO invests to allow the full level of generation from intermittent sources and should not be treated differently to other sources of generation. Therefore there is no need to wait for the SQSS review.
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	No

Questionnaire: Intermittent Generation

Name of Respondent:	*Simon Lord*
Company:	*First Hydro Company*
Responding on behalf of:	

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Generation whose output varies due to physical constraints.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No. The infrastructure needed for intermittent generation needs to cope with the possibility that it will be generating at full output at winter peak. The fact that at some times of the year full output is not achievable does not diminish the level of investment required.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	None. The current approach is appropriate. In the future a new access product could be developed allowing NGC to sell two parties mutually exclusive access rights with the full TEC cost shared by two parties.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	We think the current methodology is acceptable and do not advocate change.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	See Q 4
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area? We believe that TO invests to allow the full level of generation from intermittent sources and should not be treated differently to other sources of generation. Therefore there is no need to wait for the SQSS review.
Q.7	Are there any other issues on intermittent generation you wish to be considered?
	No

Questionnaire: Intermittent Generation

Name of Respondent:	**Maf Smith**
Company:	**Scottish Renewables Forum`**
Responding on behalf of:	**Scottish Renewables Forum**

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	Clearly all generation is intermittent and the terminology currently used would benefit from agreed definitions. It is becoming increasingly common, worldwide, to use the term variable generation for technologies such as wind wave and tidal. Whilst neither term fully reflects the distinctions between, for example, wind and fossil fired generation SRF believes that the term "variable" is an improvement on the term "intermittent" and would recommend its adoption. *For the purposes of this questionnaire, SRF considers intermittent generation to be that which, in the absence of despatch instructions to modulate its output, provides a variable output between zero and full load depending on weather conditions (for example prevailing wind speed).* *SRF would not class CCGTs to be intermittent even though their maximum output varies with air temperatures.* *Nor would we make a distinction between despatchable and non-despatchable generation since intermittent generation can also be despatched (for example, in the provision of frequency response).* *It is also worth noting that some generation technologies (for example some small hydro schemes) have some limited storage capacity and can choose to delay an amount of electricity generation in response to market conditions. Such generation is in effect "semi-intermittent"*
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	Yes. The existing charging methodology does not recognise the fundamental distinctions between intermittent and non-intermittent generators. The two major differences being that intermittent generation has a lower load factor than conventional generation and it cannot choose to generate at maximum capacity at times of peak demand or times of high prices.
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	SRF would propose two changes to the treatment of intermittent generation. *Firstly we propose that the annual capacity charge be scaled down to reflect the lower probability of maximum generation coinciding with maximum demand.* *In conjunction with this proposal, the access arrangements should be revised to allow increased capacities of intermittent generation to be connected to the system than would otherwise be allowed for non*

	intermittent generation. This would reduce the potential impact on NGC's cost recovery. For example, where 500MW conventional generation might be connected with a network charge of £20/kW pa, 1000MW of intermittent generation might be allowed with a network charge of £10/kW pa. In both cases NGC's revenue would be £10m pa. *Secondly we propose that network charges should contain both capacity charges (scaled as appropriate for intermittent generation) and usage charges. Usage charges should be applied on a MWh basis in every half hour as BSUoS charges already are. However the charge in £/MWh should be fixed in advance and should be constant i.e. it should not vary from half hour to half hour as BSUoS charges do.*
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	We don't believe that the scaling of capacity charges should apply to non intermittent generation (or rather that the scaling factor for such plant should be set to 1). However, the proposal to recover a proportion of network charges on a MWh basis should apply to all generators.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
	These proposals should apply to all generation that pays Use of System charges some of which is embedded. *Given that in Scotland the definition of a large power station can begin at only 5MW, there will be a large amount of intermittent generation (in cumulative terms) connecting into the grid system within Scotland. Given this, it is correct that such changes are also applied to embedded generation.*
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging methodology in this area?
	No
Q.7	Are there any other issues on intermittent generation you wish to be considered?

Questionnaire: Intermittent Generation

Name of Respondent:	Stephen Moore
Company:	EDF Energy
Responding on behalf of:	EDF Energy (Cottam Power) Ltd, EDF Energy (Services) Ltd, EDF Energy (Sutton Bridge Power) Ltd, Jade Power Generation Ltd, London Energy plc, SEEBOARD Energy Ltd, West Burton Ltd

Q.1	Please can you provide your definition of intermittent generation including your rationale?
	All generation is, in fact, intermittent in that it does not generate all the time; as such few generators are ever able to use their full TEC every day. Any change of methodology for certain types of generators with differing load factors would be arbitrary.
Q.2	Do you believe that the existing charging methodology should be modified to account for intermittent generators?
	No, the current methodology is based on the maximum level of access that a power station has onto the transmission network. To change it for generators with low load factors could be discriminatory as such generators would still be likely to generate at full capacity at some stage during a year. *We support the continuation of a methodology that charges for the maximum capacity required. There are two major flaws in allowing a generator with a low load factor to pay a reduced amount of TEC on the assumption that average generation will be nowhere near maximum potential output (e.g. wind farm pays 35% of TEC, allowed to export equivalent of full TEC for 35% of year):* *1). Where several wind farms were located close to each other meteorological conditions could mean that all would be generating at the same time thus necessitating all of the access guaranteed by full TEC.* *2). It could create perverse incentives for sites not to generate where they risked exceeding their annual quota of TEC at the end of a charging year. If a year had been particularly windy then such a quota would be used up earlier, encouraging wind generators not to produce at the end of winter with potential security of supply implications.*
Q.3	What changes would you propose for intermittent generation in the charging model (e.g. scaling in the transport model or the use of a merit order approach, commodity charge) and how would you justify your proposals?
	There may be scope to look at the method of scaling used in the model to reduce generation to the level of demand, perhaps using different scaling factors for different technology types. Such an approach may better reflect typical flows on the system without undermining the principle of TEC.
Q.4	Do you believe that your proposals for intermittent generation should be applied to other types of generation?
	Any changes to the principles of the charging model should apply to all types of generation, to do otherwise risks becoming prescriptive and favouring certain types of generation over others. TEC is a payment for maximum access and that should apply to coal and oil stations as well as wind farms.
Q.5	Do you think your proposal would have an impact on embedded generation, and why?
Q.6	Do you believe that National Grid should await developments in the review of the treatment of intermittent generation in the GB Security and Quality of Supply Standards before proposing any change to the charging

	methodology in this area?
	It is unlikely that there are any 'quick wins' which could be implemented in time for the 2006-07 charging year. The time to consult upon, and gain approval for, a proposal to reduce the cost of TEC for certain types of generation would, aside from being discriminatory, replicate the uncertainty caused by the delays to the approval of the 2005-06 methodology.
Q.7	Are there any other issues on intermittent generation you wish to be considered?