DTI/OFGEM Embedded Generation Working Group
Rapporteur Contribution

Charging Principles

09 November 2000

1. Introduction

1.1 It is likely that in the future generating plant embedded in distribution networks will contribute a larger proportion of total national generation, considering the Government's policy objectives for renewable plant and CHP and the wish among developers to introduce various types of generating plant in distribution networks.

1.2 Set against this background, and taking into account the new regulatory structure under which distribution companies will have to facilitate competition in generation and supply across their networks, this paper explains the current commercial situation and identifies some possible changes to the commercial arrangements and incentives to facilitate increased levels of embedded generation.

1.3 While the paper sets out the potential consequences of each option for change, the rapporteurs have not sought to select any 'preferred' option. That is a matter for OFGEM and HMG - following more detailed work and full consultation with affected parties. In considering these options further, HMG and OFGEM should take account both the consensus comments set out in the options and recommendations sections of this paper and the points of view of the Network Operators, Generators, Suppliers and customer groups which are annexed.

2. Background - The Current Situation

2.1 In 1989 when the principles of network charges were being determined, the underlying assumption was made that all power flows in a distributor's system was from the Grid Supply Point (GSP) to a customer' s terminals. The aggregate of the charges made on this assumption recovered the full relevant costs of the price regulated distribution activity.

2.2 There was also a presumption made that the exported energy from embedded generators would normally be absorbed at the voltage of connection (or a lower voltage) i.e. Energy would still flow 'down' the distribution network and the network operator would still recover DUoS from Suppliers. It followed from these assumptions that network charges were not normally applied to power exported onto the distribution network by embedded generators.

2.3 Demand customers provide a revenue stream to the Network Operator, via distribution use of system charges (DUoS) for the ongoing provision of the distribution network and hence an allowance is normally made in the calculation of their connection charge. Embedded generators do not pay a DUoS charge (and hence do not provide a revenue

stream to the Network Operator) and so they would normally pay the appropriate full cost of the connection. Larger generators who are connected directly to the transmission system pay transmission charges only. They do not pay DUoS or distribution connection charge.

2.4 The full cost of connection payable by an embedded generator includes any charges in respect of assets remote from the local point of connection (i.e. 'deep' connection assets). These include any costs in respect of changes to protection or voltage control needed as a result of the connection of the generator to accommodate the actual anticipated power flows in the system arising as a result of the connection of the generator. Connecting embedded generators into the distribution network increases the system 'fault level'. If the increased fault level exceeds existing equipment fault ratings it results in the requirement to change equipment or reconfigure the network. The generator would be charged the full cost of any such work.

2.5 The initial connection charge may include a component for the future capitalised associated operation and maintenance charges. Alternatively these may be considered (and charged) as an annual service charge. These charges do not include the replacement of these assets when time-expired. Such arrangements are normally specified in the connection agreement.

2.6 The 'point of connection' arrangements (looped in, single connection, teed feeder etc) is determined by the embedded generator itself. Any resulting operational or capacity constraints are included in the connection agreement between the generator and the network operator.

2.7 Generators are 'credited' with a loss factor that has the effect of crediting the exported energy as though it was appearing at the GSP. The Distribution Network Operators do not gain any 'credit' in their allowed revenues for any reduction in losses due to embedded generation.

3. Definitions

3.1 For the purposes of the subsequent sections of this paper the following definitions will apply.

- A 'Deep Connection' charge is when the connection charge includes all the associated costs of connection including any costs incurred at remote locations or at higher voltage levels

- A 'Shallow Connection' charge is when the connection charge includes the cost of connecting to the nearest appropriate point in the network (i.e. does not include remote costs or cost incurred at higher voltages)

- A 'Shallowish Connection' charge will include some element as yet undecided of the cost of reinforcement incurred. These definitions may be more explicitly defined, or altered, following more detailed financial analysis of the potential impact
- 'Entry' charges would be paid by generators and distribution interconnectors and 'Exit' charges paid by customers (via Suppliers). However, because of the flexibility inherent in the entry and exit charges, level of payment (or negative payment) will depend on a variety of factors

- It should be noted that the terms 'entry' and 'exit charges' as used in this paper differs from the way they are currently defined or used within the industry

3.2 The following is a breakdown of the possible components of 'Entry' and 'Exit' Charges to support the various options that are set out in the next section.

Distribution Network Entry Charges	**Distribution Network Exit Charges**
Local reinforcement charge (+ve or –ve)	Local reinforcement charge (+ve or -ve)
Deep reinforcement contribution (+ve or –ve)	Deep reinforcement contribution (+ve or -ve)
Transport (UoS) charge (+ve or –ve)	Transport (UoS) charge (+ve or -ve)
Operation & maint charges on connection asset	Operation & maint charges on connection asset
Connection asset time-expired replacement costs	Network asset time-expired replacement costs
Other Charges	**Other Charges**
Shallow connection charge (unique assets)	Shallow connection charge (unique assets), with DUoS allowance

- Distribution costs not allocated but which will need consideration when the detailed analysis is undertaken are network losses, NGC 'pass through' costs and (potentially) distribution network constraint costs

4. Possible Options for Future Charging Regime for Connection and Use of Distribution Systems.

4.1 Option 1: Status Quo (The Reference Case)

- Generators continue to pay 'deep' connection charges
- Demand continues to pay 'shallowish' connection charges
- All other reinforcement costs are met through DUoS, which is paid solely by demand

	Positive Impact	Negative Impact
Distributor	• No changes to current systems and methodologies. • Potential windfall benefits • Reflects current Price Control	• No incentive to actively support embedded generation • Generation could use up spare network capacity • 'First comer / second comer' issue
Generator	• No ongoing payments	• Capital cost of connection remains high • Different treatment to demand • Exposure to potential 'cliff face' costs
Supplier/demand customer	• Billing systems unchanged • Generator connection costs directly allocated	• Non-generator related costs continue to be met by demand

4.2 Option 2: Shallow generator connection, all reinforcement costs paid by load customers

- Demand would continue to pay 'shallowish' connection
- Generation would pay 'shallow' connection only connection assets up to point of common coupling
- Any reinforcement necessitated by generation connections would be financed out of DUoS. Only demand would pay DUoS

	Positive Impact	Negative Impact
Distributor	• No changes required to billing systems etc.	• Step change in requirement for capital expenditure • If 'shallow' definition differs from transmission definition could send inefficient locational signal to larger generators
Generator	• Reduced capital cost with no corresponding increased running cost	•
Supplier/demand customer	•	• Increase in DUoS, including initial step change

4.3 Option 3 : Shallow generator connection cost, reinforcement costs being shared by all parties

- Demand would continue to pay 'shallowish' connection
- Generation would pay 'shallow' connection and some level of entry charge
- All reinforcement is paid by some combination of demand (exit) and (entry) charges

	Positive Impact	Negative Impact
Distributor	• Income stream from embedded generation • Income from investment in network (RAB)	• Introduction of new / more complicated(?) charging methodology and requirement for new billing systems • Increased capital requirements • Locational message missing
Generator	• Reduced capital cost for new entrants	• Entry charges may be positive or negative (depending on location)
Supplier/demand customer		• Possible short term increase in DUoS • Potential zonal pricing issue
	• Net position is a trade off between, on the one hand, DUoS reducing because some network costs are now being paid by generators and on the other hand generator triggered reinforcements being funded (at least in part) by demand use of system.	

4.4 Option 4 : Shallowish generator connection cost, reinforcement costs being shared by all parties

- Demand would continue to pay 'shallowish' connection
- Generation would pay 'shallowish' connection and some level of entry charge.
- All reinforcement paid by some combination of demand and generation exit and entry charges

	Positive Impact	Negative Impact
Distributor	• Income stream from embedded generation • Income from investment in network (RAB)	• Introduction of new / more complicated(?) charging methodology and requirement for new billing systems • Increased capital requirements • Locational message limited
Generator	• Reduced capital cost for new entrants	• Entry charges may be positive or negative (depending on location) • Some generators would see overall increased project costs
Supplier/demand customer	•	• Possible short term increase in DUoS • Potential zonal pricing issue
	• Net position is a trade off between, on the one hand, DUoS reducing because some network costs are now being paid by generators and on the other hand generator triggered reinforcements being funded (at least in part) by demand use of system.	

4.5 Option 5: Shallowish connection charge for smaller generators, Site specific charges for larger generators

- Small and medium scale generators (up to (say) 5MVA) would be treated in a similar manner to equivalent demand i.e. 'shallowish' connection and some combination of the elements of entry charges
- Larger generators (those connected above (say) 5MVA) would be treated on a site-specific basis

	Positive Impact	Negative Impact
Distributor	• Similar treatment to load • Transaction costs are acceptable • Income stream from embedded generation • Potential for better network management	• Increased capital requirements • New, more complex arrangements and new billing systems
Generator	• New entrant smaller generators will face lower capital costs • Larger generators will have a partial choice over capital or running costs	• Generators will have exposure to ongoing costs
Supplier/demand customer	• Generators would be meeting a share of network costs	• Possible increased use of system to compensate for generator triggered reinforcement

All the above options (with the exception of option one – status quo) would require the following to be undertaken :

- fundamental changes to the regulatory pricing structure for connection of embedded generators
- a clear commitment from Ofgem as to how they will treat the funding in the current and future 'price control' periods
- Significantly more analysis to understand the impact on customers, network operators, generators and suppliers in order that they can be fully supported by all the affected groups. This would include looking at the implications for existing embedded generators in addition to those for potential new generators

Finally, if the charging principles for embedded generators are to be changed ahead of the next price control review to stimulate more embedded generation, Ofgem will need to give a firm commitment to the Distribution Network Operators as to how any additional expenditure

(capital and revenue) and finance costs in the period to 2005 will be treated at the next price review**.**

5. Recommendations

Given the government's policy objectives for renewable plant and CHP the following recommendations are proposed in order to facilitate and support these aims.

5.1 The Group recommends that OFGEM undertakes, in conjunction with key stakeholders, detailed analysis on the above options taking into account the issues outlined in this paper and its annexes so as best to assess, in detail, the potential impact on all the stakeholders and on Government policy to achieve its aspirations for renewable and CHP plant.

- in the short term (within 5 years)

- in the long term (beyond 5 years)

This must be looked at in conjunction with the other papers, as the issues are complex and inter-related.

5.2 Ofgem and HMG will need to set out their position concerning embedded generation for the next price control review period, and the objective if the charging arrangements are to be changed. Any such changes will require significantly more analysis to understand the impact on customers, network operators, generators and suppliers in order that they can be fully supported by all the affected groups. This would include looking at the implications for existing embedded generators (potential for grandfathering) in addition to potential new generators.

5.3 These proposals will also need to be considered against the background of a number of ongoing issues which, while not part of the Working Group's remit, will impact on any solution. The issues include :

- compatibility with the new standardised licence obligations
- compatibility with the draft EU directives on renewables concerning priority access issues
- the fact that Ofgem's Environmental Action Plan discussion paper suggests that access for renewable generation should improved and standardised (more information available, sensible charging policy, common technical standards)

- the fact that the principle of 'cost pass throughs' does not align with the Distribution Network Operators being incentivised to act as market facilitators to operate the distribution system in a least cost manner

- the need to address access rights for generators (i.e. network constraints)

- the future treatment of ‘losses’ and ‘saved losses’ in distribution networks

Finally this paper has looked at ‘internal’ ways of dealing with the charging for network infrastructure to support embedded generation. Consideration should also be given to funding being made available to Distribution Network Operators by them bidding for capital grants for infrastructure development.

6. Contributors to the Report

The paper has been compiled by the following DTI embedded generation working group members:
Catherine Mitchell and Alan Laird, acting as rapporteurs, with Karen Marshall acting as an observer.
Contributions were received from Alan Laird and Phil Jones (on behalf of Network Operators, Lewis Dale (on behalf of NGC), Terry Brookshaw (on behalf of Suppliers), Catherine Mitchell and Stephen Andrews (on behalf of Generators), Andrew Horsler (on behalf of domestic customers), Phil Baker (on behalf of DTI) and Graham Meeks (on behalf of DETR). Review comments were provided at DTI Embedded Generation Working Group Meetings.

ANNEXES – Individual Rapporteurs' Points Of View

The following sections set out the issues and views that individual rapportuers representing distribution network operators, embedded generators, suppliers and customers, wish OFGEM and HMG to take into account in reaching its conclusions.

7. Distribution Network Operators

7.1 There are many [and varied] different types and sizes (and hence different connection and operational attributes) of embedded generation and these present substantially different criteria in deciding the most appropriate connection arrangements.

7.2 Sizes (and type) of embedded generation may be broadly classified by connection voltage as detailed in the "Current and future levels of CHP and renewable generating capacity" created by the Embedded Generation Working Group.

7.3 The operational characteristics of embedded generation vary extensively. At one extreme the generator may operate in parallel with the distribution network to meet [part, or all of] the on-site demand and never export any energy to the network. At the other extreme the generator may export nearly all the generated energy to the distribution network.

7.4 In both cases the generator will make a contribution to the fault level infeed and could either absorb or provide re-active power to the distribution network. The point of connection (including the voltage of connection) to the network needs to take account of the generator operational characteristics as well as those of existing connectees.

7.5 At present the Distribution Network Operators charge the full marginal cost of connection to the generator as a connection charge. This includes any 'deep' system costs i.e. costs in respect of those assets remote from the connection which nevertheless are needed to accept the generation connection. This is consistent with the current regulatory framework in which there is no income stream to finance a generation connection. The connection charge for the 'deep' system costs may be partly mitigated by the Distribution Network Operator where it can be shown that the replacement of assets have only been brought forward by the actions of the embedded generator. That is a 'time advancement' credit is given to the generator. This, of course, cannot apply if replacement expenditure was not contemplated.

7.6 The recent review of the distribution price control arrangements signalled that there were operational efficiencies to be gained in operational expenditure and sought to constrain capital expenditure. It took no specific account of any particular increase in the level of embedded generation or any capital expenditure by the Distribution Network Operators to meet that need.

7.7 The current distribution price control formula incorporates a term designed as an incentive on the distribution business to reduce system losses. It is clear that embedded generators on the system alter load flows, sometimes significantly. Larger embedded generators where the exported energy cannot be absorbed close to the point of connection will actually be seen to increase system losses. The distributor has to recognise this in its submission of Loss Adjustment Factors (LAFs) to the Pool (BSCo in future). Smaller embedded generators (connected to the LV system) where the exported energy can be absorbed locally do tend to reduce system losses. Generators are given a credit in their purchase terms (either by the supplier who they are contracted to, or by the pool if they are a pool member) to take account of these losses and the effect is that they trade their exported energy at the 'pool boundary'.

7.8 However the distribution price control formula is formulated in such a way that the effect of saved system losses is netted out of the calculation and the Distribution Network Operator takes no benefit from these actual savings. In some circumstances the embedded generator whose primary purpose is to meet his own on-site demand but requires a 'stand-by' facility from the Distribution Network Operator may cause a disbenefit to the Distribution Network Operator in the calculation (due to the network capacity being provided, but few units being consumed, which affects the DUoS pricing model).

7.9 Embedded generators have the potential, in certain circumstances, to enable the distributors to avoid or delay reinforcement of the distribution network and/or reduce reliance on the connection to the transmission network. However for this to happen there must be a need for the local reinforcement; the generator must be technically capable and contractually bound to meet the needs of the Distribution Network Operator. The Distribution Network Operator must be able to satisfy itself that:

- the use of local generation is secure;
- that the contractual arrangements are sound;
- the arrangement can be sustained (at least for the planning horizon to either re-contract with another generator or plan and execute the reinforcement);

- it is the most economic overall
- does not prejudice service delivery to demand customers

7.10 The current standard licence conditions seek to 'ring-fence' distribution activities such that a Distribution Network Operator should not operate generation assets for commercial purposes. It is not yet clear whether an operational contract either with the supplier or generator would breach this condition

The existing arrangement has the merits of being:

- capable of application in a standard way;
- consistent between different sizes, classes and types of generators;
- consistent with the current regulatory framework;
- consistent with the low risk/low return regulatory policy
- free of cross subsidy between generation and demand

7.11 Distribution Network Operators recognise that, in particular, full marginal cost connection charges can be a barrier to entry.

7.12 It is clear that full marginal cost connection charges can result in significant differences in cost due to 'first and second comer' issues and the extent of available spare capacity at a location when the connection offer is made.

7.13 Increased embedded generation will reduce available fault level 'headroom' in the local network, which may result in increased costs of connecting subsequent new load and generation in the local network.

7.14 In the long term embedded generators ceasing to generate may create the risk of stranded network assets, if a policy of other than 'deep' connections is adopted.

7.15 If the charging principles are to be changed ahead of the next price control review (without re-opening the current price control arrangements) Ofgem will need to give a firm commitment to the Distribution Network Operators as to how any additional

expenditure (capital and revenue) and financing costs in the period to 2005 will be treated at the next price review.

7.16 A balance must be struck between the complexity of the charging mechanism and the resulting transactional costs.

8. Generators

8.1 The DTI consultation document raises the possibility of changing the structure of network charges.

8.2 A major concern of embedded generators is that there is no standardised means of charging for connections across Distribution Network Operators (DNOs), nor publicly available information about expected alterations to the network as a result of demand changes or operation and maintenance work. As a result, embedded generators are concerned that part of their deep connection charge may pay for, or contribute to, DNO reinforcements to the system which, properly, should be undertaken by the DNOs. This concern is closely linked to Issue 4 of the Working Group. Any charging mechanism that is put in place must be clearly defined, transparent and cost-reflective so that generators are confident that their charge is correct and/or verifiable.

8.3 Shallow connection charges, if they were defined as the cost of connecting to the nearest point of the network with no reinforcement costs further up the system, do not incorporate a locational message. However, a shallow connection charge in addition to an entry charge is able to provide the most economically efficient locational message and incentives.

8.4 Generators wish to see entry charges (which could be positive or negative) applied to all power entering the distribution network, whether it is from the transmission system or from embedded generators.

8.5 Any losses saved (or increased) or other benefits (disbenefits) in the DNO network provided by generation or demand could be reflected in the charging mechanism. The change to such a flexible charging mechanism would be a fundamental alteration in the operation of distribution networks. This move is viewed by generators as vital if DNOs are to become market facilitators and if distributed generation is to be incorporated into the network in the most efficient manner.

8.6 The relative proportion of distribution revenue collected from shallow / shallowish connection charges, entry charges and exit charges will need to be decided. The key to the puzzle of charging for embedded generation is to ensure that DNOs receive appropriate remuneration for embedded generation while at the same time removing any barriers inherent in the current charging mechanism.

8.7 The recovery of the additional reinforcement expenditure (i.e. those between shallow and deep connection) is the nub of the charging issue. Entry charges are a very flexible concept which allows the recovery of those additional costs in any number of ways and therefore should be able to be structured to provide appropriate price signals to suit all parties.

8.8 If embedded generator charging moved to an Entry charge in conjunction with shallow/shallowish connection charges, it would be important that all (Entry) to the distribution networks must in principle be able to be charged on the same basis regardless of whether these are embedded generators, distribution interconnectors or transmission system connections. These entry charges could be set to zero initially but altered as active management of DNOs increased.

8.9 Generators would argue that 'cost pass throughs' are unacceptable in a competitive market and would be inappropriate in a charging mechanism, as this one is, which is intended to complement the development of Distribution Network Operators as market facilitators which operate the distribution system in a least cost manner by incentivising market actors and providing choice for customers.

8.10 DSM projects may potentially contribute system benefits, equivalently to embedded generation, if they are located appropriately on the network. However, at the moment, no general locational price signals exist for them to be able to provide those benefits, although a few examples of DSM projects were adopted by the PESs in the 1990s. The ways to incentivise DSM should be considered and incorporated into the new charging mechanism when examining embedded generation.

8.11 Any change from the current charging system to one of shallow/shallowish connections and entry charges would require a detailed investigation to understand all the possibilities and implications of each possibility. In addition, it should incorporate the concept of negative charging, as used by NGC; review how the replacement of, or introduction of, infrastructure assets which benefit many system users can be charged; review how incentives for speculatory investment in new infrastructure assets for generator/load use could be rewarded. At present there are no mechanisms for rewarding such investments either by the DNOs or the private sector, and this issue needs to be addressed.

8.12 The benefits of moving to a charging system based on shallow / shallowish connection charges and entry charges are:

- it is a very flexible mechanism, with the ability to be structured in a simple way
- it is complementary to the NGC system
- it allows a demand charge which is related to actual use of assets
- it has the potential to overcomes problems raised earlier in this paper
- it establishes a means of providing locational incentives for siting EG (and demand or demand side management) within the distribution network. For example, Entry charges could be structured in a way to be revenue neutral, by having a mixture of negative and positive charges, which give locational signals.
- charges can be set to complement regulatory goals
- it reduces the concern of generators paying for reinforcements to the network which may be affected by their connection but which should properly have been replaced and paid for by the DNO under their O&M plan
- it introduces a mechanism whereby reinforcement of (parts of the) distribution system could be paid for and spread across (particular) network actors
- it is complementary to the statutory aims of the Distribution Network Operators to facilitate competition
- it complements active management
- it facilitates net-metering
- potentially eliminates first comer / second comer issues

8.13 Agreed Standards and costs need to be addressed for a number of issues related to connection and use of the distribution system:

- Design Fault Levels

- Tariff Support Allowance
- 'G59' protection
- On-site Generation incentives

8.14 G77 eligible technologies (It is argued elsewhere in report that G77 should be expanded to include inverter technologies other than PV.

9. Suppliers

9.1 Network Connection Policy – Broad Approach

9.1.1 Suppliers recognise that the connection policies employed by DNOs for generator connections are different to the connection policies for customer connections.

9.1.2 Generators experience the impact of a 'deep' approach whilst customers see the impacts of a 'shallower' approach.

9.1.3 The connection policies of DNOs for customer connections have evolved since Vesting and have been amended to take account of the views of OFGEM.

9.1.4 Suppliers take the view that, in principle, connection policies for generators and customers should be equitable and consistent.

9.1.5 Therefore, Suppliers recommend that DNOs should adopt connection policies for generators, which are equitable and consistent with the connection policies as advocated by OFGEM, and employed by DNOs for customers.

9.2 Distribution Pricing For Generators

9.2.1 Suppliers recognise that the adoption of a connection policy for generators based on a shallow approach will need to be accompanied by the introduction of generator entry charges.

9.2.2 Distribution exit charges for demand are set on a voltage level basis and it would be consistent to adopt a consistent approach for generators.

9.2.3 Therefore, Suppliers recommend that DNOs should introduce generator entry charges for each voltage level and should set out the principles and methods by which such charges will be set.

9.3 Distribution Pricing For Suppliers

9.3.1 Suppliers believe that a review of distribution exit pricing is warranted.

9.3.2 It is apparent that the Government's policy initiatives are likely to result in a position whereby Suppliers are likely to be purchasing increasing volumes of electricity from embedded generation sets.

9.3.3 The corollary is that Suppliers will be purchasing decreasing volumes of electricity from the central NETA market and will be transporting less electricity through the transmission system and across the higher voltage levels of the distribution systems.

9.3.4 It is evident that Suppliers experience different charging treatments according to the electricity sector in question, as illustrated below.

Wholesale	Gross energy purchased at National Balancing Point Minus Gross energy purchased at embedded generation sets
Transmission	Gross energy purchased at Grid Supply Points Minus Gross energy purchased at embedded generation sets
Distribution	Gross energy purchased at exit points Minus On site purchases

9.3.5 The wholesale and transmission arrangements are such that Suppliers are credited with purchases from generation sets embedded within distribution systems.

9.3.6 Thus, the more electricity that is purchased from embedded generation sets the lower the level of wholesale and transmission costs.

9.3.7 However, in the distribution sector, no matter how much electricity is sourced from embedded generation sets, the distribution costs of a Supplier remain unchanged. This is perverse.

9.3.8 Therefore, Suppliers recommend that DNOs should review the principles and methods that are employed for the setting of demand exit charges.

9.4 Distribution Charging Arrangements

9.4.1 The Government's policies in combination with technological developments are likely to result in more embedded generation being located on a customer's premise.

9.4.2 In particular, it is probable that Domestic micro-CHP and PhotoVoltaic (PV) installations are likely to grow in number in the period to 2010 and thereafter.

9.4.3 Suppliers recognise this prospect and, indeed, some Suppliers may promote such technologies.

9.4.4 Suppliers believe that a customer's decision to invest in energy efficiency measures is a matter for them. What is important is that the customer should receive appropriate price signals in relation either to investment in demand management and reduction or to potential investment in generation.

9.4.5 Suppliers are of the view that, in respect of distribution, the cost messages conveyed to customers via their Supplier should reflect the value to the DNO.

9.4.6 DNOs indicate that investment is largely driven by maximum capacity needs and thus Suppliers envisage the need for two basic cost messages, viz.

- the value of a kilowatt of maximum demand capacity

- the value of a kilowatt of generation capacity

which would be reference to voltage levels not geography.

9.4.7 Where a customer chooses to install on-site generation, it would be for the customer to nominate the maximum of the import or export capacity needed.

9.4.8 Therefore, Suppliers recommend that DNOs should provide appropriate distribution capacity price signals to generators, customers and their suppliers.

10. Customers

10.1 Domestic Customers

10.1.1 Customers wish to see the lowest sustainable cost electricity accompanied by progressively improving quality of supply. Under the Utilities Act, the principal objective of the Secretary of State and the Gas and Electricity Markets Authority will be to protect the interest of consumers, wherever possible by competition.

10.1.2 Customers recognise that the Government's policy objectives will result in increasing levels of embedded generation, and this is welcomed as representing a potential for increasing competition and consumer choice, as well as meeting climate change emission targets. The introduction of substantially greater levels of embedded generation will have significant effects on distribution networks, and a comprehensive analysis and review of charging is necessary.

10.1.3 It will be essential to analyse the impact on consumer prices and quality of supply of any options that are considered for revised charging arrangements. The effect on total costs and final prices of a move from deep to more shallow charging for generators will be the result of a complex interaction of factors: some elements of cost may rise, but it is also possible that some may fall. Consumers will wish to see that the appropriate incentives are in place to minimise total costs and prices. Domestic consumers will also wish to see that any changes do not disadvantage non half-hourly metered customers compared with larger customers.

10.1.4 The Utilities Act also required the Secretary of State and the Authority to have regard (inter alia) to the interests of consumers residing in rural areas. Proposed changes must be analysed for any disadvantageous effects they could have on rural customers.