Structure of Electricity Distribution Charges

Update document

October 2002

Summary

The purpose of this document is to build on the material set out in earlier documents with the aim of developing robust long-term charging structures for connection to and use of local distribution systems. In particular, the project has three key aims:

- to review the charging principles established by the Electricity Council in the early part of the 1980's;
- to establish a transparent boundary between connection and use of system charges for all users of the network; and
- to establish a robust framework for generator use of system charges for implementation from 1 April 2005.

The document sets out initial thoughts on the key principles that should underpin the structure of electricity distribution charges. It also sets out initial recommendations on the development of a shallower connection boundary and some form of entry and exit use of system charges.

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1. Rationale

Introduction

1.1. Ofgem's primary statutory objective is to protect the interests of consumers, wherever possible by promoting effective competition. Many areas of the energy industry are subject to, or in the process of being opened to, competition. Where competition has been introduced, Ofgem will continue to monitor these markets to ensure that they operate effectively and deliver ongoing benefits to consumers.

1.2. There are some areas of the industry where companies retain an effective monopoly since where it may not be possible or appropriate to introduce competition. This applies to the transportation of energy to consumers over national and local networks of wires and pipes. In these circumstances, Ofgem has put in place price controls and other incentive regimes to protect the interests of consumers. Within the context of this regulatory framework, network businesses set charges for access to their networks in response to the incentives that they face.

1.3. There are presently 14 licensed distribution network operators (DNOs) in Great Britain. Each of these distribution businesses owns and operates one or more networks and sets charges for connection to and use of their systems. These distribution networks comprise overhead lines, cables, transformers, and switchgear to facilitate the transfer of electricity from the transmission system and distributed generation to consumers' premises. As discussed above, distribution businesses establish the structure of their charges for access to and use of its network within the context of regulated price controls, which constrain the overall level of revenue that they are each able to earn.

1.4. In recent decades, Great Britain has relied almost exclusively upon electricity generated by large power stations connected at 132kV and above, thus the majority of generating capacity is presently connected to the high voltage transmission systems. In contrast, most consumers are connected to the local distribution networks at low voltage (LV). In the light of this, distribution networks are presently designed and operated to transfer electricity in one

direction from transmission exit points to consumers. The structure of electricity distribution charges across Great Britain has developed within the framework provided by this high-level operating model.

Issue

1.5. There have been ongoing structural changes within the energy industry, which include the introduction of revised wholesale trading arrangements, the development of transmission access arrangements and the ongoing development of competition in electricity supply, generation, connections and metering. With further structural changes anticipated as a result of Government initiatives to promote renewable and distributed generation, and the entry of new licensed distribution networks, the high-level operating conditions of the industry are likely to change as more electricity is provided by generators connected to local networks. It is within this broad context that Ofgem has initiated a project to review the structure of charges levied by electricity distribution businesses.

1.6. Electricity distribution costs account for around £2 billion annually and make up a significant proportion of the total bill that consumers pay (about 25 to 30 per cent of the bill for a typical domestic consumer), and presently suppliers have no effective means of avoiding or reducing these charges. The basis on which charges for connection to and use of distribution networks are calculated has remained largely unchanged since the Electricity Council established the present approach around 20 years ago. It is now unclear that the present basis of charging provides appropriate incentives on generators, DNOs and customers to encourage efficient use of and long-term investment in these networks.

1.7. The electricity sector is continually evolving and it is clear that new factors, such as the connection of distributed generation, raise several issues that were not considered 20 years ago. Establishing an appropriate basis for distribution charging, in the light of the factors identified, can therefore be expected to benefit both customers and DNOs. It is within this context that the structure of electricity distribution charges may have a bearing on the development of competition in electricity generation, supply, metering and connections.

1.8. The direct costs that Ofgem will incur from undertaking this project are very small in relation to its importance and the proportion of final prices that the customer will face in relation to the provision of distribution services. Ofgem's budget for this project is £350,000, which includes an allowance for consultancy support. This is equivalent to less than one penny per electricity consumer.

1.9. The direct costs to the industry are expected to be relatively small. The costs of implementing changes to charging structures will depend on the outcome of the review and on companies' management and IT systems. Nevertheless, these costs are not expected to be significant in the context of the importance of distribution charges to the efficient operation of the electricity industry and the development of competition.

Objective

1.10. Undertaking this review of the structure of distribution charges should help:

- protect the interests of consumers by developing robust long-term charging structures to facilitate competition in the generation, distribution and supply of electricity; and
- ensure that regulated companies provide appropriate incentives to encourage the efficient use of the network.

1.11. It is clear that access to distribution networks on fair and transparent terms will help facilitate further advances in the competitive market for both the generation and supply of electricity.

Policy

1.12. Three broad policy options have been identified:

- Maintain the existing charging framework and focus attention on providing appropriate incentives on distribution businesses, generators and customers. This would enable DNOs to respond flexibly to changing needs of users without significant regulatory intervention;

- Initiate a high level review of the charging principles with the aim of developing consistent charging principles across network businesses; and

- Undertake a detailed review of charging principles and their application in developing charge structures.

1.13. The structure of electricity distribution charges is an integral part of the incentives faced by users of the system. It is not clear that option 1 would strike an appropriate balance between generators, DNOs and customers. It has also been suggested that the existing charge structures distort incentives, in particular incentives to connect distributed generation, because common principles are applied inconsistently. In the light of this, Ofgem's favoured approach is to undertake a detailed review of the charging principles and their application.

1.14. As noted above, the basis of distribution charges has a significant impact on the long-term interests of consumers. There are factors, such as a significant increase in connection of distributed generation, that raise issues that were not taken account for when the principles for the current structure of charges were developed. If an appropriate basis for distribution charging is established, there will be benefits to customers, DNOs and distributed generators. Consequently, it would not be appropriate to maintain the present basis of charging without thorough consideration of the issues raised by anticipated structural changes. To do so would be likely to undermine the development of distributed generation, with significant economic, social and environmental consequences.

2. Timetable and responses

Purpose and structure of this document

2.1. In December 2000, Ofgem published an initial consultation paper setting out background information on the form and structure of charges levied by each electricity distribution business for use of its distribution system. The purpose of the paper was to identify the key issues in respect of the methods and principles used in setting distribution charges and to assess whether, in the light of changes to the structure and operation of the electricity industry, such methods and principles remain appropriate.

2.2. As well as discussing the overall approach to the structure of charges, the December document also examined a range of specific issues relating to the present structure of charges and matters relating to distributed generation, energy efficiency and connections.

2.3. In February 2001, Ofgem held a public workshop to discuss the key issues and concerns arising from the December document. Representatives from distribution businesses, electricity and gas transportation companies, supply businesses, customers, various consultancy firms and other interested parties attended the event held at Regent's College, London.

2.4. In September 2001, Ofgem published an initial consultation document that set out its initial thoughts in respect of interim changes to the regulatory framework to facilitate the connection of distributed generation. In March 2002, Ofgem published its initial conclusions in respect of interim changes to the regulatory framework and Ofgem intends to publish a decision document on these changes later this month.

2.5. The purpose of this document is to build on the material set out in earlier documents with the aim of developing robust long-term charging structures for connection to and use of local distribution systems. In particular, the document has three key aims:

- to review the charging principles established by the Electricity Council in the early part of the 1980's;
- to establish a transparent boundary between connection and use of system charges for all users of the network; and
- to establish the framework for generator use of system charges for implementation from 1 April 2005.

2.6. To achieve these aims, the document recaps on the key issues discussed in earlier publications and sets out Ofgem's present thinking on these matters. It also identifies the timetable and process for the project over the coming year.

2.7. The structure of this document is as follows:

- Chapter 3 describes the main features of the regulatory framework influencing the structure of electricity distribution charges. The chapter also outlines the main challenges facing distribution businesses over the coming years;
- Chapter 4 identifies the main charging principles with respect to electricity distribution charges;
- Chapter 5 discusses issues relating to the boundary between connection and use of system charges for network businesses;
- Chapter 6 sets out Ofgem's further thinking in relation to the long term charging framework for distributed generation;
- Chapter 7 describes many of the key aspects relating to connection and use of system for other network users;
- Chapter 2 and appendix 1 describe the project timetable and summarise the consultation process. They also identify the key policy interactions across other Ofgem work streams; and
- Appendices 2 and 3 summarise the views expressed during the plenary session of the February 2001 public workshop. They also summarise the responses to the December 2000 consultation paper.

Project timetable

2.8. Ofgem has met with several interested parties since the start of the project in June 2000. This has included more detailed discussion about the implications of distributed generation for the long-term structure of distribution charges. It will be important to continue meeting with interested parties on a bilateral basis as the project progresses.

2.9. Ofgem hopes to establish a series of small working groups with distribution businesses to take forward key aspects of the work relating to the regulation of network companies. One such group will look at the structure of electricity distribution charges. The purpose of the working groups will be to provide fora for informal discussion of many of the key issues so as to assist Ofgem in developing its ideas. The working groups will not act as decision-making bodies and will not preclude a full consultation of the issues at an appropriate stage.

2.10. Ofgem intends to hold further workshops as the project progresses. These will provide interested parties with an opportunity to discuss the project in an open forum. The timing and scope of these workshops may vary depending on the interactions with other Ofgem projects and the level of interest in the issues to be discussed.

2.11. Ofgem and the Institute of Electrical Engineers (IEE) held a conference on 10 September 2002[1], which covered a number of areas including the way electricity distribution networks operate within the context of renewable and CHP generation. This conference has been beneficial by informing the structure of charges project.

2.12. The table below sets out the timetable for the review of the structure of electricity distribution charges.

1 "Renewables, CHP and electricity distribution networks – a strategic review".

Table 2.1: Outline project timetable

Date	Deliverable
December 2002	Industry workshop
January 2003	Initial proposals document
March 2003	Public workshop
	Bilateral meetings with interested parties
	Possible update document
June 2003	Proposals document

2.13. Ofgem intends the initial proposals document to focus on setting out draft proposals in relation to some of the key issues set out in this document and views expressed by interested parties. In particular, Ofgem intends to set out proposals on the boundary between connection and use of system charges for all users of the network. The initial proposals document will also set out Ofgem's initial thoughts regarding the implementation of these proposals.

2.14. Ofgem intends to meet with interested parties to provide them with an opportunity to provide feedback and comments to the initial proposals. Depending on the views expressed by interested parties, Ofgem may seek to refine its thinking further and it may be appropriate to publish a further update paper to set out some of the key issues arising from the discussions.

2.15. Once Ofgem has considered the views expressed by interested parties, it expects to publish a proposals document in June 2003. This will set out proposals for the methods and principles that distribution companies should seek to adopt, especially reflecting greater connection of distributed generation. It will also discuss the key issues surrounding the implementation of these changes and the wider regulatory and commercial implications of these proposals ahead of the next distribution price control review. At the same time, Ofgem intends to publish a proposals document setting out proposals for the way in which it intends to develop the framework of price controls for monopoly networks. It

will also set out the key objectives, issues and principles for the next distribution price control review.

2.16. It is important that the final proposals are implemented in an efficient manner across all of the distribution companies. As such, Ofgem proposes to establish an implementation steering group once the proposals document has been published in June 2003. Successfully utilised across Ofgem workstreams, it is Ofgem's view that a steering group is the best way forward for the Structure of Charges project.

2.17. The issues discussed in this document are complex and wide ranging. In light of this, the timetable set out above may appear ambitious. Nevertheless, Ofgem recognises that it is important to set out proposals in a number of areas as soon as practicable. In particular, it will be important to establish the boundary between connection and use of system charges ahead of the next distribution price control review.

2.18. Views are invited on any aspect of the proposed timetable and in particular on:

- the key issues and priorities for the project on which it is important to reach conclusions by March 2003;
- any issues that may be delayed or deferred for discussion during the coming price control review; and
- any issues that may be delayed or deferred for discussion during the next price control period.

Interaction with other projects

2.19. The project has important links with a number of other areas of work, including the work being carried out by:

- the Department of Trade and Industry (DTI), Ofgem and the industry on the technical arrangements for the connection of distributed generation;
- Ofgem on the development of the price control framework for monopoly networks;

- Ofgem in relation to the introduction of competition in the provision of electricity connections; and

- Ofgem on the incentives to reduce electrical losses on distribution networks.

2.20. It is important that the linkages between the various projects are understood. Further details on the areas that they cover and their respective timetables are given in appendix 1.

Responding to this document

2.21. It would be helpful to hear from those with an interest in the issues raised in this paper, including distribution businesses, suppliers, distributed generators, customers and their representatives. Views are invited by 6 December 2002. Where possible, responses should be sent electronically to:

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2.22. All responses will normally be published on the Ofgem website and held electronically in the Research and Information Centre unless there are good reasons why they must remain confidential. Consultees should try to put any confidential material in appendices in their responses. Ofgem prefers to receive responses in electronic form so that they can easily be placed on the website.

2.23. Should you have any questions regarding this event or the issues raised in this document, please contact Colin Green on the above number or Lars Rognlien on 020 7901 7341.

2.24. A copy of this document and other Ofgem publications are available from the Ofgem website (www.ofgem.gov.uk).

3. Background

Introduction

3.1. This chapter describes the challenges facing DNOs and their implications for the long-term structure of distribution charges. It also sets out the main features of the regulatory framework that governs distribution charges.

Challenges facing distribution businesses

3.2. In recent decades, Great Britain has relied almost exclusively upon electricity generated by large power stations connected at 132kV and above, thus the majority of generating capacity is connected to the high voltage transmission systems. In contrast, most consumers are connected to the local distribution networks at low voltage (LV). As a result, the main purpose of local distribution systems has been to transfer energy from the transmission system to consumers' premises.

3.3. Each distribution network is designed to the standards set out in Engineering Recommendation P2/5. These specify different levels of security for different sizes of electrical demand. In general, the standards require circuits to be designed to provide higher levels of security where they meet the largest demands. The standards are less rigorous where the size of electrical demand served by a circuit is small. Subject to these minimum security standards and voltage requirements, distribution networks have developed into largely radial systems with circuits of sufficient capacity to meet the reasonable demands of consumers. However, the present design of passively operated distribution networks means that they typically lack the capability to export significant amounts of electricity from dispersedly connected distributed generation.

3.4. In contrast, transmission systems have been designed and developed to accommodate widely dispersed generation connections and transfer energy flexibly to required exit points on the system. Since demand and generation are more closely matched on transmission systems, it is important that the power flows across them can be actively managed and this has implications for their

design and operation. For example, transmission systems have extensive network control systems in place.

3.5. The network design requirements applicable to transmission level voltages are also more rigorous than those applying to distribution voltage levels in recognition of the potentially damaging consequences of a transmission system failure.

3.6. It is important to consider the issues raised by the above challenges and their impacts on generators, DNOs and consumers. The principal objective of the Gas and Electricity Markets Authority (the Authority) to protect the interests of consumers, wherever appropriate by promoting effective competition, will be an important consideration when evaluating the need for regulatory change. The Authority will also be guided by the Government's draft guidance on social and environmental matters in relation to electricity[2] which invites Ofgem, taking account of its statutory objectives, to have regard to the desirability of:

- removing barriers to distributed generation;
- developing network access for distributed generation on fair and transparent terms, including fair recompense for benefits that distributed generation may afford network businesses in terms of providing system security, deferring the need for system investment, or otherwise;
- distribution systems that are capable of accommodating the likely growth in distributed generation, having particular regard to the Government's targets for renewable generation and for Combined Heat and Power (CHP) schemes;
- developing fair and transparent charging regimes for distributed generation; and
- ensuring easy access to information relevant to distributed generators, including clear and transparent rules governing connection.

3.7. The challenges facing the electricity sector have significant implications for the design and operation of local distribution systems. These include the likely need for:

- substantial network development to accommodate distributed generation and the associated requirement for investment to be kept to efficient levels;
- changes in the way in which distribution networks are designed and operated;
- vigilance to ensure that the minimum standards of service to demand customers are maintained; and
- the introduction of commercial arrangements consistent with the proposed industry model, in particular revised charging frameworks.

3.8. It is therefore important to consider whether the existing commercial and regulatory framework for distribution businesses, distributed generators, suppliers and their customers is appropriate in light of the Authority's principal statutory objective and other anticipated structural changes. This document examines the methods and principles adopted by distribution businesses in setting charges for connection to and use of their networks and invites views on whether, in light of structural changes, these remain appropriate. The document also discusses some of the key issues in relation to the connection of distributed generation.

Regulatory framework

3.9. This section summarises the key elements of the regulatory framework relating to distribution charges. These include:

- the Electricity Act 1989;
- the Competition Act 1998;

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2 Made under section 3B of the Electricity Act 1989.

- the price controls applying to each distribution business;
- quality of service regulation; and
- licence conditions prohibiting discrimination between customers or classes of customers.

The Electricity Act 1989

3.10. The Electricity Act 1989 (as amended by the Utilities Act 2000) sets out the duties and functions of the Authority, in particular its principal objective to protect the interests of consumers, wherever appropriate by promoting effective competition. The Authority must carry out its functions in the manner that it considers is best calculated to achieve the principal objective, having regard to:

- the need to secure that all reasonable demands for electricity are met;
- the need to secure that licence holders are able to finance their activities; and
- the promotion of efficiency and economy of distribution systems.

3.11. In carrying out these duties and functions, the Authority shall also have regard to:

- the interests of consumers, including those who are disabled or chronically sick, consumers of pensionable age, consumers with low incomes and consumers residing in rural areas; and
- guidance issued by the Secretary of State in respect of social and environmental matters.

3.12. The changes to the Electricity Act introduced by the Utilities Act 2000 specify that distribution is a separate activity, which can only be carried out by a person who is authorised to do so by a licence or under an exemption. As a consequence, several new licensed distribution companies may now be created to build and operate networks connected within existing distribution systems. It is important to consider how embedded distribution networks might impact on

the structure of electricity distribution charges. This is discussed further in chapter 6.

3.13. The Electricity Act also sets out the statutory duties of licensed distribution companies to develop and maintain an efficient, co-ordinated and economical system of electricity distribution; and facilitate competition in the supply and generation of electricity.

3.14. The statutory framework has a number of implications for the structure of electricity distribution charges. It is important to consider how the regulatory framework that governs the structure of electricity distribution charges might develop in light of Ofgem's increased social and environmental responsibilities. There are important issues to consider within this context, which include:

- the need for DNOs to be able to provide for the direct connection to their network of increased amounts of generating capacity, in line with Government targets;
- the on-going requirement for DNOs to provide network access on transparent and non-discriminatory terms to all network users; and
- government initiatives to improve energy efficiency.

Competition Act 1998

3.15. The Competition Act 1998 (the Competition Act) provides the Authority with concurrent powers, with the Office of Fair Trading, to investigate anti-competitive agreements or behaviour prohibited by chapters I and II of the Competition Act. These powers under general competition law provide additional protection for consumers against the abuse of market power by industry players.

Price controls and standards of service

3.16. The regulatory framework has been designed to provide and strengthen the incentives on distribution businesses to maintain or improve the level of service provided to consumers whilst keeping costs to an efficient level.

3.17. The price control framework that governs the level of distribution charges provides incentives for each distribution business to minimise the operating, capital and financing costs of its activities. Nevertheless, Ofgem has initiated a project that will seek to improve the framework of price controls applying to all network monopoly companies. The project will also lay the foundation for the next distribution price control review that will commence in 2003/04.

3.18. In addition to the price controls, Ofgem has also established Guaranteed and Overall Standards of Performance to encourage distribution businesses to maintain and improve levels of service. Guaranteed Standards of Performance determine the levels that must be met in respect of a variety of service indicators relevant to individual consumers. These generally provide that, if a company fails to provide the level of service specified under normal operating conditions, then it must make a fixed payment to all customers affected. Overall Standards apply to areas where it is not appropriate or feasible to give individual guarantees but where it is reasonable for customers, in general, to expect a minimum level of service.

3.19. The incentives and information project (IIP) has established quality of service incentive regimes within the price control framework to strengthen incentives to deliver appropriate levels of service in respect of:

- the duration of customer interruptions;
- the number of interruptions per year; and
- the speed of telephone response.

3.20. As discussed earlier, each distribution business is required to design its network to certain minimum standards. These arrangements are complemented by the Electricity Supply Regulations, made by the Secretary of State, which place a duty on distribution businesses to ensure a continuous supply of electricity is maintained except in specified circumstances. The regulations also define limits for allowed variations in voltage levels and set out requirements about the safety and adequacy of the network. These provisions influence distribution business costs and the quality of service that customers can expect to receive.

Supplementary restrictions on charges

3.21. Price controls are an important feature of the regulatory framework that governs distribution charges and affords protection to consumers as a whole. Nevertheless, the price controls are not sufficient to protect the interests of individual consumers or groups of consumers. In the light of this, licence conditions (standard conditions 4 to 4C) require licensed distribution businesses to levy charges for connection to and use of their distribution system on a transparent and non-discriminatory basis.

3.22. These conditions specify that the charges levied on users of the distribution system should not differ between users or groups of users except in so far as these differences reflect reasonable variances in the costs associated with providing those services. These conditions also prohibit a distribution business from setting charges for use of the distribution system that restrict, distort or prevent competition in the generation, distribution or supply of electricity.

4. Charging principles

Introduction

4.1. This chapter builds on the material set out in chapters 3 and 4 of the December 2000 consultation document. It explores the key principles that influence the level and structure of network charges. It also sets out the various approaches that might be adopted by distribution businesses in relation to connection and transportation charges.

Guiding principles of network charging

4.2. The issues surrounding the structure of charges for connection to and use of distribution systems cannot be considered in isolation. Many of the issues in relation to network charges have also been considered in relation to access to other gas and electricity networks. Ofgem considers that, where appropriate, common principles should be recognised and applied consistently between the gas and electricity sectors and across similar activities (for example transmission and distribution).

4.3. Where there is scope to do so, it has been Ofgem's policy to seek appropriate market based solutions that deliver equitable treatment across parties and reveal the value that different parties place on access to the network. These should deliver benefits to consumers in the long run. Nevertheless, there are circumstances where market-based mechanisms cannot be adopted and in these cases Ofgem's approach has been to use regulatory instruments to provide appropriate protection to market participants and incentives to deliver outcomes that are consistent with the long-term interests of consumers. In considering the issue of distribution network charges, Ofgem will seek to apply the same principles that have guided work on access to other types of network.

4.4. To encourage the efficient use of each distribution system, the charges levied by distribution businesses for connection to and use of the distribution system should, where appropriate, reflect the costs that users impose on the network. However, it is important that the charges recognise the benefits that users can also bring. For example, a user may reduce the need for network reinforcement

or improve security of supply to other consumers. Charges may be structured to recognise these wider benefits and, where appropriate, incentivise users to connect to the system at appropriate locations.

4.5. Charges that reflect the long run marginal or incremental costs of expanding the system can provide appropriate locational price signals and hence encourage efficiency both in the use of the network infrastructure and in investment decisions. However, it is difficult to develop and implement pure marginal cost pricing models in practice because of the substantial cost of developing and implementing the IT systems necessary to identify charges for each individual entry and exit point.

4.6. Furthermore, distribution businesses operate networks with substantial fixed costs, which will not be captured by marginal cost calculations. In order for these companies to finance their activities in the long-run, they must be able to set prices that allow them to recover efficient levels of fixed costs. Failure to do so can undermine the integrity of existing assets and discourage investment in new assets. However, marginal cost calculations can still play a useful part in setting charges if they are appropriately adjusted to allow for fixed cost recovery. Nonetheless, Ofgem considers that it is important for the methods and principles adopted in respect of distribution charges strike an appropriate balance between cost reflectivity and simplicity of application.[3]

4.7. Respondents to the December 2000 consultation document expressed strong support for a system of cost reflective charges that is both fair and equitable. Several respondents also commented that network charges should also:

- be transparent;
- provide price stability, although not at the expense of inflexibility to a changing environment;
- recognise the needs of all network users; and

3 Further information on this issue can be found in chapter 3 of the December 2000 consultation document.

- facilitate effective competition in both generation and supply.

4.8. Ofgem considers that these principles should, where possible, form the basis for deriving charges for connection to and use of distribution networks. It is also desirable that network charges:

- are consistent with Ofgem's wider social and environmental objectives, for example by providing appropriate tariff incentives with respect to network losses; and

- are sufficiently flexible to adapt to future changes in the approach to network regulation and incentives, eg tradable firm access rights.

4.9. Views are invited on:

- whether it is appropriate to adopt the general principles set out above;

- the appropriate balance between cost reflectivity and simplicity of application; and

- whether the principles adopted should apply uniformly to all users or whether it is appropriate to apply these principles differentially to each group of network users.

Connection and use of system charging

4.10. The electricity distribution licences impose an obligation on distribution businesses to make connections to the distribution system upon request and allow licensees to recover the reasonable costs of making the connection from those seeking the connection. This raises a number of issues regarding what constitutes the reasonable costs of connection and how they should be allocated.

4.11. The connection charge policies adopted by distribution businesses will determine the extent to which network costs are recovered through connection charges or transportation charges. They are, therefore, an important determinant of the overall level and structure of distribution charges. The remainder of this chapter describes the various approaches to connection charging that can be

adopted and examines the impact that each of these options would have on the level and structure of electricity distribution charges.

The boundary between connection and use of system

4.12. Distribution businesses can adopt one of three broad approaches in deriving charges for connection to the distribution system. The first approach involves an estimate of the total costs that will be incurred as a result of connecting new load or generation to the system, including the costs of all network reinforcement. This is often described as a "deep" connections policy. The second approach involves an estimate of the costs of the connection assets, excluding the costs of reinforcement at higher voltage levels. This is often termed a "shallowish" connections policy. The third approach involves an estimate of the cost of those assets required to connect a customer to the system, excluding the costs of extension and reinforcement to the distribution system. Consequently, this type of connection only reflects the costs of providing the service line or cable necessary to connect a customer to the system. Hence, it is normally called a "shallow" (or "local") connections policy.

4.13. Under each of these arrangements, transportation charges will recover some proportion of the costs associated with the provision and reinforcement of network assets, together with any costs associated with provision of customer related services, that have not been recovered through the connection charge. The costs of reinforcing the distribution at higher voltage levels may fall within transportation charges where a distribution business adopts a shallowish or shallow connections policy. The extent to which such costs fall within transportation charges will largely depend on the extent to which it is considered that the new network assets form part of the wider distribution system rather than being provided for the benefit of a particular user.

4.14. All three connections policies can be considered to satisfy each of the general principles set out earlier in the chapter to some degree, although the extent to which they do so varies by policy and principle. The desirability of a given connections policy depends, therefore, on the emphasis placed on each of the principles by Ofgem, distribution businesses, users and customers alike.

4.15. Ofgem considers that the methods adopted by network businesses should strike an appropriate balance between the principles set out above. The remainder of this section describes some of the main advantages and disadvantages of each type of connection policy, and considers whether they are desirable within the context of principles set out above.

Deep connections policy

4.16. A deep connections policy assumes that all of the assets provided or enhanced as a result of a connection are for the particular benefit of the customer that is being connected (the "connectee"). As implemented by the distribution businesses, a deep connection policy has resulted in connectees having to pay a one-off up-front charge to cover all the costs of the connection, including estimated operation and maintenance costs for the lifetime of the assets. This is not, however, an integral part of a deep connections policy, which can just as well be achieved via annualised charges.

4.17. Deep connections policies provide strong locational signals regarding the varying costs of locating at different points on the network, given the existing network assets and their configuration at the time of connection. This may minimise the investment in system assets that distribution businesses have to undertake, provided that the connectees can respond to the signals. Up-front payment of a deep connection charge should also minimise the network company's exposure to the costs of asset stranding arising due to load migration.

4.18. Nevertheless, a deep connections policy suffers from a number of major drawbacks. It imposes all the reinforcement costs on the marginal user that triggers the reinforcement, regardless of whether or not it is the major contributor to the overall costs of the system at the point where reinforcement is required. By virtue of when it chooses to connect to a system, a small customer may be faced with prohibitive reinforcement costs. Equally, it leads to free-riding problems: subsequent connectees may benefit from using assets for which a previous connectee has already paid. This problem is discussed in the section in chapter 5 on 'Initial contributor vs. second comer'.

4.19. Even if the reinforcement costs are not prohibitive, a deep connections policy increases the costs faced by connectees, particularly if they have to obtain

financing to fund an up-front one-off payment. The administrative burden of identifying and appropriately allocating to a large number of smaller users the costs of system reinforcement can also increase the costs faced by connectees. These costs may inhibit the development of effective competition in the provision of connections, both by reducing the number of connections undertaken and as a result of the substantial development and implementation costs of deriving transparent charges for individual connections.

4.20. If all the system costs are reflected in up-front connection charges, there is no mechanism for reviewing the ongoing costs that a customer may impose on the system. Over time, the costs previously imposed by a user at a given location may vary due to changing load patterns or changing network configuration and design but it is impossible accurately to reflect such dynamic impacts in an up-front connection charge. Including any form of on-going fair and equitable transportation change will be difficult given the complexity of any deep connection policy.

4.21. Overall, therefore, Ofgem considers that the disadvantages of a deep connection policy outweigh its benefits.

Shallowish connections policy

4.22. Under this approach, the charges levied by the network business are restricted to those arising in respect of assets required for the sole use of the connecting customer. Several variants of this approach have been adopted, including limiting the connection charge to the costs of system reinforcement around the point of connection. In addition to the costs of assets around the point of connection, shallowish connections charges can also include more general reinforcement costs, if the connectee is the main user of the assets. The costs of other system reinforcements, generally those deeper within the network, will be included in the general system costs that may form part of transportation charges.

4.23. Compared to a deep connection policy, the up-front costs of a shallowish policy provide much weaker locational price signals, although they do not entirely disappear. However, if a shallowish connections policy is coupled with ongoing stable locational transportation charges, the overall package can provide just as

strong locational signals with regard to siting decisions. The transportation charges can also provide a means of reflecting the impact that changing conditions on the network have on the costs imposed by parties.

4.24. A well-defined shallowish connections policy is relatively simple to apply and, provided that the methodology is transparent, it will generally provide predictable connection charges that can be verified by the user. It reduces some of the problems associated with a deep connections policy, in particular the financial burden on connectees, and makes it easier to connect to the network. In general, this is likely to facilitate effective competition in the generation, distribution and supply of electricity by reducing a potential barrier to entry. It may also help facilitate competition in the provision of electricity connections by enhancing the transparency of the connections activity and its associated charges, which may deliver wider benefits to consumers.

4.25. A shallowish connections policy will increase the cashflow exposure of network companies since the costs of at least some of the system reinforcement will be recovered by annualised charges. However, the overall costs (of connectee and licensee) can be lower than under a deep connections policy because the licensee may have access to cheaper sources of finance or more efficient capital structures than a small connectee. Nonetheless, it is important to strike an appropriate balance between risk and reward for licensees, particularly with regard to the rate of return they are allowed to earn on their assets.

Shallow or local connection

4.26. Under a shallow connections policy, a connectee will only face the costs of the assets necessary to facilitate connection to the distribution system at the lower boundary of a voltage or transformation level. Consider, for example, a housing development that requires the installation of a new low voltage main and transformation equipment to facilitate connection to the system. The developer would be faced with charges for the service cables and joints to the new LV mains. However, any further system extensions represent complete voltage and transformation levels within the distribution reinforcement model and would form part of the general system costs recovered through transportation charges.

4.27. This approach does not reflect the costs of system reinforcement that may be necessary at the location of connection or deeper reinforcement of the distribution system within connection charges. If transportation charges do not provide appropriate locational signals, then a shallow connection policy may lead to connections being made that significantly raise the transportation charges paid by all users and can result in greater system reinforcement being undertaken than would be the case with a shallowish or deep connection policy. Nonetheless, properly designed transportation charges should deliver appropriate locational signals and hence overcome these potential drawbacks.

4.28. The major advantage of a shallow connections policy is that it completely overcomes the problems associated with prohibitive marginal connection costs and free-riding. Thus, it clearly provides a non-discriminatory and transparent approach to connection charges. In addition, it can encourage competition in the provision of connections, since the assets that need to be delivered are well defined. On the other hand, the scope of the reinforcements open to competition will be smaller.

4.29. As with a shallowish connection policy, it is important that the arrangements for transportation charges allow network businesses to recover the costs of system reinforcement not included in connection charges. In particular, price controls on transportation charges need to recognise the cashflow risks to which licensees are exposed from recovering capital costs through annualised charges.

Transportation charges

4.30. As described above, the connections policy adopted by network businesses will determine the extent to which the costs of providing and maintaining network assets are recovered through capital payments (one-off or annualised) by the user or ongoing transportation charges levied on suppliers or generators. This section describes the different methods and principles that companies might adopt in deriving transportation charges.

4.31. As noted above, locational long run marginal cost (LRMC) pricing can be used as a means of providing appropriate price signals to encourage efficient use and investment in network infrastructure. Distribution businesses may define long run marginal costs as the cost of transporting an additional unit of electricity for

a sustained period, including the costs of reinforcement or extension to the distribution system. Long run incremental cost (LRIC) pricing is a closely related concept, with costs measured in terms of a larger increment to demand, rather than an additional unit.

4.32. To address the problem of fixed cost recovery, distribution businesses can apply a mark-up over costs to ensure that an efficient level of total costs is recovered. This can be done in a number of different ways, each of which results in different distributional effects.

4.33. Multi-part tariffs are one approach under which there is a lump sum charge that covers fixed costs of the business and a variable charge that relates to marginal or incremental costs. Such an approach reduces the strength of the locational signals delivered by the long run marginal costs. Moreover, if the variable charge is calculated on metered volumes and the lump sum is volume-independent, it affects low users of the network disproportionately. In addition, it is often difficult to determine what proportion of fixed costs should be allocated to each customer group. In some circumstances, companies may seek to reflect other factors such as the volatility of consumption when determining the appropriate balance between tariff components.

4.34. Another approach is to scale all long run marginal costs by the same proportion. Suppose for example, that LRMC prices would recover 80 per cent of a company's total costs, under this approach each LRMC would be increased by 25 per cent. This approach preserves the percentage locational differences although it widens the absolute locational differences. However, it would be simple to apply and may lead to predictable pricing structures.

Conclusions

4.35. In the light of anticipated structural changes, it is important to consider whether it is desirable to adopt different methods and principles for setting distribution charges. Ofgem considers that the structure of electricity distribution charges should be:

- cost reflective;

- easy to apply and cost effective to implement;
- transparent;
- predictable;
- strike an appropriate balance between stability and flexibility to changing market conditions[4];
- facilitate effective competition in the generation, distribution and supply of electricity; and
- maintain consistency with Ofgem's wider social and environmental objective, for example provide appropriate tariff incentives with respect to network losses.

4.36. Ofgem is interested in hearing from interested parties on any aspect of the material raised in chapters 2 and 3. In particular, views are invited in relation to the application of the charging principles set out above and the desirability of moving to a shallower connection regime.

4 In this context, market conditions is taken to encompass possible changes to the regulatory regime such as the introduction of firm tradable access rights.

5. Connection and use of system: general issues

Introduction

5.1. This chapter describes some of the key features in respect of the way distribution businesses presently set charges for connection to and use of their distribution systems. It will be important to consider whether it might be appropriate to adopt revised arrangements in light of the anticipated structural changes to the electricity industry. This chapter also examines specific issues in relation to capitalised operation and maintenance (O&M) charges, tariff support allowances and second comer issues.

5.2. Distribution businesses determine the level and structure of distribution charges within the limits set out by the regulatory framework. Distribution businesses also have regard to a range of factors relating to costs, such as the voltage level of connection and consumers' anticipated consumption profiles. As a result, distribution businesses levy different charges on different network users.

5.3. There are many similarities in the distribution networks operated by each licensed distribution business. Nevertheless, there are a number of notable differences including variations in size, customer density and the relative mix of customers connected. The extent to which network characteristics differ across distribution businesses may influence the overall level and structure of distribution charges.

Connection charges

5.4. Standard condition 4 of the electricity distribution licence sets out the requirement for DNOs to publish a statement of connection charges in a form approved by the Authority. These statements should set out:

- a schedule listing of items of significant cost liable to be required for the purpose of connection to the system. This should include indicative charges for each item and an explanation of the basis on which these charges are derived;

- the methods and principles by which charges are levied in respect of reinforcement or extension of the distribution system that is deemed a necessary part of providing the connection;

- the method adopted where, at the licensee's discretion, the assets installed are of a greater size or capacity than required for use of system by the person seeking a connection;

- the basis of any charges for maintenance, repair or replacement of those assets provided and installed as part of making the connection; and

- the methods and principles associated with charges for the disconnection and subsequent removal of any plant or equipment .

5.5. Standard condition 4 also requires that, in establishing the connection charges referred to in the statement, distribution businesses should seek to recover an appropriate proportion of the costs incurred in carrying out necessary works, together with a reasonable rate of return.

5.6. Ofgem considers that any connection charge policy adopted by distribution businesses should be consistent with the principles discussed in chapter 4. Connection charges should be broadly cost reflective, yet simple to apply. They should also be transparent, deliver price stability and recognise the needs of users of the network. In the long term, these principles should ensure efficient allocation of resources to deliver appropriate levels of network investment and, where possible, reward distribution companies for providing customer-focused service.

DNO connection policy

5.7. Distribution businesses operate a shallowish connections policy in respect of demand customers. In August 1994, OFFER set out proposals in respect of the appropriate method for deriving connection charges for demand customers as

part of the distribution price control review[5]. OFFER proposed that connection charges for demand customers should not take account of reinforcement costs more than one voltage level above the voltage of connection. Reinforcement costs beyond this level should be treated as reinforcement to meet general load growth to be recovered through transportation charges.

5.8. OFFER proposed that demand customers should not normally be charged for network reinforcement if the increased load requirement did not exceed 25 per cent of the existing capacity at the point of connection to the system. However, the proposals recognised that it is desirable that some reinforcement costs be borne by the users where they intend to connect substantial or abnormal loads.

5.9. In contrast, generators connecting to distribution systems face deep connection charges, with the reinforcement costs recovered via a one-off up-front charge. That is to say, distributed generators pay for any changes to the existing network that are necessary as a result of their connection. This may include the full costs of replacing equipment associated with network protection, voltage control and increased fault levels on the network. Several interested parties have identified significant up-front connection charges for distributed generation as one factor that may be deterring some types of distributed generation from entering the market.

5.10. Ofgem accepts that deep connection charges for distributed generation may not be appropriate. In the light of this, Ofgem's March 2002 consultation paper[6] stated that, in the longer-term, distributed generation should face shallower charges for connection to distribution systems. These issues relating to distributed generators are considered further in chapter 6.

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5 "Distribution Price Control: Proposals", OFFER, August 1999
6 "Distributed generation: price controls, incentives and connection charging – further discussion, recommendations and future actions", OFGEM, March 2002

Connection policy: other energy networks in Great Britain

Introduction

5.11. As indicated above, Ofgem considers it important that common charging principles are recognised and, where appropriate, applied consistently between the gas and electricity sectors and across similar activities (eg transmission and distribution). It is important to consider the extent to which the connections policies adopted across the various sectors differ. Table 5.1 summarises how the connections policies adopted across the energy industries differ between the sectors and between transmission and distribution activities.

Table 5.1: Connection charge policies of network businesses

	Electricity		Gas	
	Transmission	**Distribution**	**Transmission**	**Distribution**
Entry/ Generation	Shallow	Deep	Shallow/ Shallowish	N.A.
Exit/ Demand	Shallow	Shallow/ Shallowish	Shallow/ Shallowish	Shallow/ Shallowish

5.12. The table demonstrates that the connections policies adopted by electricity distribution businesses in respect of entry connections differ from the policies operated by other energy networks. Within the context of anticipated structural changes, it would appear difficult to justify significant differences in the connections policies operated by similar networks.

Electricity transmission

5.13. All three transmission companies in Great Britain - the National Grid Company (NGC) in England & Wales; ScottishPower Transmission Ltd (SPTL) and Scottish Hydro Electric Transmission Ltd (SHETL) in Scotland - now operate shallow connections policies for both generation and demand.

5.14. Moreover, their connection costs are not recovered through one-off payments but via annualised charges spread over 20 years. In the event that a system wishes to stop using the transmission system before this time, termination fees are payable to ensure that the transmission operator recovers the outstanding costs of the connection.

Gas transportation

5.15. The connections policies adopted by the seven gas transporters in Great Britain differ across companies and, in some cases, are less clearly defined than the policies adopted by electricity distribution businesses[7]. However, the charges levied by these network companies appear to resemble those of a shallowish or shallow connection policy, in that they typically reflect the costs of supplying and laying a service pipe or gas main and the costs of connecting a pipe to an existing main.

5.16. Transco is by far the largest gas transporter in Great Britain. It owns and operates the national transmission system (NTS) and 13 local distribution zones (LDZs) across Great Britain. The LDZs are medium and low pressure local distribution systems for transporting gas. Transco operates a shallowish connections policy for connection to its gas transportation network, although it is applied differently to different types of consumer. For example, Transco has adopted standardised connection charges for all domestic connections that are within 23 metres of the point of connection to the local system.

5.17. In common with other network owners, Transco charges for larger connections on a bespoke basis. If the connection requires reinforcement of the existing gas network then Transco currently applies an "economic" test to assess whether the future transportation income that it will earn from the customer will be sufficient to meet the costs of the reinforcement. For the majority of connections, transportation revenues will be sufficient to meet the costs of reinforcement. Nevertheless, there will be some instances where the incremental cost of the connection exceeds expected future transportation income. In these circumstances, the connection charge may include a contribution towards the costs of network reinforcement. Ofgem is presently reviewing the application of this reinforcement test for connections to the NTS.

[7] There is evidence that some gas transporters recover all infrastructure costs through transportation charges, ie they do not levy connection charges.

5.18. Alternatively, gas customers can obtain a connection from a company other than Transco. In these circumstances, a qualified third party provides and installs the connection assets but Transco undertakes and charges for the final connection to its system and then adopts the assets that have been installed. Transco has recently finished a trial to allow accredited third parties to make their own final connections to the Transco owned gas main. It is anticipated that there will be a national roll out of this scheme over the coming months.

Summary on connection charges

5.19. Ofgem welcomes views on whether it might be appropriate for electricity distribution businesses to adopt a common connections policy. Views are also invited on whether it might be desirable for distribution businesses to adopt a connections policy that is consistent with the policies adopted by other electricity and gas network businesses.

Transportation charges

5.20. Standard condition 4 of the electricity distribution licence sets out the requirement on DNOs to publish a statement of charges for use of the distribution system in a form approved by the Authority. These statements should set out:

- the charges for the distribution of electricity across the system;
- the methods and principles adopted for setting charges for the availability of the distribution system;
- charges in respect of accounting and administrative services; and
- a schedule of distribution loss adjustment factors applying to the network.

5.21. Ofgem considers that transportation charges established by distribution businesses should also be consistent with the principles examined in chapter 4. In the long term, these principles should also help ensure efficient allocation of resources to deliver appropriate levels of network investment and, where possible, reward distribution companies for providing customer-focused service.

DNO transportation charges

5.22. Before privatisation, regional electricity companies determined the use of system component of final supply prices with reference to the distribution reinforcement model developed by the Electricity Council in 1984[8]. This approach was largely based on the method and principles set out in a paper by Boley and Fowler (1977)[9].

5.23. The distribution reinforcement model was established to derive an estimate of the LRICs of the distribution system. This approach enabled the area boards to establish cost reflective tariffs for transporting energy across the network to different customer groups, including tariff incentives to reduce losses. The model was also found to derive relatively stable estimates of LRICs, which provided a degree of price stability.

5.24. Estimates of the LRICs for each network were derived by assessing the costs of providing system assets at each voltage level using a stylised model of the distribution network. These models attempted to capture the costs of network investment necessary to meet an additional 500MW of diversified load. Each model was constructed to reflect some of the specific load and customer characteristics of the existing network. The high level cost estimates derived for each voltage and transformation level were then allocated to customer groups based on their contribution to peak system load and consumption characteristics. This allocation formed the basis for determining the variable component within the hypothetical network tariff. Customer-related costs were then allocated across each customer group to establish the distribution component of prices.

5.25. The purpose of the distribution reinforcement model prior to privatisation was to identify the appropriate proportion of network costs that could be recovered on a fair and equitable basis from customers through retail supply prices. The

8 "Tariff formulation manual", The Electricity Council, 1984
9 "The basis of cost reflective tariffs in England and Wales", T A Boley and G J Fowler, IEE Third International Conference on Metering, Apparatus and Tariffs for Electricity Supply, London 1977.

model was not intended to develop distribution charge structures to support competitive markets for the generation and supply of electricity.

5.26. The nationalised industry supported large-scale generating plant connected at transmission voltages. There was little or no generation connected at distribution network voltages. As a consequence, there was no requirement to recognise the development of distributed generation and its impact on system costs within the distribution reinforcement model. Instead, the model assumed that energy would flow from the transmission system to consumers' premises.

5.27. Since privatisation, most distribution businesses have adopted a broadly similar approach in establishing distribution tariffs to that set out by the Electricity Council[10]. The distribution reinforcement model has been modified to recognise the constraints determined by the regulatory framework usually by scaling charges to match allowed revenues.

5.28. While the charging principles adopted by distribution businesses are broadly similar, there are some significant differences in the way these are applied. Some DNOs derive estimates of system costs based upon the replacement value of the network whilst others have opted to derive system costs based on reinforcement costs. Similarly, some distribution businesses have unbundled some distribution services, for example meter operation and revenue protection, from their Distribution Use of System (DUoS) charges, whereas other distribution businesses include these services within DUoS.

5.29. Several interested parties have commented that the structure of electricity distribution charges should strike an appropriate balance between cost reflection and tariff simplicity. There is strong support for the principles presently adopted by DNOs. However, several respondents to the December 2000 consultation paper suggested that these should be applied consistently to ensure transparency of charges and comparability of cost information.

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10 Further detailed information about how distribution businesses presently derive transportation charges can be found in appendices 2 to 14 of the December 2000 consultation document.

5.30. One respondent proposed that distribution businesses should provide standardised charging information with a clear indication of the services that underlie each charge. Another respondent went further to suggest that DNOs should offer a group of generic network tariffs. It was suggested that these steps would help facilitate the development of the market. However, a number of respondents expressed concern that these approaches may stifle innovation.

5.31. The views and arguments set out above appear to have some force. Ofgem considers that it is desirable for distribution businesses to apply charging principles consistently both within and between distribution service areas. There also appears to be merit in the development of generically defined tariffs for a common package of network services. However, it is important that the development of generic tariffs does not stifle tariff innovation and flexibility. In light of this, Ofgem suggests that the scope of any generic tariffs be limited to a small number of customer groups. It is envisaged that DNOs would then be able to develop further tariffs in discussion with users to offer an enhanced package of services consistent with their needs.

Transportation charges: other energy networks in Great Britain

Introduction

5.32. The same issues about consistency of charging principles and their application raised in relation to connection charges also apply in respect of transportation charges. Table 5.2 summarises how the transportation charging policies adopted across the energy industries differ between the sectors and between transmission and distribution activities.

Table 5.2: Transportation charge policies of network businesses

	Electricity		Gas	
	Transmission	**Distribution**	**Transmission**	**Distribution**
Entry/ Generation	Scaled LRMC by zone	None/ O&M	Auctions	N.A.
Exit/ Demand	Scaled LRMC by zone	Scaled LRIC, by voltage & transformation level	LRIC by zone within each LDZ	Activity based cost modelling & utilisation by pressure tier

Electricity transmission

5.33. NGC calculates its transportation charges on the basis of an investment cost related pricing (ICRP) model. This is a zonal model that calculates the LRMCs of increments in generation and demand in each zone. There are currently 15 generation zones and 12 demand zones, although the number and definition of the generation zones can change if the pattern of flows and hence incremental costs changes. Whilst the ICRP model is used to determine the relative values of transportation charges, the final values are scaled so as to recover 30 per cent of NGC's allowed revenues from generators and 70 per cent from demand. The result of this is that whilst demand transportation charges are always positive, generation transportation charges can be negative.

5.34. It should also be noted that the summary in table 5.2 applies to the Transmission Network Use of System (TNUoS) charges levied by the NGC in its role as Transmission Asset Owner. It separately charges Balancing Services Use of System Charges (BSUoS) to cover the balancing costs that it incurs in carrying out its system operator activity.

Gas networks

5.35. The methodology used to determine TO transportation charges on Transco's NTS differs markedly between entry and exit. Entry charges are the results of auctions of capacity rights that entitle the holder to input gas into the NTS up to the capacity purchased. Separate auctions are held for each of the main entry terminals and the reserve prices are set for these auctions on the basis that if administered prices were to apply, there would be a 50:50 split in revenue from entry and exit charges. Where Transco recovers more than its allowed revenues, this excess is returned to users of the system. Exit charges are derived from scaled LRIC calculations. Separate charges are calculated for sub-zones within each LDZ and for individual large sites directly connected to the NTS, eg gas fired power stations.

5.36. LDZ transportation charges are split 50:50 between capacity and commodity elements on the based of activity based cost modelling. Neither charge is location specific, instead charges are based on customer sizes. The capacity

charges are calculated from the average cost of utilisation of each of the main pressure tiers of the LDZ in combination with the probability of loads within consumption bands using that band. The customer charges, which reflect supply point related charges including those related to service pipes and emergency work, are calculated on a similar basis.

Summary on transportation charges

5.37. Views are invited about whether it is desirable to apply charging principles consistently across all distribution businesses or more broadly across all energy network businesses. It would also be helpful to hear from interested parties on the possible scope of generic network tariffs and the process for establishing their specification.

Tariff support and capitalised O&M charges

5.38. In calculating connection charges, distribution businesses sometime make allowances for the proportion of connection costs that can be deferred and recovered through use of system tariffs. These allowances are often described as tariff support allowances. The application of tariff support allowances tends to make the boundary between connection and use of system charges more complex and less transparent.

5.39. Distribution businesses also make up-front charges for ongoing operation and maintenance of connection assets. As with tariff support allowances, including an up-front operation and maintenance charge makes the boundary between connection and use of system charges more complex and less transparent. Moreover, most distribution businesses derive operation and maintenance (O&M) charges based on their current profile of costs. In light of this, up-front charges do not recognise ongoing cost reductions and efficiency savings made by distribution companies.

5.40. A more clearly defined boundary between connection and use of system charges will encourage competition in the provision of electricity connections and reduce the number of connection charge disputes that occur in respect of the allocation of system assets. It is also important that distribution businesses provide sufficient information to assure users that the charges for use of system

and connection have been calculated appropriately. Tariff support allowances and capitalised O&M charges may impose significant distortions. In the gas sector, capitalised O&M charges and capital credits (tariff support) have been removed from connection charges as part of the move to shallow connection charges. In the light of this, Ofgem invites views on whether it is appropriate to remove tariff support allowances and capitalised O&M charges from connection charges.

5.41. Significant modification to the boundary between connections and use of system charges would raise a number of concerns in respect of the treatment of existing users and the impact on price control revenues. Nevertheless, several distribution companies have already taken steps to simplify their connection charge policies in respect of tariff support allowances and up-front (O&M) charges to minimise the potential disturbance to the boundary. These steps have been made to achieve revenue neutrality with respect to the assumptions underpinning the present price control arrangements. Ofgem encourages distribution businesses to simplify the application of tariff support and up-front O&M charges for the remaining period of the present price controls. We invite distribution businesses to come forward with proposals for revised arrangements by 13 January 2003 to apply from 1 April 2003.

Initial contributor vs. second comer

5.42. If a network company adopts a connections policy that recovers a significant proportion of the costs of network reinforcement through one-off capital payments, then users seeking a connection will have an incentive to free-ride on the investment paid for by earlier users as a means of avoiding potentially prohibitive reinforcement costs themselves. The incentive arises due to the existence of minimum network design and security standards that may require the provision of network capacity in excess of the level required by the connectee. In light of this, a user seeking a connection can take advantage of excess capacity on the system that has been paid for by other users.

5.43. In the absence of a mechanism to reimburse the initial contributor for the assets used by the second-comer, users may defer connection to the system in order to avoid being the initial contributor to network reinforcement. Nevertheless, if all

users seek to defer their connection to the system to avoid becoming the initial contributor, connections activity may be limited in some areas of the network where the costs of reinforcement are high.

5.44. The Electricity (Connection Charges) Regulations 2002[11] provide a mechanism for initial contributions to network reinforcement to be reimbursed from connection charges levied on subsequent connections that take advantage of the reinforcement paid for by the earlier contributor. However, these arrangements only extend to domestic connections at present.

5.45. The question of reimbursement of initial contributions becomes more significant the 'deeper' the connections policy adopted by network companies. In particular, a deep connections policy may impose substantial reinforcement costs on some users of the system. Equally, the greater the exposure to substantial reinforcement costs the greater the uncertainty about the potential size and timing of any reimbursement that may occur.

5.46. Nevertheless, several interested parties have commented that assessments of economic viability of distributed generation projects, where connection charges represent a significant proportion of costs, are unlikely to factor in the possibility of unspecified reimbursement of the contribution to network reinforcement. The views and arguments expressed in relation to these matters appear to have some force. Ofgem considers that the connections policy adopted by distribution businesses should recognise the needs of current and future users of the system. In light of this, Ofgem considers that steps taken to remove the incentives on users to 'free-ride' on the investments paid for by others are likely to remove an unnecessary barrier to connections activities, and in particular barriers to distributed generation connections.

5.47. Ofgem is presently consulting on amendments to the Electricity (Connection Charge) Regulations 2002. As part of a wider initiative to remove barriers to entry and perverse incentives that might unjustifiably inhibit the development of distributed generation, Ofgem has concluded that extending the mechanism for

partial reimbursement of initial contributors to distributed generation would provide greater consistency and equity of treatment.

5.48. There is also a strong case for extending the scope of the Regulations to industrial and commercial demand connections. Ofgem has been approached by developers and by a regional development agency, seeking a way for Ofgem to enable distribution businesses to facilitate extension of the electricity infrastructure. Ofgem has concluded that extending the reimbursement mechanism to them would achieve comparable, consistent and equitable treatment of all demand connections.

5.49. Ofgem intends to introduce amended regulations early next year after considering the views expressed by interested parties in response to the consultation.

Structure of the price control

5.50. Several distribution businesses have taken steps to set charges that better reflect the regulatory pricing framework. The aim has been to minimise the divergence between regulated income and allowed revenues and to strike a balance between cost reflection and tariff stability. In the longer term, it is not clear that the price control formula, which is primarily designed to constrain the overall level of revenues that a distribution business can earn, should drive the structure of electricity distribution charges. It is therefore important to consider how the regulatory pricing framework interacts with the charging structures. The regulatory pricing framework must not distort transportation charging structures.

5.51. Several interested parties noted that the revenue driver had not been updated as part of the last price control review[12], although the scope of the price control had changed significantly with the removal of metering costs. Some groups have expressed concern that the revenue driver may not reflect the balance of

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11 Electricity (Connection Charge) Regulations
12 Distribution companies allowed revenues vary with changes in the number of customers connected to their networks and the volume of energy transported, as well as RPI.

long run costs and therefore any attempt to reflect this within network charges might distort price signals.

5.52. Ofgem considers that it is desirable that the form of price control is sufficiently flexible to accommodate changes in the structure of charges. The present average revenue control identifies four broad tariff baskets that form part of the revenue driver. Each tariff basket has a value representing the average cost of transporting a unit of energy across the network. The revenue driver is constructed to recognise any changes in both the level and pattern of network demand and adjust the revenue constraint accordingly.

5.53. Inaccurate or inappropriate revenue drivers may distort incentives on network companies and lead to inefficient price signals. It is likely that the expansion of distributed generation will impact significantly on the network and the volume of energy transported, and this will have to be considered as part of the forthcoming price control review. It is envisaged that this work will extend to a review of the form and structure of the price controls.

5.54. The December 2000 consultation document invited views on whether it might be desirable to adopt detailed tariff basket price controls from April 2005. Several respondents commented that tariff basket price controls would probably lead to greater volatility within use of system charges. It was also suggested that there would be greater revenue uncertainty due to problems with accurately forecasting demands within each tariff group. However, several respondents recognised the importance of putting in place appropriate revenue drivers to facilitate flexible tariff structures.

5.55. Views are invited on whether it is desirable to develop the framework of price controls to provide sufficient flexibility to facilitate ongoing development in the structure of use of system charges. In particular, it would be helpful to discuss with interested parties their initial thoughts on interaction between network tariff structures and the next distribution price controls.

Conclusions

5.56. Several interested parties suggested that greater emphasis should be placed on the requirements of network customers and the level of service that they receive

from distribution businesses. To date, there have been relatively few complaints about the principles adopted by distribution businesses in establishing distribution charges. In these circumstances, it is not clear that there is a case for a significant change to the overall principles. Nevertheless, some interested parties have expressed concern about specific aspects of the charging regime or the overall method adopted by companies.

5.57. However, in the light of anticipated structural changes within the industry, especially those in relation to distributed generation, it will be necessary to modify the present approach in respect to the structure of connection and use of system charges. Revised arrangements will require careful consideration in relation to their implementation, the affect on existing users of the network, the timing of changes, and the implications for the distribution price controls.

5.58. Views are invited on:

- whether DNOs should adopt a common connections policy;
- whether the connection policy adopted by DNOs should be consistent with policies adopted by other gas and electricity network operators;
- whether it is desirable to apply common charging policies consistently across all network businesses;
- the development of generic network tariffs based on common services;
- the rationalisation of tariff support and capitalised operation and maintenance charges; and
- whether it is desirable that the structure of the distribution price control provides sufficient flexibility to facilitate the continuing development of tariff structures and if so, how this might be achieved.

6. Connection and use of system: distributed generation

Introduction

6.1. Distributed generators are generating plants connected to the local distribution systems rather than the high voltage transmission network. Typically, distributed generators are small or medium-sized combined heat and power (CHP) plants or power plants using renewable fuel sources. However, other types of generating plant may also be connected to distribution systems.

6.2. In the future micro-generation technologies, such as micro-CHP and photovoltaic cells, are likely to become more widely available to residential and small business consumers. It has been suggested that these micro-generation technologies may be installed in substantial numbers over a short time period. This is likely to have a significant impact on the way local distribution businesses design and operate their networks.

6.3. This chapter builds on the material set out in Ofgem's March 2002 consultation paper. It explores the major issues affecting distributed generation in relation to the structure of electricity distribution charges with the aim of developing robust long term charging structures by April 2005.

Connection and use of system charges

Introduction

6.4. As described in paragraph 5.9, distributed generators typically pay the full capital cost of connection to the local distribution system in the form of a one-off capital payment. This payment is intended to recover fully the costs of providing, operating and maintaining all of the system assets required by the connecting generator.

6.5. Distributed generation may bring benefits to local distribution systems in the form of reduced electrical losses, the avoidance or postponement of the need for

system reinforcement and increased security of supply. Some distributed generation may also be able to provide balancing services to the network operator. The extent of these benefits will largely depend on the location and output pattern of each generator. If a distributed generator is located where demand is relatively low or if its output is erratic, it may impose additional costs on the network.

6.6. Where generation is located close to demand these generators may reduce losses and increase security of supply. Thus, encouraging additional generating capacity to be connected to distribution networks may also bring additional benefits in the form of reduction in the emissions of climate change gases. Several interested parties have commented that the existing commercial arrangements for connecting distributed generation fail to recognise the costs and benefits provided to the network. It has also been suggested that the substantial up-front charges for connection act as a significant barrier to entry for small and medium sized distributed generation.

6.7. The views expressed in relation to distributed generation connections would appear to carry some force. In light of the arguments expressed, Ofgem proposes that distributed generation should face shallower charges for connection to distribution systems. Careful consideration must be given to the definition of the boundary between connection and use of system charges, and the arrangements for recovering other system costs. It will also be important to consider the treatment of existing distributed generators.

6.8. It is important to recognise that it may take some time to establish appropriate cost recovery and incentive mechanisms in relation to distributed generation. Moreover, further discussion and debate are required to establish the detailed framework for electricity distribution charges. In these circumstances, it is not clear that it would be appropriate to replace the existing distribution price controls before March 2005. In the light of this, Ofgem has set out proposals for interim charging arrangements for distributed generation connections until robust long-term charging arrangements can be put in place.

6.9. The proposed interim arrangements should go some way to reducing barriers to entry, while causing minimum disruption to regulatory framework. Moreover,

they would not appear to limit the options that may be available for the next distribution price control period but provide a framework for the development of a robust long-term charging framework.

6.10. The key interim proposals are that:

- distributed generators should have the choice of paying the costs of connection 'up-front' or paying only for the 'shallow' costs in this way, the balance being collected through an 'annualised connection charge' negotiated with the DNO. Disputes as to these matters can be referred to Ofgem for determination;

- until at least April 2005, generation connections (with the exception of micro-generation installations) should continue to pay site-specific charges;

- additional connection charges may not be required for micro-generation installations to existing premises where connection assets of appropriate specification are already in place. However distribution businesses will need to consider how use of system charging structures for premises using micro-generation reflect the costs and benefits deriving from such an installation; and

- distribution businesses should be prepared to negotiate charge variations on the basis of any costs and benefits as are reasonably identifiable. In this regard, avoided investment in distribution assets - including deferment of asset replacement - would be a likely topic for discussion. In order to facilitate negotiation, Ofgem would look to distribution businesses to take positive steps to reduce the time and cost that is frequently associated with the preparation of network studies and connection quotations. Increased transparency in quoted charges would, in some cases, also be welcome.

6.11. Several distribution businesses have expressed concern that a move to annualised connection charges for deep reinforcement increases their exposure to the risk of stranded assets. Ofgem considers that DNOs have access to a range of instruments to manage some of the increased risk to their businesses. Termination payments might be one way of addressing their concerns. However, Ofgem recognises that in some instances distribution businesses may

not be able to fully recover their costs where a distributed generator fails before the connection assets have been paid for in full. In these circumstances, Ofgem proposes that efficiently incurred expenditure should be included within the regulatory asset base provided that the DNO has taken appropriate risk mitigation measures.

Options for charging structures

6.12. As noted earlier, the connection charge policy adopted by distribution businesses will determine the extent to which the costs of providing, operating and maintaining network assets are recovered through one-off capital payments or from ongoing transportation charges. This section explores various distribution charge structures that might be adopted by network companies within the context of the principles set out in chapter 4. It builds on the work initiated following the conclusions of the DTI and Ofgem embedded generation working group.

6.13. It is important that any pricing framework generates sufficient revenues to enable a distribution business to operate its network efficiently without distorting price signals or incentives. Chapter 4 summarises the key principles that might underpin a robust long-term charging structure. In practice, network charging structures are unlikely to meet all of these requirements in full. In many instances, there will be conflicting pressures exerted by each of the key charging principles. In light of this, it is important to manage these trade-offs effectively.

6.14. It is desirable that the charging framework adopted for connection to and use of distribution networks does not provide inefficient incentives to connect to particular networks. In these circumstances, Ofgem considers that the charging frameworks adopted for use of monopoly networks should be broadly consistent between the gas and electricity sectors; between transmission and local distribution; and treat entry (generation) and exit (demand) customers equitably.

Embedded Generation Working Group (EGWG) recommendations

6.15. In January 2001, EGWG outlined five broad options for determining the charges levied for the connection of distributed generation. The options suggested were to:

- **Option 0**: do nothing, i.e. maintain the existing connections policy of shallowish connection charges for demand customers and deep connection charges for generator connections;
- **Option 1**: adopt shallow connection charges for demand and generation, with demand customers bearing the costs of any additional general reinforcement of the system;
- **Option 2**: adopt shallow connection charges for generation and shallowish connection charges for demand customers, with a mechanism for sharing general reinforcement costs where these are for the mutual benefit of both demand and generation;
- **Option 3**: adopt shallowish connection charges for demand and generation, with a mechanism for sharing general reinforcement costs where these are for the mutual benefit of both demand and generation; and
- **Option 4**: adopt shallowish connection charges for small and medium sized demand and generation together with some combination of use of system charges reflecting an average contribution to system reinforcement. Larger connections would be charged on a site-specific basis where the user's contributions to general system reinforcement are allocated based on the utilisation of assets.

6.16. These options were considered and discussed in chapter 5 of Ofgem's September 2001 consultation document as part of the preliminary discussions in relation to the development of interim changes to the regulatory and commercial framework. During the past year, there has been extensive discussion and debate about the changes to the industry framework necessary to accommodate the connection of large amounts of distributed generation. Significant progress

has been made in a number of areas, which may not be immediately transparent to some interest groups. In the light of this, this section re-examines the recommendations of the EGWG and summarises Ofgem's initial conclusions.

6.17. Several distributed generators have commented that deep connection charges for distributed generation impose a substantial initial capital cost on developers seeking to enter the market, which may impact on the financial viability of some distributed generation projects and in some instances may prevent schemes from progressing. It has also been suggested that deep connection charges discriminate against smaller generators since larger transmission connected generators typically face shallower charges.

6.18. Several interested parties have commented that it is important that the charging framework should treat both demand and generation on a fair and equitable basis. At present, demand and generation are treated differently. Ofgem recognises that the relatively small numbers of distributed generators currently connected to the distribution network may pose difficulties with regard to harmonising generation and demand charges in the short term. However, it agrees with the general principle that generation and demand should be treated consistently.

6.19. Ofgem has indicated that it is desirable to move to a shallower connections policy for distributed generation in conjunction with some form of ongoing use of system charges. Careful consideration must be given to the precise definition of the boundary between connection and use of system charges and the arrangements for recovering other system costs. Revised charging arrangements may take a variety of different forms and it is therefore important to consider the wider implications of each approach. The remainder of this section begins by examining the alternative arrangements discussed by the EGWG.

Option 1: Shallow generator connection charge with all reinforcement costs paid by demand customers

6.20. This option would mean that distributed generators would pay one-off connection charges for assets for the sole benefit of the generator. Distributed generators would not pay use of system charges on their exports. All system related costs would be borne by demand customers.

6.21. From the perspective of distributed generators, the major advantage of this approach is that the average connection charge they face would fall significantly. Moreover, the average cost borne by distributed generation over the life of system assets will also fall in the absence of the requirement to pay transportation charges. Nevertheless, this structure of electricity distribution charges is not sufficiently flexible to capture the cost and benefits that distributed generation may provide to the distribution system. It is likely that all of the costs and benefits will be included within general system costs and therefore smeared across all other network users.

6.22. Several distribution businesses have expressed concern that Option 1 provides few incentives to encourage distributed generation to connect to appropriate sections of the network. A number have commented that a shallow connections policy may also encourage over-connection of distributed generation since generators do not face the full costs that they impose on the system. In the long run, these factors may lead to higher system costs that may be passed through to consumers in the form of higher use of system charges (in addition to the higher charges they would automatically face from having to pay for the general reinforcement costs associated with distributed generation).

6.23. The EGWG noted that under Option 1 the present system of DUoS charges would be retained. In light of this, it was suggested that there would be no requirement to invest in new billing systems. Nevertheless, the present system of DUoS charges is largely based on the volume of energy transported over the network. As the number of distributed generators begins to rise, the volume of energy distributed over the network will become less predicable. In order to manage this volatility and ensure that costs are fully recovered, it may be desirable to move to a system of simple capacity based charges.

6.24. A number of interested parties have commented that, under Option 1, the definition of connection charges would benefit some forms of generation technology more than others and therefore potentially distort the market. As described in paragraph 4.26, the shallow definition means that the connectee does not contribute to any system extension necessary to provide the connection. It has been noted that those forms of generation that impose significant costs by requiring substantial extension to the existing system, such as

wind generation, may benefit ahead of those generation technologies that are required to locate close to demand.

6.25. These concerns can be partially addressed by introducing the concept of generation only spurs. This definition recognises that generation may provide network benefits when it is located close to demand. Where energy must be transported over long distances, transportation costs are typically higher. In light of this, the transmission definition includes the costs of extending the transmission system for the sole benefit of the generator. This approach is intended to encourage economic outcomes.

Option 2: shallow connection charges for generation with sharing arrangements for reinforcement costs for the mutual benefit of both demand and generation

6.26. This option is similar to Option 1 except that demand and generation customers contribute to the reinforcement costs to the general system. Under Option 2, a distributed generator would continue to pay shallow connection charges. However, some form of generator DUoS charge would be introduced to recover an appropriate contribution towards system reinforcement. It has been suggested that the DUoS element might take the form of a simple entry charge based on the agreed connection capacity of the generator.

6.27. It would also be possible to devise a more complex system of charges to reflect the different costs and benefits that individual generators might impose on the system. Entry charges might be positive or negative to recognise the net costs, or conversely benefits, that the generator imposes on the system, which will tend to enhance locational signals. However, careful consideration must be given to the allocation of system costs between demand and generation when developing the structure of use of system tariffs. An inappropriate allocation of costs will distort price signals and connection incentives.

Option 3: Shallowish connection charges with sharing arrangements for reinforcement costs for the mutual benefit of both demand and generation

6.28. This option would mean that a distributed generator would pay a one-off connection charge that would include the costs of providing those assets for the sole benefit of the generator and a contribution to some of the costs of upstream reinforcement. It has been suggested that this approach should align the charging policy for generation connections with the present policy for demand connections. In this case, reinforcement costs would be limited to the voltage of connection and one voltage level above. Moreover, costs would not be incurred unless the generation export requirement exceeds 25 per cent of network export capacity.

6.29. This approach limits the scope of reinforcement costs to those incurred around the point of connection. This would provide strong incentives to connect at appropriate locations on the network. There would be a need for DUoS charges, which might take the form of simple entry and exit charges. It may, however, be more appropriate to devise a more complex system of charges to reflect better the different costs and benefits that individual generators impose on the system.

6.30. One distribution business notes that the most significant driver of generator reinforcement costs is the contribution of generation to fault levels on the system. Substantial increases in fault levels typically require immediate replacement of switchgear and the costs of switchgear replacement are often a major contributor to reinforcement costs. It has suggested that it is desirable to develop a fault level contribution rule that triggers a contribution to system reinforcement when the fault level exceeds a given threshold. It is envisaged that it would operate in a similar manner to the existing 25 per cent rule.

Option 4: Shallowish connection charges for small and medium sized generators and demand customers with sharing arrangements for reinforcement costs for the mutual benefit of both demand and generation

6.31. This approach is similar to Option 3, except that larger demand customers and distributed generators would pay site-specific charges for connection and use of system based on their specific contribution to asset utilisation.

6.32. Several respondents to the September 2001 consultation paper supported the implementation of Option 4. It has been suggested that this approach will enable the alignment of the generation connection policy with the arrangements and several parties have noted that charges for large demand connections are determined on a site-specific basis. It has also been argued that this approach provides greater scope for large generators to negotiate appropriate commercial terms.

Discussion

6.33. The recommendations of the EGWG provide a sound basis for progressing the debate in relation to the development of appropriate distribution charge structures. Each of the options set out above differ in two areas:

- the extent to which the boundary between demand and generation connections differs; and
- the allocation of general reinforcement costs within use of system tariffs.

6.34. Chapter 4 summarises the key characteristics of robust distribution charge structures. Ofgem considers that the structure of electricity distribution charges should, amongst other things, be:

- cost reflective;
- easy to apply and cost effective to implement;
- transparent; and

- facilitate effective competition in the generation, distribution and supply of electricity.

6.35. Within the context of these principles, Ofgem considers that the structure of electricity distribution charges should establish a boundary between connection and use of system charges that applies consistently to both demand and generation. Ofgem also considers that use of system charges should reflect an appropriate allocation of costs between demand and generation, recognising the costs and benefits that each group imposes on the distribution system and providing appropriate locational signals. In the light of these considerations, this section considers each of the options set out above.

6.36. Ofgem does not consider that Option 1 is a desirable outcome. As noted above, Ofgem strongly supports the industry view that demand and generation connections should be treated fairly and equitably. Option 1 does not appear consistent with this principle as generation is subsidised by demand customers. This will lead to inefficient use of the network and uneconomic investment in some areas of the country. In addition, a move to shallow connection charges unaccompanied by appropriate locational signals from transportation charges might result in higher system reinforcement costs than would otherwise be the case.

6.37. Option 2 provides a better allocation of costs compared with option 1, since generators contribute to reinforcement costs arising from their connection. Nevertheless, careful consideration must be given to the resulting allocation of system costs between demand and generation. Smearing the costs uniformly across all users as part of use of system charges will distort price signals, weakening incentives on both demand and generation to locate in appropriate areas of the network. It is important that both generation and demand customers bear the net costs or benefit that they impose on the system.

6.38. Provided that appropriate locational signals can be provided by transportation charges, this approach should deliver an efficient outcome. However, the highly interconnected nature of distribution networks may make it difficult to define locational transportation charges in a robust and transparent fashion. In light of this, it may be appropriate for connection charges to reflect the costs of

reinforcement around the point of connection to strengthen locational signals (option 3).

6.39. Ofgem considers that there is some merit in exploring Option 3 further. It is again important that use of system charges are based on appropriate allocation of costs and benefits between demand and generation. Nevertheless, careful consideration must be given to the conditions that trigger the payment of reinforcement costs by demand and generation. In some circumstances, large industrial customers could also contribute to fault levels where industrial processes use induction motors intensively. To ensure a fair and equitable treatment, it would appear desirable that any fault level contribution rule would also apply to demand connections. We welcome views on the merits of a fault level contribution rule.

6.40. Ofgem would welcome views on the merits of exploring each of the options set out above. However, we recognise that the recommendations of the EGWG are not exhaustive. We would therefore like to hear from interested parties in relation to other potential options that might be adopted from 1 April 2005 where they are considered to be consistent with the principles set out in paragraphs 6.33 and 6.44 above.

6.41. Changes to the structure of electricity distribution charges will influence the risk exposure of DNOs. It is important that the balance of risks and rewards is appropriate to ensure that DNOs face the correct incentives to manage and operate their networks efficiently. It will therefore be important to consider these issues within the context of the next distribution price control review.

6.42. Each of the options set out above may impose substantial costs on both DNOs and suppliers in terms of establishing new billing systems to facilitate a generator DUoS charge and new data flows within the settlement system. It is important to consider whether there is an appropriate balance between costs and benefits from undertaking system changes. Views are invited on whether the costs of implementing revised charges structures are likely to be significant.

Use of system tariffs

6.43. Use of system charges are designed to recover the remainder of distribution system costs. These charges may take a very simple form. However, it may be appropriate to devise a more complex system of charges to reflect the contribution of different user groups to system security, quality of supply and power quality.

6.44. At present, suppliers pay use of system charges for electricity that leaves the distribution system. In the future, it is desirable that charges are also levied for electricity as it enters the distribution system. This should provide appropriate incentives to reduce distribution costs by encouraging suppliers to contract with network users to balance their own positions with respect to local supply and demand. If all suppliers were to balance their local generation and customer portfolios at each level of the distribution network then the deviation between local supply and demand would be minimised.

6.45. Charges for entry and exit to the system may also ensure that the costs of reinforcing the distribution system whether for import or export are paid for by the appropriate consumers. For example, there may be substantial investment in a local network to facilitate the export of large amounts of electricity from local distributed generation to customers in other networks. It is important that charges are structured to recover an appropriate proportion of costs from out of area customers.

6.46. Consider a supplier contracting with large amounts of coastal wind generation connected to a distribution network and who is using this electricity to cover supplies to customers connected to the adjoining inland network. In this case, the supplier and generator will face a combination of two sets of entry and exit charges. These distribution costs will ultimately be borne by the consumer purchasing the energy from the supplier. As a consequence, the inland consumer pays a contribution to the costs of reinforcing both networks. Entry and exit charges therefore encourage an appropriate allocation of costs between consumer groups.

6.47. In contrast, the existing approach of levying exit charges will typically encourage DNOs to recover their costs from connected customers and may therefore result in an inappropriate allocation of costs.

6.48. There are a number of ways that entry and exit charges might be established and applied in practice. In theory, it would possible to develop entry and exit tariffs for every connection point on the system, although this is likely to be impractical. At the other extreme, a single entry charge and a single exit charge could be applied throughout a distribution network. Within this range, a variety of different charging structures is possible. It will therefore be important to strike an appropriate balance between cost reflectivity and tariff simplicity.

6.49. One DNO has indicated that it might be appropriate to develop a matrix of tariffs for every combination of entry and exit voltage levels. This simple approach develops a series of net tariffs that are applied to the appropriate proportion of volume purchased and supplied by the supplier. Figure 6.1 below demonstrates how this arrangement might work in practice. Table a) sets out the matrix of net entry-exit tariffs. Table b) summarises the volume purchased and supplied. Table c) outlines the total charge faced by supplier given the volume of energy purchased.

6.50. In general, the charges faced by a supplier will be minimised where energy is purchased and supplied at the same voltage level. This recognises the benefit of generation located on the same transformation level. In contrast, where energy is purchased at the GSP and supplied at low voltage, the net entry-exit tariff should reflect the costs of providing assets to transform the voltage level. This is typically more costly and therefore the net entry-exit tariff will be greater. It has been suggested that this approach delivers strong incentives to encourage suppliers to contract with distributed generation as a means of avoiding network charges. It may also encourage generation to locate close to areas of high demand.[13]

[13] The level of distribution charges is typically a secondary factor influencing the connection location. Technological factors are often a primary determinant of location.

Figure 6.1: Entry – Exit charges

Table a) Distribution Network Tariffs

		Entry level			
		132kV	**33kV**	**11kV**	**LV**
Exit Level	**132kV**	A	B	C	D
	33kV	E	F	G	H
	11kV	I	J	K	L
	LV	M	N	O	P

Table b) Supplier Volumes

		Entry level			
		132kV	**33kV**	**11kV**	**LV**
Exit Level	**132kV**	Z			
	33kV				
	11kV			Y	
	LV	X			

Table c) Distribution Network Charges

		Entry level			
		132kV	**33kV**	**11kV**	**LV**
Exit Level	**132kV**	AZ			
	33kV				
	11kV			KY	
	LV	MX			

6.51. This approach has some merit and provides an appropriate basis for considering these issues further. However, it is a simplified approach and fails to recognise time of day distinctions in respect of costs or any locational differences in costs within a voltage level. As the model is presently constructed, use of system charges for two rate tariffs such as economy seven are likely to increase significantly as all units will be charged at the same tariff rate. In light of this, it may be desirable to establish a matrix for peak, off-peak and general tariffs to fit more consistently with the present tariff framework.

6.52. It would be helpful to hear from interested parties about whether it is desirable to adopt a system of entry-exit charges from April 2005 and in particular initial views on the possible framework for such charges. Views are also invited on whether it is desirable to reflect the additional benefits that generation and load may provide to the system within such charges or whether these benefits should be reflected in bilateral agreements.

Summary on use of system issues

6.53. In considering the issues set out above it is important to consider the Authority's principal statutory objective to protect the interests of consumers, wherever appropriate by promoting effective competition. Views are invited on the appropriate mechanism for dealing with existing distributed generators and in particular whether they should be incorporated within the revised charging framework. It is our initial view that failure to integrate fully existing distributed generators within the revised charging framework will lead to significant market distortion.

Micro-generation: connection and use of system charges

6.54. The earlier part of the chapter discusses the key issues relating to the structure of electricity distribution charges and distributed generation. In general terms, Ofgem considers that it is desirable to move to shallower connection charges and some form of use of system charges. In light of this, Ofgem welcomes views on the appropriate boundary between connection and use of system charges.

6.55. Careful consideration should be given to the use of system charging policy adopted by distribution businesses in relation to the installation of micro-generation technologies. In March 2002, Ofgem concluded that there was little evidence to suggest that the installation of photovoltaic cells and domestic CHP within existing premises would necessitate significant reconfiguration of existing connections. In light of this, Ofgem set out interim arrangements that proposed that micro-generators should not bear any additional connection charges unless there was a justifiable need for substantial reconfiguration of existing connection assets. Nonetheless, there will be additional costs in relation to the installation of micro-generation schemes, including the costs of installing new metering equipment, that fall outside the scope of the connection charge. Ofgem considers that it is appropriate that these costs are borne by consumers.

6.56. As described earlier in the document, distribution use of system charges reflect those costs of providing and maintaining network assets that do not form part of the connection charge. Typically, these costs are allocated according to the consumption characteristics of the customer group. The installation of micro-

generation technologies may have a significant impact on the level and profile of consumption, which distinguishes customers with micro-generation from customers without generation assets. It is important that distribution businesses take steps to develop distribution use of system tariffs for customers with micro generation installed. This will avoid cross-subsidy between those customers that have micro-generation equipment installed and those customers who do not.

6.57. Many of the costs associated with the provision of network assets are largely fixed in the short term. As a consequence, suppliers of domestic and small business consumers that have installed micro-generation technology might see an increase in the level of transportation charges per unit supplied, as distribution businesses seek to offset lost revenues and reflect increased average unit costs to accommodate energy exports. Nevertheless, the implementation of a system of entry and exit charges will encourage suppliers to manage their energy portfolios to avoid substantial transportation costs. This may lead to lower transportation costs for all consumers.

6.58. Many of the arguments in support of these interim measures would appear to hold in the longer term and it would seem desirable that the proposed interim arrangements continue for the foreseeable future.

6.59. It would be helpful to hear from DNOs and micro-generation equipment manufactures in relation to the key interactions between micro-generation and network investment requirements. It would also be helpful if companies could set out the steps that they propose to take to ensure that effective commercial arrangements are in place by before April 2005. This should include details of use of system tariffs for micro-generation customers.

Network constraints

6.60. Access to the distribution system for distributed generators, suppliers and customers is limited to the connection capabilities of the site and this provides an upper bound on the potential aggregate access. Nevertheless, network constraints and failures on the distribution and or transmission systems may reduce these limits. In practice the connection arrangements for many distributed generators, suppliers and customers do not confer firm access rights.

6.61. In light of the anticipated structural changes to the industry and in particular the expansion of distributed generation, several interested parties have commented that distribution network constraints may become more prevalent. Careful consideration must be given to the future treatment of LV constraints and failures.

6.62. The December 2000 consultation paper suggested that distribution businesses have no direct control over the economic and financial costs arising from network constraints or failures. However, there are a number of options available to network users to reduce their exposure to these costs. In these circumstances, it would not be appropriate for distribution businesses to bear the direct costs of imbalances arising out of distribution constraints and failures.

6.63. As distribution companies begin to manage their systems more proactively, it will be important to ensure that distribution businesses are correctly incentivised to respond effectively to network incidents. A small number of suppliers have suggested that following the introduction of revised transmission access arrangements, consideration should be given to introducing similar arrangements for distribution networks.

6.64. At present, distribution networks tend not to experience the sort of capacity constraints that are common on transmission networks. It is therefore not clear to what extent similar access arrangements will be appropriate in the future. Nevertheless, as the framework for regulating network companies continues to develop, it may be relevant to reconsider the extent to which payment of distribution charges should confer firm rights of access[14] for customers, suppliers and generators.

6.65. It would be helpful to receive comments from interested parties on the desirability of introducing tradable firm access rights for network users. In particular, views are invited on the anticipated level and cost of LV constraints.

[14] By 'firm access rights' it is meant the requirement for a DNO to buy back access rights it has sold but cannot physically deliver.

Conclusion

6.66. Views are invited on:

- the introduction of a system of entry and exit charges for all users (demand, generation and micro-generation) from April 2005;
- whether it is desirable to adopt a common connections policy for all connections;
- the merits of the various charging options set out above and in particular whether it is appropriate to adopt a shallow or shallowish connection policy from April 2005;
- the appropriate scope of connection and use of system charges for distributed generation;
- whether it is desirable to preserve some form of locational price signals within connection and use of system charges;
- the proposal that customers installing micro-generation equipment should not face additional connection charges unless work was required because the customer had an unusual or abnormal load, but it should pay specific distribution use of system tariffs which reflect the costs and benefits they create; and
- how companies might best be incentivised to manage LV network constraints and failure effectively, and in particular whether it is desirable to introduce a system of tradable firm access rights.

7. Connection and use of system: demand

Introduction

7.1. Analysis in the December 2000 consultation paper revealed relatively large differences in the hypothecation of costs to charging components between the distribution companies. The companies appeared to estimate costs differently, with some businesses placing a greater emphasis on certain characteristics rather than others.

7.2. As the December paper set out, cost reflectivity is an important principle that allows for an efficient electricity industry. Rational agents facing DUoS charges that appropriately reflect the costs of providing these services will make decisions that are cost effective.

7.3. A common approach to calculating charges, the yardstick approach, was carried forward after privatisation in 1990. This method is considered to yield broadly cost reflective charges that are based on customers' contribution to peak demand.

7.4. Although varying inherent characteristics of the distribution networks will result in differences in cost allocation, many of the observed differences in charges are too large to be justified by these variations. It appears that, although most DNOs adopt the yardstick approach, the charging principles are applied differently. Consequently, the structures of charges differ between DNOs. The differences in the application of the tariff setting methodology therefore indicate that some distribution companies' tariffs are reflecting costs poorly.

7.5. In addition to being an indication of poor cost reflectiveness, the differences in approaches between DNOs make it difficult for suppliers to construct retail tariffs.

The balance of charging components

7.6. One dimension of the balance of charging components is the distinction between fixed and variable elements of charges. Fixed charges should reflect

the costs of providing customer-related services, while variable elements should reflect volume driven costs. The proportion of fixed charges for standard domestic customers levied by the distribution companies range from 0 per cent to 40 per cent. Differences in network characteristics can clearly not explain this variation. There are similar variations in this balance between customer groups within each DNO.

Unit charges, capacity charges and time of day split

7.7. The yardstick approach assigns the charges to each customer based on his or her contribution to peak load on the network. In this sense, the yardstick approach is a capacity charge. Since, for example, consumption in an off peak-period does not contribute significantly to the network capacity requirement, levying a network asset charge (the main component of the DUoS charge) for distribution occurring in this periodat night may not be cost-reflective[15].

7.8. Cost reflective capacity charges should reflect the overall contribution of the customer to peak load. However, this would necessitate a replacement of the customer's meter to enable capacity metering. Since the profile of consumption is broadly similar across smaller customers, spreading the costs over units consumed provides a reasonable approximation for these customers. However, if micro-generation technology is installed in large quantities, the profile of consumption may change significantly and become increasingly varied.

7.9. Cost-reflectiveness could be improved by installing maximum demand meters for all customers and introducing charges based on some measure of annual peak demand. A less drastic method, which would be a step towards an available capacity charge, would be based upon the maximum rating of the connection assets.

[15] The may, however, be a contribution to network control systems necessary to monitor power flows and faults on the system. These costs may be reflected within use of system charges.

Power factor

7.10. 'Power factor' is the share of the network capacity that can be used as actual, or active, power. The residual is called reactive power and is needed to energise electric and magnetic fields in certain types of network and customer equipment. The transport of reactive power reduces available network capacity and causes additional network losses. However, equipment exists that corrects for low power factors and therefore increases available capacity. This has the benefits of redcing losses, deferring the need for network reinforcement and improving voltage quality. Power factor correcting equipment can be installed both on customers' premises and on the network itself.

7.11. At privatisation, all distribution businesses levied a specific charge for customers with low power factors. In recent years however, many distribution businesses have ended these charges. Where distribution businesses do levy a charge for low power factors, it is not clear whether the suppliers separately identify this on the customers' bills. It is also not clear whether the charge is even passed on to the relevant customer or whether it is smeared across all customers within the tariff.

7.12. Ofgem understands that, since privatisation, there has been a marked reduction in the installation of power factor correction equipment. This may suggest that networks are being operated less efficiently and that there is scope for improved performance. In light of this, Ofgem is considering incentive arrangements to improve network power factors and will be collecting detailed information from DNOs in due course.

7.13. A capacity charge based on kVA, rather than a charge per kW or kWh, would explicitly transfer the costs of low power factors onto the customer[16], who would then face appropriate incentives to install power factor correcting equipment. Alternatively, DNOs and suppliers could be required to levy charges for reactive power and to identify it to customers.

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[16] This is because the kVA measures the potential power, or capacity, while kW measures the actual power. A customer with a power factor of 0.95 requires 1 kVA of capacity to supply 0.95 kW of power.

7.14. It is therefore for consideration whether it is appropriate to introduce a set of guidelines to narrow down the charging principles to ensure that these are applied similarly across the DNOs. This would enhance cost reflectivity and improve benchmarking between the DNOs. It would also make it simpler for suppliers to construct retail tariffs. The guidance would have to strike a balance between setting out methods of tariff calculations and allowing innovation.

7.15. Views would be welcomed on the potential incentive mechanisms to improve network power factors.

EHV charges

7.16. Concerns have also been expressed regarding charges for EHV customers. EHV customers are typically connected to the distribution network at either 132kV or 33kV. EHV charges are not regulated and are calculated on a site-specific basis. This avoids the problem of a potentially volatile average tariff for the relatively small number of EHV customers. Furthermore, if site specific charges are more cost-reflective, it should enhance efficiency by ensuring that costs are borne by the customers that impose them.

7.17. Several respondents have expressed concern about the relative movement in EHV charges since privatisation, compared with the movement of regulated charges. Between 1990/91 and 1999/00, EHV charges have fallen by around 16 per cent in real terms compared to a decrease in regulated charges of 25 per cent. The cause for this difference is not clear.

7.18. The fundamental concern regarding EHV charges is thus transparency. As long as the charges are site specific, customers need to be able to understand how the tariff is calculated and why changes are implemented. There seems to be an acceptance of site specific charges for EHV customers, but Ofgem is considering whether distribution companies should be required to provide more information about how they arrive at their EHV tariffs.

Summary of responses to information request (March 2002)

7.19. In March 2002, a letter was sent to distribution businesses requesting information on the steps they had taken to improve the transparency of EHV

charges. In addition, the distribution companies were asked to provide samples of EHV charges with a commentary on their derivation.

7.20. Most distribution businesses claimed that they gave customers and suppliers a significant period of notice of the charges and any revisions made. It was widely claimed that site-specific EHV charges were calculated through clear tariff structures. It appears that most companies use a similar tariff structure based on a standing charge and capacity fee.

Typical charging components

7.21. Asset charges cover all specific major items of equipment between the GSP and the customer that are associated with the EHV connection. The size and type of the charges generally depend on

- current replacement, operations and maintenance costs of assets (ranging from 1% to 2.25% of asset value)
- rate of return
- initial capital contribution by customer
- whether the customer is a sole-user or shared-user of the asset
- other customer characteristics (including load, coincidence factor, location)

7.22. NGC Exit Charges are generally derived from the NGC exit charge at the GSP to which the customer is allocated. No margin is added to the NGC charges. The factors that determines the level of charge are the customer's coincidence factor with reference to the load at that GSP and the customer's share of capacity at the GSP.

7.23. Local Authority Rates Charges are passed through without margin and allocated according to the customer share of the capacity of the whole distribution network.

7.24. Low Power Factor Charges are levied by some DNOs to penalise EHV customers who have low power factors (typically less than 0.9) to encourage such customers to invest in equipment to increase their power factor.

7.25. It is, however, often unclear how the DNOs charges are allocated to standing charges and capacity fees.

Charging structures

7.26. Most distribution companies recover the costs outlined above through a simple structure based on a £/month standing charge (covering fees for sole user assets and site specific administration costs) and a p/kVA/month capacity charge (covering contributions to joint user assets, NGC exit charge and local authority rates). However, several DNOs have amended the model to offer flexible weightings for the different components.

7.27. Several companies levy unit charges to differentiate between day and night consumption and to recover NGC exit charges. Some companies levy a reactive power charge.

7.28. Despite the information presently available to EHV customers, Ofgem has received further complaints regarding the amount of detailed information provided by distribution businesses. Further concerns have also been expressed in relation to the movement of EHV charges. Careful consideration must be given as to whether EHV charges should fall within the scope of the next distribution price control. These issues will be considered as part of the price control review. However, there are steps that can be taken to enhance the information provided to EHV customers.

7.29. It is important that distribution businesses provide detailed information in a timely manner to enable EHV customers to validate their use of system charges. Despite this, it has been suggested that many distribution businesses fail to provide even a simple breakdown of the tariff calculations setting out the assets allocated for the sole use of the EHV customer. Ofgem can see no justifiable reason why distribution businesses are unable to provide this information to customers at the beginning of each year. In light of this, it would be helpful if distribution businesses could set out proposals by 31 January 2003 setting out

the steps they intend to follow to improve the quality of information available to EHV customers.

Energy efficiency

7.30. Electrical losses on electricity distribution networks, measured as a share of volume distributed, have been monitored as part of price control compliance analysis since the electricity industry was privatised in 1990. At that time, losses in England and Wales accounted for 7.4 per cent of units distributed. Initially, losses decreased and reached 6.6 per cent in 1995/96, as shown in table 7.1. Since then, they have been stable at around 6.8 per cent. However, with a unit growth of 1 to 2 per cent per annum, lost units have increased in absolute terms. In contrast, transmission losses have been between 1.6 to 2.0 per cent in the same period. Early figures show a reduction to 1.5 per cent in 2001/02.

7.31. Suppliers, and ultimately consumers, pay for distribution losses. However, they face few incentives to invest resources in reducing losses, as much of the benefits from such efforts are smeared across all suppliers. Yet, distribution businesses are best placed to take such investment decisions, being the owners and operators of the assets. To encourage the distribution businesses to take steps to reduce losses, an incentive mechanism rewards and penalises the businesses for reductions and increases in losses. This incentive mechanism was strengthened in 1995, but its impact has been limited. Currently, distribution businesses receive 2.9p/kWh (in 1999/00 prices) of losses saved as part of the losses incentive arrangement.

7.32. The direct costs of losses mainly stem from the value of the lost electricity and the cost of transporting the electricity associated with losses. In addition, there are environmental costs to society that are not internalised in the price of electricity. Given that a certain share of electricity consumed in the UK is generated from fossil fuels, some of the associated carbon emissions could be avoided if the network losses were reduced. This would assist in achieving the Kyoto targets by 2012.

7.33. Line losses increase with the distance the electricity is transported and the number of transformations in voltage levels the electricity undergoes. Domestic

customers are located at the lowest voltage level and therefore will impose the highest losses on the network in transporting energy from the GSP. Similarly, distribution areas with less dense populations will have more kilometres of lines and cables per customers than an urban network. Generally, rural customers therefore impose a higher cost due to losses than do urban customers. Consequently, these costs exacerbate the underlying differences in charges across the network. Nevertheless, in the future distributed generation may be encouraged to connect at low voltages to reduce the cost of losses.

Table 7.1: Transmission and Distribution losses form 1990/91 to 2000/01

DNO (%)	1990/ 91	1991/ 92	1992/ 93	1993/ 94	1994/ 95	1995/ 96	1996/ 97	1997/ 98	1998/ 99	1999/ 00	2000/ 01
Eastern	7.0	7.0	6.8	6.5	6.7	6.9	7.1	7.0	7.1	7.3	7.1
East Midlands	6.6	6.5	6.7	6.8	6.0	6.1	6.1	6.1	6.1	6.1	6.0
London	7.8	7.2	7.0	7.0	7.1	6.7	7.1	6.8	7.1	6.5	7.3
Manweb	9.8	8.1	8.7	8.7	8.1	8.8	8.8	9.0	9.0	8.9	9.1
MEB	6.2	5.9	5.7	5.5	5.5	5.5	5.6	5.5	5.4	5.4	5.4
Northern	7.5	7.6	6.8	7.2	6.1	6.8	6.9	6.7	5.6	6.7	6.6
Norweb	7.1	7.1	6.3	6.3	6.4	4.8	5.0	5.7	6.0	5.9	6.2
Seeboard	7.9	7.7	7.6	7.5	7.5	7.1	7.6	7.7	7.6	7.4	7.6
Southern	7.1	7.2	7.1	7.0	7.0	7.2	7.2	7.2	7.2	7.2	7.2
Swalec	8.9	8.4	8.1	7.0	7.0	6.7	8.0	6.9	6.1	7.7	7.2
Sweb	8.6	8.5	8.5	8.3	7.3	7.2	7.9	7.3	7.5	7.3	7.9
Yorkshire	6.3	6.3	6.2	6.2	6.5	6.5	6.5	6.5	6.6	6.7	6.6
Distribution Losses Weighted average	**7.4**	**7.1**	**7.0**	**6.9**	**6.7**	**6.6**	**6.8**	**6.7**	**6.8**	**6.8**	**6.9**
Transmission Losses	**1.7**	**1.6**	**1.7**	**1.9**	**2.0**	**2.0**	**1.8**	**1.7**	**1.8**	**1.8**	**1.6**

7.34. Losses can be separated into two broad categories. *Load dependent losses* are caused by the resistance of conductors to the passage of current. These losses are proportional to the square of the current. *Fixed losses* are due to the need for power to energise equipment, independently of units transported. The majority of fixed losses occur in transformers.

Latest thinking on distribution losses

7.35. Ofgem is about to initiate a separate project on distribution losses. The project will examine the development of losses in relation to the incentive mechanism in the price control. It will aim to quantify the costs of losses in order to provide an incentive that will bring losses down to a more efficient level.

7.36. An efficient level of losses implies that the marginal cost of reducing losses by one unit equals the marginal benefit of the same reduction. Currently, few individual actors in the electricity industry derive significant benefits from reduced losses. Since losses have remained stable over the last five years it has been suggested that the incentive mechanism appears to be too weak. To do so will require a higher and more appropriate level of incentive that would encourage distribution businesses to implement measures to reduce losses towards the efficient level. Possible efforts to reduce losses that relate to the structure of charges are set out below.

Network load and capacity

7.37. For a given network size, an increased load leads to higher losses. Studies show that an optimal distribution network that accounts for the cost of losses, can be one where the utilisation is as low as around 30 per cent of capacity. This is radically different from how the UK distribution network has been designed and implies that a significant adjustment to the losses incentive might be appropriate.

7.38. Most customers' load varies significantly by time of day and season. Peak demand for a domestic customer can be 5 times higher than demand during the night. Similarly, peak demand in winter can be very much higher than peak demand in summer. One measure of the magnitude of peaks in a load profile is given by its load factor, the ratio of average demand to peak demand.

7.39. A distribution business may be able to manage demand by structuring its tariffs appropriately. By charging more for distribution during peak hours, some demand may be shifted away from these periods so that the system load factor increases, which will lead to a lower utilisation of capacity and therefore lower distribution losses.

Location of generation

7.40. By locating more generation closer to demand, the volume of units lost will be reduced. The connection of CHP, mini-CHP and micro-CHP plants to distribution networks might significantly reduce losses. Green generation, such as wind, marine and bio power, is also more likely to be connected to distribution networks, albeit not necessarily close to demand centres.

7.41. The issue of distributed generation is complex, however. Despite apparent efficiency and environmental gains, the connection of distributed generation has been slow. Large up-front costs of connection and a lack of compensation for efficiency gains have probably reduced the attractiveness of such generation projects. The structure of charges levied on distributed generators will play a major role in creating an adequate environment to encourage new generators. In addition, improved incentives on distribution businesses to reduce losses might encourage them to offer more favourable connection terms to prospective generators. These issues are dealt with in a separate project on distributed generation on which a consultation document was published in March 2002 and have been touched upon in chapter 6.

Power factors

7.42. In Ofgem's view, reactive power is a cause of distribution losses that can be rectified relatively easily. All distribution businesses should include an explicit charge for low power factors in their tariffs. Furthermore, it would be desirable that suppliers allocate these charges to the relevant customer and to explicitly identify these charges on the customers' bills. This would provide the customer with an incentive to invest in power factor correcting equipment.

Other issues

7.43. Other areas have been identified where increased investment can reduce distribution losses. Ensuring that the incentive mechanism is set at an appropriate level will encourage the distribution businesses to invest to reduce losses towards the efficient level. Areas in which loss efficiency may be improved due to the incentive mechanism include:

Low loss transformers

7.44. Losses in transformers depend on the material from which they are constructed. Typically, low loss transformers are more expensive than higher loss transformer. Investment in new, more efficient transformers would therefore reduce losses.

Network configuration

7.45. The electricity lost increases with the distance it is distributed. In the longer term, improving network configuration can reduce this distance and hence reduce losses.

Conclusions

7.46. Views are invited on the following issues:

- Whether it would be beneficial to introduce a guidance to tariff setting principles to ensure more consistency between DNOs and, if so, how detailed the guidance should be.
- The advantages and disadvantages of, over time, moving to capacity charging for all customers, either by a proxy or by installing meters that can record maximum demand.
- Whether DNOs and suppliers should be required to levy and identify reactive power charges on their bills.
- Whether DNOs should be required to provide more detailed information about tariff calculations to EHV customers and, if so, how detailed.

Appendix 1 Ofgem workstreams

Introduction

1.1 This Appendix sets out a detailed timetable over the next year for the main projects and areas of work relating to the DNOs. Given the important interaction between the work on developing price controls and that on the structure of distribution charges the timetable for both projects has been brought together.

Key areas of work for 2002/03

Distributed Generation (various Ofgem directorates. Co-ordinator: Arthur Cooke)

1.2 Key issues being considered include:

- consultation on Engineering Recommendation P2/5 (as part of Ofgem's wider consultation on the governance of industry standards);
- addressing the uncertainties associated with the benefits of distributed generation;
- work programme of the joint DTI/Ofgem Distributed Generation Co-ordinating Group (DGCG) and its Technical Steering Group (TSG);
- standardisation and simplification of connection agreements for DCHP; and
- looking at the feasibility of introducing premium power zones, including:
  - technical and commercial aspects;
  - safeguarding the interests of all connected parties; and
  - relating arrangements for distributed generation to principles underlying transmission access and the provision of ancillary services.

Structure of charges (Colin Green)

1.3 Key issues being considered include:

- establishing an appropriate long-term charging framework for distributed generation, including:
  - the boundary between connection and use of system charges; and
  - the structure of ongoing generation charges.
- assessing whether the present arrangements of volume related charges are likely to remain appropriate as network conditions change.
- rationalising the boundary between connection charges and use of system charges for domestic customers

Distribution Losses (Colin Green)

1.4 Key issues being considered include:

- identifying the drivers of electrical losses on distribution networks;
- establishing whether it is appropriate to strengthen the incentives to reduce losses, and if so, how this should be achieved; and
- considering the role of distributed generation and its impact on losses.

Developing price controls (Cemil Altin)

1.5 Key issues being considered include:

- reviewing how companies' efficiency is assessed;
- reviewing the incentive framework on companies to achieve efficiency savings;
- looking at how to deal with investment uncertainty and ensuring the provision of incentives to meet customers' demands; and
- identifying key issues, objectives, timetable and process for the next distribution price control review.

Timetable of work

Date	Workstrand			
	Structure of charges	**Developing price controls**	**Distributed generation**	**Other Projects (including losses)**
2002				
AUGUST		Initial consultation paper Statement document	Preliminary paper on 'banding' of distributed generation	Regulatory accounts submitted
SEPTEMBER	Public workshop on network issues	Public workshop on network issues	Public workshop on network issues	Public workshop on network issues Ofgem Quality of Supply report on DNOs (IIP) Review of regulatory accounts
OCTOBER	Update paper	Industry workshop	Summary of responses to March document	Initial consultation on normalisation Final proposals on governance of electrical standards. Possible workshop on losses Asset Risk Management Survey (visits)
NOVEMBER		Second consultation paper	Summary of responses to consultation on Electricity (Connection Charge) Regulations 2002	Report on Asset Risk Management Survey results
DECEMBER	Industry workshop	Update document		Second consultation on normalisation RAGs for 2003/04 finalised
2003				
JANUARY	Initial proposals	Possible industry workshop Bilateral meetings with interested parties	Connection process guidance Review of 'banding' of distributed generation Implementation of Electricity (Connection Charge) Regulations Guidance on best practice on basic active network management	Asset Risk Management participants' seminar

Appendix 2 Summary of the plenary session: February 2001 workshop

2.1 This section contains two sections summarising the February 2001 workshop. Firstly, a summary report of the discussions in the working groups and secondly, the background information given by Ofgem to the working groups.

Reports from the working groups

Working group A – demand customers and distribution businesses

2.2 It was reported that the group had considered ten of the issues identified by Ofgem and that their initial views on these issues were as follows:

- the group agreed with the principle of cost reflective charging, although it was noted that it is important to be mindful of the associated transactions costs of a pure economic solution – i.e. large scale installation of half-hourly metering to facilitate site based charges would be costly;
- it was suggested that stability and predictability may stifle innovation, although innovation may result in significant price disturbance which may be undesirable;
- the group supported a system of charges that did not differentiate between customers geographically;
- some felt that distribution businesses should make available standardised distribution tariffs, although this might conflict with tariff innovation. It may be appropriate to adopt a group of generic non half-hourly and half-hourly tariffs;
- the group favoured shallow connections charges over a deep connections policy;
- the removal of tariff support allowances (TSA) and capitalised operating and maintenance charges (O&M) was not a high priority for the group. Some felt that a customer should have a choice in respect of how the charge is levied;

- the group suggested that Ofgem might learn from the experience of the gas and water industries, in particular the ongoing debate in relation to the capacity-commodity split in gas and the operation of tariff basket regulation in water;

- the group favoured greater standardisation of information provided by distribution businesses; and

- it was suggested that EHV customers should be treated no less favourably than customers in the regulated sector, such that distribution charges for EHV customers move broadly similarly to those of regulated charges. It is also necessary to improve the mechanism for customers to refer charging disputes to Ofgem for determination and/or dispute resolution.

2.3 In summary, customers are broadly content with the approach adopted by distribution businesses in respect of electricity distribution charges, although it was emphasised that distribution businesses should place sufficient information in the public domain to enable network users and connected customers to verify that their charges are set at an appropriate level.

2.4 There was a discussion on the role of the distribution businesses in encouraging energy efficiency. Some members of the group felt that distribution businesses should set charges to encourage improvements in power factors, as this will improve utilisation of existing network capacity. It was noted that it was not a key priority of the distribution businesses to encourage a reduction of kWh consumption.

2.5 It was noted that there was a discussion about the different connection policies identified in the December 2000 consultation paper. The group favoured a shallow connection policy over a deep connection policy, although some group members noted concerns that it would mean that requirement for capacity would be generally smeared across all customers in a way that would mean that some customers would subsidise the capacity requirements of other customers. It is necessary to consider the impact of any change to the present connection policy on connected customers, in particular the treatment of customers with connections obtained and paid for under the present regime, i.e. those disadvantaged by a deeper connection charge.

2.6 The group indicated that it is important that accurate and timely information is available to verify the level of charges especially for EHV customers. Some members of the group felt that charging information produced by the distribution business should be placed on the Ofgem website. Some members of the group thought that there should be full disclosure of information to EHV customers in respect of the allocation of assets and their associated costs.

Working group B – suppliers and distribution businesses

2.7 It was reported that the group had considered seven of the key issues identified by Ofgem and that their initial views on these issues were as follows:

- it was suggested that a cost base pricing model remained appropriate, although it may be necessary to update the Boley and Fowler method;
- the group stressed the importance of tariff stability, predictability, and transparency to facilitate the operation of the market. In light of these factors, the group generally accepted that distribution businesses should ideally offer six or seven core tariffs, possibly based on the profile groups;
- it was noted that suppliers require clear and concise information on a consistent basis. Further consultation is required to identify the industry's requirements;
- some members of the group also noted that there was insufficient information to verify the accuracy of DUoS invoices, which must be addressed. Further discussions are necessary to identify the industry's requirements;
- the group had noted that rural and urban customers had not been clearly defined. It is important to consider carefully the wider implications of a move to geographically differentiated charges. Generally, the group was happy with the present system of averaging;
- the group agreed with the principle of fixed and variable components of charges. It was considered to be important that distribution businesses adopt a common view of costs, although it is important that price disturbance is minimised;

- the group was happy with the present approach to charging for supplies to domestic and non-domestic customers. Further work may be appropriate to assess whether charges reflect an appropriate balance of costs; and

- the group briefly covered the issues of network constraints, reactive power charges and network losses, although no common views were expressed.

2.8 In summary, it was suggested that the structure of electricity distribution charges should strike an appropriate balance between cost reflection and tariff simplicity. However, the group suggested that distribution businesses should adopt a consistent approach to ensure transparency of charges and comparability of cost information.

2.9 The group suggested that it was important that distribution businesses enhance the information available to suppliers to facilitate development of the market. At present, distribution businesses have adopted different policies in respect of charges for meter operation and prepayment services. It was noted that some distribution businesses have unbundled these charges from core distribution tariffs whereas other distribution businesses bundle some or all of these services within DUoS. Some members of the group noted that it was also unclear what services were being provided as part of their charges. It was argued that greater transparency was required and that as such distribution businesses should provide standardised charging information with a clear indication of what services underlie each of the charges.

2.10 It was noted that suppliers and distributors rarely consult each other in respect of their requirements. The group suggested that there should be greater consultation between distribution businesses and suppliers to ensure that the information available meets the requirements of affected parties.

Working group C – embedded generators and distribution businesses

2.11 The group reported that it had considered a variety of issues against the background of Government's commitment to encourage CHP and renewable forms of generation. These issues can be categorised in four ways:

- the incentive framework;

- the charging framework;

- network management and operation; and
- information requirements.

2.12 The group noted that it had considered the relationship between embedded generation and the regulatory framework, in particular the steps that might be taken to improve incentives on distribution businesses with respect to embedded generation. The group believed that the present arrangement of deep connection charges removed the long term link between embedded generation and the distribution network operator – i.e. the "fit and forget" approach – and was not compatible with the targets set by Government in respect of embedded generation. It was suggested that distribution businesses should be encouraged to maintain an ongoing bilateral operational relationship with embedded generators.

2.13 The group commented that it was necessary that Ofgem consider enhancing the regulatory framework to achieve this aim. However, it was important that Ofgem provide clarity and certainty of approaches quickly. The group identified two options to provide incentives with respect to embedded generation:

- extended IIP arrangements; and
- regulatory solution.

2.14 It was suggested that the outcome of extended IIP approaches is less certain and possibly not consistent with the Government's target dates for embedded generation. A wider regulatory solution may be more successful in providing appropriate incentives as soon as possible. The experience of NGC may provide an insight into the way forward.

2.15 The group considers the desirability and practicability of zonal charging structures for embedded generation. It was noted that it was difficult to consider the number and size of charging zones until the overall structure, level and longevity of zonal charges are known. However, it was suggested that large charging zones would provide greater stability whereas smaller zones would provide greater cost reflectivity, but would be relatively more complex.

2.16 The group commented that it was necessary to determine the fundamental basis of zonal charges, i.e. charges based on load density or charges based on assets.

Some members of the group suggested that it was important that the basis of charging was applied consistently to demand and generation customers. It was noted that progressively smaller zones would converge towards site specific charges.

2.17 It was suggested that both embedded generators and distribution businesses require access to a range of information in taking business decisions. It was noted that there should be better communication between the parties. The group felt that enhanced information would facilitate better decision making and greater transparency. Some members of the group felt that much of the information may already exist and therefore it may only be a matter of identifying what information is required and placing this in the public domain. The group recognised that there would be costs of providing additional information and that Ofgem should consider how these might be recovered.

2.18 It was suggested that active management of distribution systems might be inevitable to accommodate large amounts of embedded generation. Some members of the group felt that embedded generators would be able to contribute to the process in some instances. It was reported that the group felt that it was important to revise the engineering recommendation P2/5. Nevertheless, it was important to examine the costs and benefits of any changes to these design standards.

2.19 It was noted that micro generation would pose greater challenges with very large numbers connected to the distribution system. Some members of the group noted that small-scale generation would require fundamental reconsideration of the purpose of the network and how it is financed. Moreover, it will be necessary to re-assess whether capacity based charges or usage-based charges are appropriate. It was suggested that the outcome would depend on what the customer values. Further, it was suggested that the scale and location of micro generation was uncertain and thus it may be difficult to consider how this type of generation might be treated in the future.

2.20 It was reported that the group had considered the issue of NETA imbalance costs, network constraints and network failures. It was noted that the group had not arrived at a common view in respect of these matters although it had been recognised that they require urgent resolution.

2.21 Representatives from embedded generators commented that the introduction of NETA will impose significant new risk and costs associated with network constraints and failures. Moreover, some members noted that the proposed arrangements in respect of the treatment of embedded generation, with regard to imbalance costs and network failures, differed significantly from the arrangements in place for plant connected directly to the transmission system. It was felt that this discriminated against embedded generation. In contrast, distribution business representatives had suggested that the risks in the electricity industry appeared consistent with the risks faced in other markets. Nevertheless, it was noted that a limited incentive could be imposed on distribution businesses to facilitate appropriate action to minimise network outages.

2.22 There was an extensive discussion of the treatment of imbalance charges during the plenary session. One attendee expressed concern that the proposed framework creates a significant barrier to entry for embedded generation. One customer representative noted that Ofgem's proposal that distribution businesses should not be liable for the imbalance costs arising from network failures would impose such costs on embedded generators, suppliers and customers. It was argued that it was inappropriate that the customer should be exposed to such costs. Ofgem reiterated its present thinking on these matters.

2.23 One attendee suggested that the then proposed electricity trading arrangements (now in place) must be revisited. Moreover, it argued that the costs of imbalances arising from a network incident should be at the very least waived for those embedded generators affected. One attendee noted that distribution businesses would be able to obtain global insurance to manage the risk over all network incidents and that such arrangements would be more efficient than individual generators and suppliers obtaining risk management services.

List of Attendees

Working group A

Brian Wharmby	Ofgem
Stephen Macey	Corus
Hugh Conway	Major Energy Users Council
Judith O'Leary	Energywatch
Peter Lynch	BCMA
Sylvia McGuire	British Gas Trading
Stephen Brady	Yorkshire Electricity Distribution
Paul Hemsley	Scottish & Southern Energy
Simon Brooke	United Utilities
Carl Bayliss	GPU Power UK
Carol Buchanan	ScottishPower
Peter Waymont	TXU Europe Distribution
Liz Aveyard	Corus
Graeme Dawson	Northern Electric Supply
James Huddie	London Power Networks
Andrew Wright	EA Technology

Working group B

Andrew Walker	Ofgem
Brian Sequeira	British Gas Trading
Mike Gibson	Eastern Energy
Richard Jagger	Northern Electric Distribution
Mo Sukumaran	Scottish & Southern Energy
Andy Jenkins	Yorkshire Electricity Distribution
Barry Sullivan	Scottish Power Supply
Colin Wood	St Clements Services
Ralph Turvey	LSE & LBS
Graham Craig	Transco
Ian Burrows	East Midlands Electricity
David Annelli	Powergen
John Turner	Western Power Distribution
Paul Delamare	London Power Networks
Peter Merrick	SEEBOARD
Doug Banks	SWEB
Nigel Cornwall	Cornwall Consulting
Peter Lant	Northern Electric Supply
David Cooper	Electricity Association

Working group C

Arthur Cooke	Ofgem
Colin McNaught	ETSU
Richard Hill	TXU Europe Distribution
Paul Eveleigh	East Midlands Electricity
Richard Smith	GPU Power UK
Brian Harrison	United Utilities
Dan Fine	SEEBOARD
Max Lalli	Scottish & Southern Energy
Nigel Turvey	Western Power Distribution
Cathie Hill	ScottishPower
Bob Morris	Electricity Association
Richard Court	National Grid Company
Rob Driver	Econnect
Geoff Scrivener	ETSU
Stephen Andrews	Ilex
Charles Unvala	Innogy
BN Hamzah	Innogy
Michael Wilks	Enron
Damien Shevloff	Nedalo
Graham Meeks	CHPA
Steve Garrett	Slough Heat & Power

Background information and issues for consideration as prepared by Ofgem

Working group A - demand customers & distribution businesses

Background information

2.24 The December 2000 Ofgem consultation paper identified a number of key issues in respect of the methods and principles adopted in setting distribution charges and attempted to assess whether in light of recent changes to the structure and operation of the electricity industry these methods and principles remain appropriate. In particular, the December paper examined the extent to which cost reflective pricing is desirable and practicable in respect of DUoS charges.

2.25 As well as discussing the overall approach to the structure of distribution charges, the paper also examined a range of specific issues in respect of supplies to demand customers. These included whether it was appropriate to adopt a system of average charges across rural and urban customers, whether differences in charges between domestic and non-domestic customers reflect differences in costs, and whether the present balance between fixed and variable charges remains appropriate. It has been suggested that there may be a need for greater consistency in the way distribution businesses charge for use of their networks.

2.26 Further information can be found in chapters 3 and 4 of the December 2000 consultation document.

Suggested issues for consideration

2.27 What factors should be considered appropriate in determining the structure of distribution charges - cost reflectivity, tariff stability, tariff predictability, facilitating competition, incentives for energy efficiency?

2.28 Would it be desirable to adopt a structure of 6 or 7 core generically defined tariffs for use of the network in Great Britain, such as general domestic, domestic economy 7, non-domestic general, non-domestic economy 7, LV tariff, HV tariff, and EHV tariff?

2.29 To what extent should charges for supplies to demand customers differentiate between customers geographically? Should these factors be reflected in the use of system element of charges or connection charges?

2.30 To what extent should charges for EHV supplies reflect differences in costs at different locations?

2.31 With reference to table 4.3 of the December 2000 document, is the existing balance between fixed and variable components of charges appropriate? What steps might be taken to improve this balance?

2.32 With reference to table 4.1 of the December 2000 document, is the present balance in charges for domestic and non-domestic customers appropriate? What steps might be taken to improve the present balance?

2.33 What charges, if any, should be site specific?

2.34 What information should be made available to customers in respect of distribution charges? What reporting requirements might be appropriate with respect to network operation and charges?

2.35 What information should be made available to EHV customers in respect of charges for use of the network?

2.36 What steps might be taken to encourage efficient use of energy?

2.37 Does the boundary between connection and use of system charges remain appropriate?

2.38 Is it desirable to remove tariff support allowances and capitalised O&M charges from connection charges?

2.39 If changes are made to the boundary between connection and use of system charges, what steps should be taken with respect to customers who have already paid connection charges on the existing basis?

2.40 Are there lessons to be learned about charges for network access from other regulated industries?

Working group B - suppliers & distribution businesses

Background information

2.41 The December 2000 Ofgem consultation paper identified a number of key issues in respect of the methods and principles adopted in setting distribution charges and attempted to assess whether in light of recent changes to the structure and operation of the electricity industry these methods and principles remain appropriate. In particular, the December paper examined the extent to which cost reflective pricing is desirable and practicable in respect of DUoS charges.

2.42 As well as discussing the overall approach to the structure of distribution charges, the paper also examined a range of specific issues in respect of supplies to demand customers. These included whether it was appropriate to adopt a system of average charges across rural and urban customers, whether differences in charges between domestic and non-domestic customers reflect differences in costs, whether the present balance between fixed and variable remains appropriate. It has been suggested that there may be need for greater consistency in the way distribution businesses charge for use of their networks.

2.43 Further information can be found in chapters 3 and 4 of the December 2000 consultation paper.

Suggested issues for consideration

2.44 Should distribution businesses adopt a consistent approach to setting network charges? Is the method set out by Boley and Fowler still appropriate?

2.45 What factors should be considered in determining the structure of distribution charges - cost reflectivity, tariff stability, tariff predictability, facilitating competition and/or incentives for energy efficiency?

2.46 Would it be desirable to adopt a structure of six or seven core generically defined tariffs for use of the networks in Great Britain, such as general domestic, domestic economy 7, non-domestic general, non-domestic economy 7, LV tariff, HV tariff, and EHV tariff?

2.47 To what extent should charges for supplies to demand customers differentiate between customers geographically? Should locational signals be reflected in the connection or use of system charge?

2.48 With reference to table 4.3 of the December 2000 document, is the existing balance between fixed and variable components of charges appropriate? What steps might be taken to improve the balance between fixed and variable components of charges?

2.49 With reference to table 4.1 of the December 2000 document is the present balance of charges for domestic and non-domestic customers appropriate? What steps might be taken to improve the present balance?

2.50 What charges, if any, should be site specific?

2.51 What is the best method for meeting the requirements of suppliers in respect of information provided by distribution businesses, including the form of charging statements? What reporting requirements might be appropriate with respect to network operation and charges?

2.52 What steps might be required to improve energy efficiency?

2.53 Is the proposal that distribution businesses should not bear the direct costs of network constraints and failures reasonable?

2.54 Are there lessons to be learned about charges for network access from other regulated industries?

Working group C - charges to embedded generators

Background information

2.55 The December 2000 Ofgem consultation paper identified a number of key issues in respect of the methods and principles adopted in setting distribution charges and to assess whether in light of recent changes to the structure and operation of the electricity industry these methods and principles remain appropriate. In particular, the December paper examined the extent to which cost reflective pricing is desirable and practicable in respect of DUoS charges.

2.56 As well as discussing the overall approach to the structure of distribution charges, the paper also examined a range of specific issues in respect of embedded generation.

2.57 Further information can be found in chapters 3 and 4 of the December 2000 consultation document, as well as in the September 2001 paper.

Suggested issues for consideration

2.58 What steps might be taken to improve incentives on distribution businesses with respect to embedded generation?

2.59 The embedded generation working group has identified a number of models with respect to charges for use of the network, such as:

a) maintaining the existing system;

b) shallow connection and network reinforcement placed on load customers;

c) shallow connection and shared reinforcement costs;

d) shallowish connection and shared reinforcement costs; or

e) site specific charges for large generators.

2.60 Ofgem has also suggested shallow connection and use of system charges. What are the appropriate selection criteria in determining the charging principles with respect to use of distribution networks and embedded generation?

2.61 Is it desirable to adopt an approach of shallow connection and zonal use of system charges for embedded generation?

2.62 What factors might determine the number and location of network charging zones?

2.63 Should there be elements of positive and negative charging?

2.64 What is the best method for dealing with load migration or volatility in this framework?

2.65 If a revised system of charges is introduced, what is the best method for addressing the impact on existing embedded generators?

2.66 What information should be provided to embedded generators on an ongoing basis in respect of:

a) network charges;

b) network outages and performance; and

c) planned network investment.

2.67 What are the key factors in considering whether it is appropriate to introduce revised network design standards? How might these standards be introduced?

2.68 What reporting requirements might be appropriate with respect to network operation and charges?

2.69 The desirability of firm connection arrangements and transportation rights incorporating commercially agreed compensation arrangements?

2.70 If distribution businesses adopt a more active approach to network operation, what are the key considerations?

Appendix 3 Summary of responses to the December 2000 consultation document

Introduction

3.1 There were 33 responses to the December 2000 Review of Electricity Distribution Charges consultation paper from a range of interested parties – distribution businesses, generators, suppliers, customers and customer representatives.

Regulatory framework

3.2 The December consultation paper invited views on the overall regulatory framework that governs the structure of electricity distribution charges.

3.3 Several respondents supported the present regulatory framework governing electricity distribution charges. Of these, a number of distribution businesses commented that the regulatory framework should provide high level objectives that should be achieved by companies but provide sufficient flexibility over the structure of charges. One distribution business commented that the current framework provides an appropriate balance between cost reflectivity and simplicity. It also noted that the existing framework strikes the correct balance between regulation and the ability for companies to manage their businesses.

3.4 Nevertheless, one respondent noted that existing regulatory structures focus around a centralised model of electricity supply and that this model will become increasingly irrelevant as the amount of embedded generation connected to distribution systems expands. They suggest that in the short term distribution businesses should consider their networks in terms of transporting energy to and from any given point. Moreover, distribution businesses should treat both demand and embedded generation customers equally. In the long term, they suggest that distribution businesses should actively encourage embedded generation.

3.5 A small number of respondents expressed concern that the regulatory framework does not appear to operate effectively for large network customers connected above 11kV.

Distribution networks

Boley and *F*owler method of calculating distribution charges

3.6 The December consultation paper invited views on the broad principles adopted by distribution businesses and the suitability of approaches to setting distribution charges based on the Boley and Fowler framework.

3.7 Respondents supported the Long Run Marginal Cost principles adopted by distribution businesses in setting charges for use of their networks. Several respondents commented that the Boley and Fowler method appears to have provided an effective cost allocation model. Nevertheless, one respondent noted that the Boley and Fowler approach does not build in sufficient flexibility and in light of the changing environment a new pricing model that supports innovation and efficiency is important.

3.8 A small number of respondents expressed concern about the approach adopted by East Midlands Electricity. It was suggested that since the tariff basket values had not been updated, charges may not reflect long run costs. In contrast, the Boley and Fowler approach has sufficient flexibility to enable the balance of costs and charges to be updated over time.

Averaging between urban and rural customers

3.9 The December consultation paper noted that the approach set out by Boley and Fowler does not reflect the geographical dispersion of costs. The paper invited views on whether averaging of charges across rural and urban customers remained appropriate.

3.10 Several respondents commented that locational specific charging would be inappropriate. Some respondents noted that the legislative framework places an emphasis on protecting the interests of customers in rural areas. Other respondents suggested that charges differentiated by location would be arbitrary and add an unnecessary level of complexity that would distort the development

of supply competition. One respondent noted that charges to rural customers are around 15 per cent higher than charges to urban customers in Ireland.

3.11 A small number of respondents noted that if location specific charges were to be adopted by distribution businesses then it would be important that such an approach is adopted symmetrically between demand and generation.

Tariff basket price controls

3.12 The December consultation paper invited views on whether it might be desirable to adopt tariff basket price controls.

3.13 Several distribution businesses commented that tariff basket price controls would probably lead to greater volatility of charges. Several respondents also noted that this form of price control requires greater analysis of cost hypothecation between distribution tariffs.

3.14 Some respondents suggested that Ofgem should consider performance based incentive arrangements. Of these, one respondent noted that there are uncertainties over the scope for further efficiency gains from distribution activities.

Other comments

3.15 A small number of respondents commented that the approach adopted by Transco in setting charges for use of the gas transportation system was generally less robust than the approach adopted by distribution companies.

Specific Issues for consideration

The balance between domestic and non-domestic distribution charges

3.16 The December consultation paper invited views on whether differences in charges for supplies to domestic and non-domestic customers reflect an appropriate balance of costs.

3.17 Several respondents supported the principle that electricity distribution charges should be broadly cost reflective. Nevertheless, many respondents commented that it was difficult to assess whether the balance of charges in different regions

reflect an appropriate balance of costs due to differences in the mix and types of customers captured within tariffs. Some distribution businesses noted that there was little distinction to be drawn between the cost imposed by domestic customers when compared with the costs imposed by small businesses. In contrast, other distribution businesses noted that small business customers imposed higher costs than domestic customers due to very different load characteristics.

Site specific charges

3.18 The December consultation paper invited comments about the desirability of site specific charges and asked whether the information presently made available to EHV customers in respect of their charges for use of the network was sufficient.

3.19 Several respondents supported the principle of site specific charges for larger network customers. However, a number of customer and supplier representatives expressed concern about the existing arrangements in respect of EHV charges, in particular there are concerns that EHV charges are relatively opaque. Several respondents suggested that distribution businesses should be required to provide better information to network users to support the levels of charges.

The balance between fixed and variable components of charges

3.20 The December consultation paper invited comments about whether the balance between fixed and variable components of electricity distribution charges remained appropriate.

3.21 Respondents indicated broad support for distribution charges comprising fixed and variable components. However, views about the balance between components were varied. Some respondents supported explicit guidance from the regulator in respect of the treatment of cost items. In contrast, other respondents favoured flexibility to ensure that charges are responsive to the changing commercial environment. Moreover, one respondent noted that a move towards consistency of treatment might result in significant tariff disturbance.

Embedded generation issues

3.22 The December consultation paper identifies the key differences in charging policies adopted by distribution businesses with respect to generation and demand customers. Views were invited about whether it might be desirable to adopt a system of shallow connection and zonal use of system charges for embedded generation.

3.23 In general, respondents did not support a system of shallow connections and zonal use of system charges. Nevertheless, several respondents indicated that the present arrangements of deep connection charges were no longer compatible with the changing commercial environment of the electricity supply industry. One respondent commented that a system of shallow connection and zonal charging would result in a more consistent approach between embedded and transmission connected plant.

Energy efficiency

3.24 The December consultation paper invited comments on whether the existing structure of electricity distribution charges provides appropriate incentives to encourage efficient use of energy, in particular whether distribution businesses should levy additional charges for low power factors.

3.25 Several distribution businesses noted that the existing structure of charges penalises larger customers if steps are not taken to control power factors. Nevertheless, two respondents commented that suppliers do not pass on the price messages provided by these charges to their customers. Three responses from other interested parties commented that suppliers should face licence obligations to identify penalties for poor power factors on customers' bills.

3.26 Supplier representatives supported incentives that encourage distribution businesses to reduce system losses. One respondent suggested that incentives should focus on improving power factors of larger users.

3.27 Large customer representatives expressed mixed views on these matters. Some respondents agreed that distribution businesses should impose penalties for customers with poor power factors. Nevertheless, one respondent noted that penal charges did not provide sufficient incentives to encourage power factor

improvement. It was suggested that distribution businesses should provide discounts to encourage investment in appropriate correction equipment.

3.28 One respondent commented that the practical way to improve energy efficiency is the avoidance of transportation. It was suggested that the ideal solution is to encourage on-site generation. However, it was noted that the present regulatory framework discourages energy efficiency especially as distribution revenues are linked to volumes transported.

The boundary between connection and use of system charges

3.29 The December paper invited views on whether the present boundary between connection and use of system charges is appropriate and in particular whether it might be appropriate to abolish tariff support allowances and O&M charges. The December paper also invited views on whether it might be desirable for distribution businesses to adopt a consistent boundary between connection and use of system charges.

3.30 Several respondents endorsed greater simplification and clarification in this area, especially initiatives that encourage the development of competition in connections. However, one respondent believed that the complexity of designing and implementing the necessary adjustments to facilitate these developments warranted further considerations that might be more appropriate for the next price control review.

3.31 Two distribution businesses commented that it would be appropriate to retain some element of capitalised O&M charges for connections with unusual load characteristics. Nevertheless, one distribution business disagreed that it would be appropriate to abolish tariff support allowances and capitalised O&M charges. It was suggested that tariff support allowances avoid the double counting between connection and use of system charges.

3.32 Two respondents suggested that it is important to achieve consistent connection arrangements for the gas and electricity industries. It was noted that a move to shallow electricity connection charges would enhance competition for the provision of both gas and electricity connections.

Enhanced information

3.33 The December consultation paper invited views on the steps that might be taken to improve the information provided by distribution businesses in respect of use of system charges, in particular whether it is appropriate to introduce a more consistent form of charging statement.

3.34 Several respondents supported the development of user-friendly charging statements, provided there is adequate consultation across the industry to ensure that it meets the needs of all parties. Some respondents also commented that it might also be appropriate to rationalise the number of distribution tariffs.

3.35 Nevertheless, one distribution business commented that charging statements should be clear rather than consistent. They also said that there is no evidence that the existing charging statements lack clarity and therefore major changes are difficult to justify.

Distribution networks and NETA

Enhanced information

3.36 The December consultation paper suggested that distribution businesses should monitor and report the number and duration of interruptions to embedded generators and invited comments on this view.

3.37 A number of respondents indicated general support for enhanced information and reporting requirements. Nevertheless, respondents expressed a range of views in respect of the scope and timing of the new requirements.

3.38 Several distribution businesses commented that additional requirements would require additional resources. They suggested that distribution businesses should be allowed to recover the additional costs of providing this information. One distribution business commented that publishing information on interruptions would have limited value due to differences in the robustness of embedded generator connections. Two distribution businesses also noted that the IIP regulatory instructions and guidance could be applied.

3.39 Two respondents welcomed monitoring of interruptions but only as an initial step. Of these, one respondent noted that the information should be used to

establish performance targets and Ofgem must develop incentives to ensure enhanced quality of supply to embedded generators.

3.40 It was suggested by one respondent that adoption of revised distribution code procedures might improve notice of planned outages. These arrangements might also be amended to reflect the requirements of both embedded generation and distributors.

Costs of imbalances arising from constraints and failures

3.41 The December 2000 consultation paper reaffirmed Ofgem's view that distribution businesses should not bear the direct costs of imbalances arising from distribution constraints and failures.

3.42 Distribution businesses support the view that they should not be liable for consequential losses arising from network constraints and failures, including imbalance costs. One distribution business noted that imposing the costs of imbalances on distributors would increase the risk profile of the business and would ultimately result in higher charges for all customers.

3.43 Several respondents did not support Ofgem's position with respect to imbalance costs. A number of respondents noted that only distribution businesses are able to take action to manage constraints and failures on their system. Of these, one respondent commented that after gate closure suppliers and generators have no control over the economic and financial consequences of network failures. They suggest that the distribution business bear some of the short-term costs, possibly the costs arising over the initial 5 hours. Another respondent commented that Ofgem's proposal removed incentives on distribution businesses to minimise exposure to risk.

3.44 One respondent commented that distribution businesses should procure risk-hedging services to manage their exposure to financial risk arising from network constraints and failures. Nevertheless, they also noted that if Ofgem is not minded to impose the costs of imbalances on distributors then they should be waived. Two respondents noted that distribution businesses were in a favourable position to purchase insurance to mitigate against these costs. Another respondent noted that a system failure in areas where a supplier has a high concentration of load could lead to significant financial losses.

New standards and penalty payments

3.45 The December consultation paper suggested that it would be inappropriate to introduce compensation payments for embedded generators or suppliers, and invited comments on this matter.

3.46 Several distribution businesses agreed that would not be appropriate to compensation payments to embedded generators and suppliers. Of these, one respondent noted that substantial penalties would create perverse incentives to favour embedded generation when restoring supplies to the detriment of domestic customers. Another respondent noted that it was not appropriate to compensate generators that had chosen low cost, low security connections.

3.47 Some respondents disagreed with Ofgem's view. Four respondents commented that incentives to restore supplies are presently distorted. It was suggested that compensation payments should be made to larger customers and embedded generators to provide appropriate incentives. Two respondents noted that payments of £480/MVA of capacity represented an appropriate level for compensation arrangements.

3.48 A small number of respondents noted that embedded generators should be compensated for loss of network availability, with one respondent adding that compensation payments should be sufficient to cover all economic and financial losses incurred. It was also noted that it is important that compensation payments are in place for NETA go-live.

3.49 One respondent noted that it was important that effective performance incentives are introduced through IIP and that these are maintained in the long term.

Risk-hedging services

3.50 The December consultation paper invited view on the proposal that risk-hedging services should be provided by commercial providers of insurance.

3.51 Several respondents supported Ofgem's view that the risk-hedging services should be left to the market. However, one respondent indicated that they had no difficulty with distributors providing such services as long as there are appropriate safeguards in place to prevent abuse of a dominant position.

3.52 One respondent suggested that Ofgem should encourage the development of risk-hedging services if it continues to support the view that distribution businesses should not be liable to the direct or indirect costs of network constraints or failure. Moreover, they supported the view that such services should be left to commercial providers.

Other comments

3.53 Several respondents commented that Ofgem should consider the recommendations of the DTI/Ofgem working group on embedded generation. Several respondents supported revised network design standards. Of these one respondent commented that they saw no justification for delaying their revision until the next price control review and does not accept that the administrative burden of reopening the price controls is sufficient justification for imposing imbalance costs on generators and suppliers. Nevertheless, one respondent commented that a review of network design standards to incorporate the financial impact of NETA would be complicated and unlikely to improve the attribution of imbalance charges. Another respondent noted that revised network design standards should be justified by cost benefit analysis.

List of Respondents

Eastern Electricity (TXU Europe Ltd)
East Midlands Electricity
London Electricity (LPN)
ScottishPower (including Manweb)
Midland Electricity (GPU Power UK)
Northern Electricity Distribution (NEDL)
NORWEB (United Utilities)
SEEBOARD
Scottish & Southern Energy
Western Power Distribution (South Wales and South West)
Yorkshire Electricity Distribution (YEDL)

Amerada
Association of Electricity Producers
BEAMA Capacitor Manufacturers' Association
British Energy
British Gas Trading Ltd
Chemical Industries Association
CHP Association
Corus
Electricity Association – Load Research Group
Enron
Innogy
London Electricity Retail (including SWEB)
Major Energy Users Committee
Northern Electricity Supply
Powergen
Seimens metering
SDC Industries
Slough Heat & Power
Terra Nitrogen
Utilities Buyers' Forum
Yorkshire Electricity Supply
Professor Ralph Turvey
Professor Lorraine Baric
Mr I G Pratt
Mr Hillary Benn MP