

**DEPARTMENT FOR BUSINESS**  
**ENTERPRISE & REGULATORY REFORM**

**ELECTRICITY PRIORITY USER  
ARRANGEMENTS**

**Proposals to update the priority  
user arrangements for use  
during an electricity supply  
emergency**

**CONSULTATION DOCUMENT**

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## **FOREWORD**

Secure electricity supplies are vital for all of us, and depend on the industry operating in a competitive market within the right regulatory framework. Disruption to electricity supplies on a regional or national level lasting for several days remains extremely unlikely. For over 30 years, where supplies have been disrupted, this has been because of local problems such as storm damage to electricity lines, rather than a more general problem with the system. Because there will always remain a risk of such disruption, it is important that businesses and organisations of all sizes have plans in place for a power cut.

No matter how robust the infrastructure is, there is also however always a possibility of disruption on a regional or national level. The Government must therefore ensure that there are effective systems in place to deal with electricity supply emergencies, as part of prudent and ongoing contingency planning.

In the event of such an emergency lasting over a period of days or longer, the main way to deal with it is by rationing supplies using 'rota disconnections'. Power would be cut to different areas on a rota basis, usually for three hours at a time, in order to minimise the time that individual and business users are without electricity. The frequency of the disconnection periods would depend on the gap between the amount of electricity needed and that available.

The electricity priority user arrangements are designed to allow certain consumers to be exempt from such disconnections. As part of our ongoing work to ensure that all such arrangements are up to date and as effective as possible, this consultation considers the purpose and operation of the current arrangements' priority lists and suggests proposals to make them more effective.

The current emergency arrangements were designed to ensure that rota disconnections do not affect those for whom such disruption would cause extremely significant problems. We believe that the arrangements should be changed to ensure that protection is better concentrated on those sites where the loss of electricity could have a significant impact on public health and safety. The changes proposed would enable the electricity companies to focus their efforts in an emergency on protecting those sites.

Although the main purpose of this consultation is to seek views on the proposed changes to improve the effectiveness of the priority user arrangements, we hope that it will also serve to raise awareness that the priority user arrangements can only provide protection in the event of a major disruption requiring government to use emergency powers, and that all businesses and organisations need to have adequate contingency plans that provide protection where it is needed from any disruption to their electricity supply.

We want to hear your views on our proposals. We would therefore welcome your responses to the questions set out in this document. Details of how to respond are given in paragraphs 2.4 to 2.6 below.

## **EXECUTIVE SUMMARY**

The electricity priority user arrangements exempt certain users from planned power cuts during a regional or national electricity shortage. The arrangements have not been updated for some time and we propose to bring them up to date, simplify them and improve their effectiveness in protecting those sites where the loss of electricity could have a significant impact on public health and safety.

The chances of a regional or national shortage of electricity supply are very low but we must have effective systems in place to manage demand during a major and prolonged period of national shortage. The electricity priority user arrangements are designed to allow this through rota disconnections, where consumers are cut off in blocks of geographic areas for 3 hours at a time on a pre-planned rota. The current arrangements provide exemption for three categories of organisation:

- ‘Vital’ – a designated list of activities within the transport, energy, water and sewerage, health and communications sectors
- ‘Food’ – major locations for food manufacture, processing and storage
- ‘Other’ – those for whom disruption to electricity supplies on a rota disconnection basis would cause substantial damage, or whose operation involves a continuous manufacturing process.

Crucially, the priority user arrangements do not offer any help when there are power cuts caused by storms, technical malfunction or accidental damage, for example a cable being cut by a digger. Disruptions from such incidents are far more likely than that arising from the implementation of rota disconnections. All businesses and organisations should have contingency plans to deal with such incidents and, if a company or organisation really needs guaranteed power, then it should consider investing in back-up technology or make other arrangements.

We have provided some information on different options for protecting the electricity supply together with indicative costs; we strongly encourage all businesses and organisations to produce or review their business continuity plans to see if there is a business case for investing in such protection. Any protection against disruption from a storm or local accidental damage to circuits is likely to be just as effective against the far more remote possibility of a regional or national electricity emergency.

In consulting on possible changes to the arrangements, we are not proposing any significant change to the administrative burdens on business or individual consumers and therefore do not believe that the changes proposed make this a regulatory proposal. Instead, we are raising the profile of the issue of electricity resilience and giving consumers information to help them consider

the options of taking steps themselves to increase the resilience of their own electricity supplies (and by doing so reducing their reliance on the Government's own contingency measures in the event of major disruption); or continuing to rely on the Government's measures.

These are commercial decisions for consumers based on risk and expenditure, and for that reason we have not included a full Impact Assessment with the consultation. But we recognise that the proposals will affect consumers and therefore the consultation includes an assessment of the impact of various options in addition to the proposals outlined below (and summarised in Annex C) to give those consulted the opportunity to comment.

The current criteria for the electricity priority lists require that consumers, in order to be included on the lists, do not have standby generation. We propose to require also that those who apply for inclusion on the list should be required to explain why they cannot install sufficient standby generation to obviate the need for priority status. We also clarify that the standby generation must be sufficient for continuation of the relevant activities and take account of the fact that hospitals must have at least two sources of power before they can carry out medical operations.

We have considered from both a technical feasibility perspective and a social perspective whether some vulnerable groups other than hospitals should be added to the Vital list. But having explored various technical options for extending the protection afforded by being on the list to low voltage consumers that share a circuit with other consumers, we do not consider it feasible to do so. We recognise that the future implementation of smart meters may offer a more feasible way to do this in the future and propose that the arrangements be reviewed again when the position is clearer. We therefore propose to retain the requirement for those on the list to normally have a direct supply, usually at high voltage, known as a discrete feeder.

Separately we have considered the case for adding care homes and those living at home who are vulnerable to the Vital list. Our conclusion is that, even if it was technically feasible to do so, the addition of such a large number of consumers would not be justified against the consequential increase in frequency of rota disconnections for everyone else including potentially other vulnerable consumers, or the increased risk of mistakes being made and unplanned disruptions taking place. It is also important to repeat that inclusion on the priority user list would only provide protection for these consumers in the event of a national emergency. More cost-effective alternatives that also provide protection against the more likely causes of electricity supply disruption are available for these consumers if they believe that their supply needs to be protected.

We therefore propose to amend the list of eligible organisations within the Vital category to focus it more on those sectors where disruption may pose a risk to life and public safety. The specific changes proposed are to remove postal services and add emergency services. The other existing eligible

organisations will remain on the Vital list if the provision of power during a rota disconnection enables them to continue operation.

In addition to raising awareness of these arrangements, we also intend to use this consultation to raise awareness of the need for resilience planning for all electricity disruptions and the alternative sources of power that are available. We will encourage the electricity industry and key groups, especially those where there is some risk to public health and safety, to work together at a regional and national level to develop or review appropriate contingency plans for any disruption in electricity supply.

The disconnection of sites on the Food list for pre-notified 3 hour periods is not considered to be a public safety issue and, in most scenarios, rota disconnections should mean food production is interrupted rather than shut down altogether. This is likely to result only in a reduction of choice for consumers rather than an obvious health risk. We have also found that identifying priority users in the food sector is very difficult due to the complexity of the supply, logistic and retail chains.

We therefore do not believe that food manufacturers, processors and storers should continue to exist as a separate category; nor should food sites be automatically treated as priority users. Instead those Food sites that are currently on the list should either be moved to the Other list or to a new Transition list.

Those organisations moved to the Transition list would retain the protection offered by inclusion on the priority user list for a period up to 3 years. During this time they should assess the business case for protecting their electricity supply and take appropriate action in readiness for their removal from the list. We will work with Network Operators and others to help this by providing more information on alternative sources of protection or other arrangements that can be made. Annex B provides some initial generic information on the options and costs of introducing back-up power.

In relation to those organisations, either currently on the Other list or eligible for inclusion on it, we believe that those that require continuous electricity supply should take steps to protect it. It is for each of these organisations to determine if a business case exists for investment to be made in appropriate protection. We think this is fairer: in a situation where electricity has to be rationed, privileging certain businesses means there is inevitably less electricity for other businesses, as well as for domestic users. In doing so it is important to remember, as has been stated above, that other causes of disruption are far more likely than a national emergency and that investment in protection against disruptions from these more likely causes is likely to also provide protection in the event of a national emergency.

We recognise however that there are some organisations where it is not feasible to put in alternative protection due to the size of the site that needs protecting or its power demands. We therefore propose that such sites that would also incur permanent physical plant damage in excess of £50m either

at their own site or consequential damage at a related site (the same level of damage as is used for the gas priority user arrangements) remain eligible for inclusion on the new Other list. Those organisations that are currently on the list but would no longer be eligible for inclusion will be moved to the new Transition list described above.

We propose to extend to these Other priority users the flexibility, currently available to Vital and Food users, not to have a discrete feeder where the Network Operator believes that maintaining supply to the other consumers on the same circuit would involve retention of only a marginal amount of associated load. Any decision by the Network Operator that the load would be too great could be the subject of an appeal to BERR.

We propose to extend to these potential Other priority users the flexibility, currently available to Vital and Food users, not to have a discrete feeder where the Network Operator believes that maintaining supply to the other consumers on the same circuit would involve retention of only a marginal amount of associated load. Any decision by the Network Operator that the load would be too great could be the subject of an appeal to BERR.

The current processes for applying for inclusion on the lists are overly complicated and inconsistent between the three types of priority user. Furthermore there is no standard requirement for the collection and maintenance of information centrally – each Network Operator maintains its own list with varying amounts of information. We propose to simplify and standardise the application process and introduce processes for the maintenance and regular review of list entries. We also propose to provide greater clarity on the roles and responsibilities of the parties involved with applicants dealing directly with Network Operators and being informed of the right to appeal to BERR once a decision has been taken.

## **SUMMARY OF CONSULTATION QUESTIONS**

### **Question 1:**

Do you agree that the Network Operator's discretion to add some sites that don't have a discrete feeder (this happens only in very rare circumstances) but have only marginal associated load be extended to all categories of priority user?

### **Question 2:**

Do you agree that the potential use of smart meters to help manage supply in the event of an emergency should be reconsidered following the completion of planned smart meter pilot programmes?

### **Question 3:**

A) Do you agree that the requirement for a discrete feeder to (usually) be in place for priority users should remain?

B) If not, do you have any suggestions as to how protection can be provided to a wider range of consumers without reducing the effectiveness of the rota disconnection arrangements?

### **Question 4:**

Should the Vital category be extended to include emergency services and Armed Forces sites that meet the remaining criteria?

### **Question 5:**

A) Do you agree that we should concentrate on protecting sites where disruption could have the most significant risks to public safety?

B) Do you agree that we should not extend protection to care homes and those in custodial care, relying instead on other measures?

### **Question 6:**

Is there anything else which could be done to help protect vulnerable groups from the effects of electricity disruptions generally and specifically in the event of rota disconnections?

### **Question 7:**

A) Is the proposed scope of the Vital list right?

B) Are there any other types of consumer that we should consider for inclusion on the Vital list? Please provide reasons for any suggestion

recognising that any broadening of the scope of the priority list will increase the burdens on those users who are not given priority status.

**Question 8:**

- A) Do you agree that Food should no longer be a separate category?
- B) Is it right to expect food industry sites to be treated in the same way as companies in other sectors? If not, what is it that makes some parts of the food industry different and how can they be defined?

**Question 9:**

- A) Should organisations that do not meet the new criteria for priority users be moved to a Transition list or removed immediately?
- B) Is the 3 year period for organisations to make alternative arrangements adequate? Is it too short or too long? Why?

**Question 10:**

- A) Do you agree that we should amend the criteria for the Other list as described?
- B) Is £50m the appropriate threshold? If not, what would be an appropriate threshold? Please provide supporting evidence for your suggested alternative threshold.

**Question 11:**

- A) Do you agree that we should require potential priority users to demonstrate why it is not feasible for them to install standby generation? Please explain your answer. How in practice could “feasible” be decided?
- B) Do you agree that the criteria should explicitly only exclude consumers on the grounds of having stand-by generation if that generation is sufficient to ensure continuation of the relevant activities with 3 hour rota disconnections for on a daily basis over a three day period? Please explain your answer.

**Question 12:**

- A) Do you agree that the proposed new arrangements are more equitable and efficient than the current arrangements?
- B) If not, how could they be improved?
- C) Do you think someone other than BERR should hear appeals? Please give reasons for your view.
- D) Are the timescales proposed reasonable?

E) Should regular reviews of the status of those on the list be held?

F) Are there any other areas with respect to administration of the scheme that need to be addressed? How do you think they should be so?

**Question 13:**

Are there any other problems or issues with the current electricity priority user list arrangements that we should consider?

## **NEXT STEPS**

During the consultation period we intend to hold a series of meetings to raise awareness of:

- a) The proposals in this consultation
- b) The scope of the priority user arrangements
- c) The need for contingency planning to deal with all electricity disruptions

If you would like to know more about these then please contact Chris Woolley at [chris.woolley@berr.gsi.gov.uk](mailto:chris.woolley@berr.gsi.gov.uk) or on 020 7215 6676.

By early 2008, we will produce a summary of the responses received. We will then spend some time considering how we should proceed before publishing our conclusions later in 2008. Depending on the decisions taken on the comments received, this could include reviewing how any changes to the priority user arrangements affect the Electricity Supply Emergency Code (ESEC) and progressing the formal change process for ESEC.

## **HOW TO RESPOND**

When responding, please state whether you are doing so as an individual or representing the views of an organisation. If responding on behalf of an organisation, please make it clear whom the organisation represents and, where applicable, how the views of members were assembled.

Responses can be submitted, preferably by e-mail, to:

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We have informed all those currently on the priority user lists and relevant trade associations of this consultation. You may pass on details of this consultation or make copies of this document without seeking permission.

## **CONFIDENTIALITY & DATA PROTECTION**

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004). If you want other information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a

statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department will process your personal data in accordance with the DPA and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

### **HELP WITH QUERIES**

Questions about the policy issues raised in the document can be addressed to:

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If you have comments or complaints about the way this consultation has been conducted, these should be sent to:

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A copy of the Code of Practice on Consultation is available at [http://www.cabinetoffice.gov.uk/regulation/consultation/consultation\\_guidance/intro.asp](http://www.cabinetoffice.gov.uk/regulation/consultation/consultation_guidance/intro.asp)

## **BACKGROUND**

### **Overview**

1. This section of the document provides an overview of the causes and likelihood of disruptions in the electricity supply, the actions that could be taken in response and how and when the priority user arrangements would be used.

### **Electricity supply disruptions**

2. Government advice<sup>1</sup> is that organisations should prepare for 3 scenarios that could cause disruptions to their electricity supply:
  - (a) Unexpected loss of supply to city/town for up to 18 hours and some rural areas for up to one week
  - (b) Planned three hour rota cuts
  - (c) Unexpected total shutdown of the grid. Power will begin to be restored within 12 hours, starting with rural areas, until power is restored across the nation over three days.
3. The UK national grid has never experienced a total loss of electricity supply across the country as described in scenario (c) and there are many safeguards in place to prevent it. This is therefore a very remote possibility. Nevertheless Government and the electricity industry has tried and tested plans in place to deal with such an event.
4. It is important to also understand the relative likelihood of disruptions being caused by unexpected loss and rota cuts implemented under Government powers in response to an emergency. Although the electricity infrastructure is very robust, incidents happen every day that cause disruptions to some consumers. In comparison it has been over 30 years since rota disconnections were imposed in response to a national emergency. More information on these two scenarios is provided in the following sections.

### **Unexpected loss of supply**

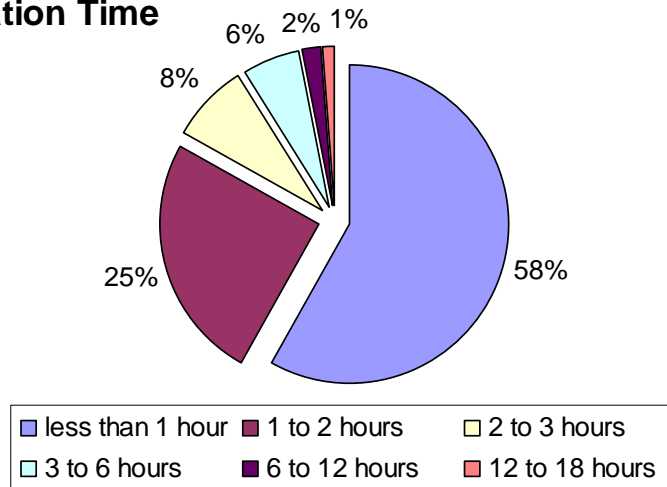
5. The unplanned interruptions referred to in scenario (a) can have many causes. The most common causes (in descending order of likelihood) that make up approximately 80% of incidents come from:
  - Weather and the environment - (35%)
  - Failure of equipment (30%)
  - Third party damage, theft (10%)
  - Birds, farm animals, domestic animals and vermin (5%)

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<sup>1</sup> [http://www.preparingforemergencies.gov.uk/business/generic\\_challenges/electricity.shtm](http://www.preparingforemergencies.gov.uk/business/generic_challenges/electricity.shtm)

6. The electricity industry manages the recovery from these incidents with the interruption duration depending on the nature of the damage. For example:
  - Damage to an overhead wire will typically be located fairly quickly and repaired soon thereafter with a typical time from interruption to repair of 2 to 4 hours
  - In the case of damage to overhead lines where the cause is severe weather the time taken to restore power will depend on the severity of the weather. Most restorations will be completed in 12 to 18 hours on a windy day, and between 4 to 7 days after hurricane force winds
  - A damaged service cable to a house can usually be repaired in 1 to 2 hours but this can increase up to 18 hours when road excavations are needed for a mains cable fault. Failures of transformers mounted on electricity poles can generally be restored in 4 to 6 hours but a ground mounted transformer could take up to 24 hours to change depending on access
7. While the repairs are being carried out, and if it is possible to do so, power will usually be restored to most consumers by switching to an alternative supply within the first 1 to 2 hours. Alternatively mobile generators could be deployed in 4 to 6 hours to supply consumers.
8. In the relatively rare circumstances where a fault or multiple faults affect a large area, for example a failure of two transmission lines due to a fire that might take 24 hours to repair, the electricity distribution company could introduce “demand control” or “local” rota disconnections. These measures are used when there are limited alternative supplies available in the area and the fairest way to deal with the situation is by sharing the available power among the consumers. (The difference is that demand control take place without warning, unlike rota disconnection.) For example, if only 50% of the power needed was available from alternative supplies, it could be shared on a three hour on/three hour off basis. The priority user arrangements do not offer any help in such circumstances.
9. Overall, the performance of the electricity industry has been improving each year since April 2002 when Ofgem introduced financial incentives to Network Operators to improve their performance in relation to the number and duration of power cuts. Nevertheless there is still a high probability that a consumer will have 1 interruption to their electricity supply per year (on average 75 out of 100 consumers have their supply interrupted once a year). The average time a consumer loses power in a year is approximately 88 minutes. If power is disrupted then the average duration of each incident for consumers is shown below using the figures for incidents in 2005/06.

## Restoration Time



10. It is clear that while most consumers have power restored within 1 hour of being interrupted, some do not have their power restored for up to 18 hours. It should also be noted that the figures above do not take account of incidents caused by severe weather; as has been explained above, recovery from such incidents can take several days.
11. In April 2002 Ofgem introduced financial incentives to Network Operators to improve their performance in relation to the number and duration of power cuts. Since this date, the number of interruptions per year for the average customer has fallen 15%, from 87 interruptions per 100 customers in 2001/2002 to 74 interruptions per 100 customers in 2005/06. In addition, the number of customer minutes lost a year as a result of power cuts during this time has dropped 17%, from 84 minutes to 69 minutes.
12. For over 30 years recovery from every disruption to the supply of electricity in Great Britain has been managed by the electricity industry in the ways described above. It is therefore far more likely that an electricity disruption would be caused by one of the reasons given above rather than as a result of rota disconnections being imposed by the electricity industry following Government use of emergency powers.

### Electricity Supply Emergency Code (ESEC) Rota Disconnections

13. Such planned three hour rota disconnections on a national basis were used in the 1970's. The current arrangements for rota disconnections set out in the ESEC were developed from the use of rota disconnections at that time but have not been used since. It would only be in extremely exceptional circumstances that the Government would take action to control demand – scenario (b) above.

14. The likelihood of such powers being used remains very low.
15. The UK currently benefits from one of the most competitive and therefore cost reflective energy markets in Europe and the Government continues to believe that the UK's energy needs are best delivered in a liberalised market. Government policy is to provide a market and regulatory framework that encourages investment consistent with its two over-riding energy goals – to ensure security of energy supply and to help tackle climate change. This framework has been strengthened with policies announced in 'The Energy White Paper – Meeting the Energy Challenge' published in May 2007, in particular in relation to security of supply through:
  - providing high quality forward looking information to facilitate timely investment in electricity generation;
  - making immediate improvements to the planning regime for electricity generation, and working towards more fundamental reforms of the planning system; and
  - reducing policy uncertainty by clarifying our policy on renewables, carbon capture and storage and to take on the issue of civil nuclear power.
16. The Government believes that these measures will provide the market conditions to ensure long-term security of supply of competitively priced electricity, and that the likelihood of rota disconnections therefore will remain very low. Similarly, it is possible that new developments, such as smart metering, can permit market solutions to assist in managing such situations.
17. However, while there is only a very remote possibility of a long-lasting national shortage of electricity, it is prudent for us to have plans and Government powers to deal with such an eventuality. The Electricity Supply Emergency Code – a direction laid under the Electricity Act 1989 – gives the Government powers to take a number of actions depending on the severity of the emergency. These actions are:
  - Appeals by the Government to the public and industry for voluntary restraint; if these did not reduce demand sufficiently then
  - Restrictions imposed on consumption by industry, commerce and other undertakings by the giving of orders (or "directions") under the Energy Act 1976 to reduce or cease the use of electricity for certain purposes.
18. If these actions did not reduce demand sufficiently then rota disconnections would be used to share the burden of power cuts as equitably as possible. For the purposes of rota disconnection those consumers who are not protected (see below) are divided geographically into 18 separate load blocks with each block accounting for 5% of available generation. Each block, which is identified by a

separate letter of the alphabet, would be disconnected for individual periods of 3 hours during the course of the emergency. The frequency with which these 3 hour disconnection periods are instigated would depend on the amount of electricity available. At the lowest level an individual site would be disconnected for two or three 3 hour periods in a week. At the highest level no electricity would be supplied at all.

19. If rota disconnections were implemented consumers would be notified in advance, usually with at least 48 hours notice, of the times at which their electricity would be cut off and restored. Details of the rota block each consumer is in and when they will be affected by rota disconnections would be provided through the press, local radio and on the internet.

#### Priority user arrangements

20. ESEC provides for certain categories of consumer to be exempt from rota disconnections. It is these priority user arrangements that are the subject of this consultation. The arrangements have not been comprehensively reviewed since 1999 and they need to be updated to ensure that they efficiently protect those that need protection most. The current criteria for inclusion on the priority user lists are set out at Annex A and a full copy of ESEC can be found at: <http://www.berr.gov.uk/files/file30310.pdf>
21. In brief however, the current arrangements provide exemption for three categories of organisation:
  - 'Vital' – covers a designated list of activities within the transport, energy, water and sewerage, health and communications sectors
  - 'Food' – covers major locations for food manufacture, processing and storage
  - 'Other' – covers those for whom disruption to electricity supplies on a rota disconnection basis would cause substantial damage, or whose operation involves a continuous manufacturing process. These organisations must also reduce their level of electricity usage in line with the level of rota disconnections if instructed to do so by the network operator.
22. To be on any of the lists it is also required that the consumer (i) does not have standby generation, and (ii) does have a discrete feeder (although there is some flexibility on this latter point in the case of Vital and Food users). In practice this usually means that the consumer has a high voltage supply that can be independently switched from the network control room.

#### *How are priority users protected during rota disconnections?*

23. Electricity is transmitted across the country at very high voltages and then distributed locally to primary substations (typically at 33 kV). Each

primary substation will typically provide power to between 50 and 150 secondary substations via up to 10 circuits. Each secondary substation will typically provide power to up to 100 consumers.

24. During a rota disconnection the Network Operator would have to disconnect all consumers on up to 9 of the 10 circuits between the primary substation and its secondary substations while maintaining the supply to the 10th. Before taking any action the control engineer will assess the network state and decide how best to maintain power to the protected user, simulate the switching and then check it again (to prevent inadvertent operation all such operations normally have two operations required prior to a command being issued). This operation would typically take just under a minute to complete for each of the 9 circuits. The engineer then has to wait for electronic confirmation that the change has been made and monitor the resulting state of the substation voltage to check that no further intervention is needed to keep it operation within safety and statutory limits. The process would then be repeated for each of the other circuits to be disconnected.
25. The overall time to complete the above assessments and operations would be approximately 10 minutes. In the majority of primary substations the power to each circuit can be switched on or off from the Network Operator control room but for some this will require trained staff to visit the primary substation to make the change. In such cases the process will take much longer.

### **Mitigating the effects of electricity disruptions**

26. Government advice<sup>2</sup> is that each business should ensure that they have robust, flexible business continuity management that will ensure that the impact of any emergency will be minimised, and should help the business recover quickly. As has already been shown the likelihood of there being a disruption to electricity supply from bad weather or accidental damage is relatively high – recent evidence<sup>3</sup> suggests that 21% of business disruptions were caused by a utility (electricity, gas, water, sewage) outage. However the same survey also found that 43% of organisations do not have contingency plans to deal with such incidents.
27. The following section provides an overview of some main protection options and indicative costs. It is not a comprehensive list of options and does not take account of running costs, the practicality of implementing each option and the ability to build or operate any plant or equipment associated with the solution. It is up to each organisation to evaluate how important continuous electricity supply is to its ability to operate and the impact that a disruption would have. A decision can then be made on whether a business case exists for investment in protection or whether alternative arrangements should be made. Some

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<sup>2</sup> <http://www.preparingforemergencies.gov.uk/business/planning.shtm>

<sup>3</sup> (Chartered Management Institute's 2007 Business Continuity Management survey, supported by Cabinet Office)

more information on these sources of protection can be found in Annex B.

28. Large industrial consumers that are planning new or expanding sites could consider using Combined Heat and Power (CHP) systems to provide all their power and heat. Although a significant investment would be needed, in the region of £10m for a 20,000kW plant, this would provide cheaper power, be a more resilient source of energy (as either CHP or the normal grid supply could provide their electricity needs) and is more carbon friendly due to the capture of heat. Such a system is likely to pay for itself in approximately 10 years purely in respect of the resilience provided without taking into account the other benefits provided by CHP.
29. Medium and small sized industrial consumers could invest in back up generation – typically diesel powered. A medium sized company (needing a minimum of 4,000kW to operate) would need to spend approximately £1m on backup generation. We estimate that the investment would pay for itself in terms of avoiding lost output in approximately 5 years. It may also be possible to offer the output from such standby generation (perhaps consolidated with others) into the commercial market.
30. A smaller industrial consumer (needing a minimum of 500kW to operate) would need to spend approximately £100,000 on backup generation. We estimate that the investment would pay for itself in approximately 4 years (economies of scale are offset by increased technical complexity for larger loads as multiple generators need to be synchronised).
31. Smaller organisations that use less electricity than this are likely to receive a low voltage supply ie the 230v supply provided to most domestic consumers and small businesses. These face similar choices to those outlined above ie CHP or back up generation but at much lower costs. For example, a small hotel or care home could mitigate the impact of a disruption by either investing in standby generation (approximately £18,000) or CHP (£36,000 - but offering savings that break even in less than 5 years). CHP also has other advantages in that community heating schemes that use CHP can take disadvantaged people out of fuel poverty by providing affordable warmth and cheaper electricity from a secure, local source, supporting sustainable community development. The use of CHP also reduces carbon emissions substantially, playing a vital part in combating climate change.
32. For organisations of all sizes there is of course also the option of having non-technical contingency arrangements eg mutual aid whereby similar organisations in different rota disconnection blocks assist each other.

33. Again it is important to note that all these types of protection could be used in the event of an electricity disruption no matter what the cause. The priority user arrangements only provide protection in the event of Government using its powers in response to a major emergency.

## **CHANGES CONSIDERED AND PROPOSALS**

34. This section considers a number of changes that could be made to the current arrangements and includes proposals on which we would like to have your views.

### **Should the requirement to (usually) have a discrete feeder be changed?**

35. Before considering this question it may help to provide a brief overview of what a discrete feeder is and why the requirement is currently in place. More information can be found in Annex B.
36. Electricity is transmitted across the country at very high voltages and then distributed locally firstly to primary substations (typically at 33 kV) and through them to secondary substations (typically at 11kV). The secondary substations provide the power at 230V that is used in most premises.
37. Each primary substation will typically provide power to between 50 and 150 secondary substations. In the majority of primary substations the power to each circuit can be switched on or off from the Network Operator control room. Each secondary substation will typically provide power to up to 100 consumers. Secondary substations do not usually have any remote switching capability and would need to be visited for switching to take place.
38. Most consumers therefore receive their 230V electricity supply through a circuit that is shared with up to 100 other sites in their area. Larger consumers that need a higher voltage supply have the option of receiving their electricity through a circuit that is for their sole use – a discrete feeder.
39. In the event of rota disconnections being implemented the Network Operator can normally carry out switching from the control room to keep power to discrete feeders while disconnecting the other consumers in the area. The current arrangements allow the Network Operator some discretion where a site otherwise eligible for protection does not have a discrete feeder. In these circumstances the Network Operator can still add the site to the Vital or Food priority user list if it believes that the amount of associated load (ie the electricity used by the other consumers that share the circuit) is marginal.
40. There does not seem to be a sound reason not to give Network Operators this same discretion to include all categories of organisation even if there is some marginal associated load providing that they meet the other criteria for inclusion on the list. We therefore propose that all organisations should be treated in the same way in respect of the possibility of some marginal associated load being accepted. It should be noted however that the usual expectation would remain that a priority user would have a discrete feeder.

Question 1:

- Do you agree that the Network Operator's discretion to add some sites that don't have a discrete feeder (this happens only in very rare circumstances) but have only marginal associated load be extended to all categories of priority user?

41. If the requirement for protected sites to usually have a discrete feeder is changed this would have the apparent benefit of allowing many more sites, including those that receive a low voltage supply, to be excluded from rota disconnections. However it is not feasible to do this without significant changes to the current electricity infrastructure and the level of staffing in the electricity industry.
42. The reasons for this are explored further in Annex B. In brief, the Network Operator would need to do some switching from the control centre and then physically visit all other secondary substations on the same circuit as the protected consumer to do some manual switching. The time taken to visit the relevant locations and do the manual switching will vary depending on their location and whether it is an urban or rural area but is likely to require a trained engineer for most of a day to protect each site without a discrete feeder. The electricity industry does not have sufficient trained engineers to carry out this amount of switching and it would not be cost-effective or feasible to recruit staff just for this eventuality. Even if it was feasible to do this, it would mean that up to 100 other premises served by the secondary substation used by the protected consumer would also be excluded from the rota disconnection thereby reducing the effectiveness of the rota arrangements. The only way to avoid this currently would be for an engineer to physically visit each of the other premises and disconnect them manually – this is obviously not feasible to do at the start and end of each 3 hour rota period.
43. We have also looked at whether changes could be made to the electricity infrastructure to make it easier to provide protection under the priority user arrangements to sites that do not have a discrete feeder. One option would be to install automated equipment to carry out all switching at primary and secondary substations that provide power to a protected site.
44. There are many factors to consider when assessing this proposal, e.g., the cost of equipment, installation, provision of communications facilities to control the equipment in the absence of mains power, maintenance and testing, and costs will depend on volume and the individual characteristics of the substations. However, industry sources suggest that a reasonable figure for this cost could be as high as £100,000 for each set of primary and associated secondary substations affected. This is not cost-effective when compared to the costs given in Annex B for alternative sources of power against all

causes of electricity disruption especially given that this investment would only be of benefit if there were rota disconnections.

45. Another longer term option would be to use smart meter technology. Some smart meters have the capability to enable either remote disconnection or provision of exemption from disconnection for targeted consumers. Because they have greater capabilities than some of the smart meters currently being trialled for implementation, such meters are likely to be more expensive. The difference in cost is hard to establish as this is a new market and the cost of the meters is changing. However we have estimated that a smart meter with the capability to support remote disconnection and reconnection would be approximately £20 more expensive than a simpler one that just provided consumers with clearer information on the cost of the electricity they use and enabled suppliers to read meters without entering the premises. This cost difference does not however take account of the need for Network Operators to introduce and adopt common standards for communication and control of the information systems to manage the disconnection.
46. The need for greater energy efficiency is the main driver for Government and industry to trial the use of smart meters. If consumers respond to the increased information available on the cost of their electricity usage by reducing consumption this will help the Government's aim to reduce carbon dioxide emissions. Electricity suppliers will also benefit by having lower meter reading costs. Consumers will benefit by having lower and more accurate bills.
47. There is however little incentive to install metering solutions with greater capabilities than information provision. Such meters only benefit the property that is 'kept-on' in the event of a rota disconnection and offer no benefit at other times. Given that they would have to be installed in every site on the same circuit as a site to be protected this could mean that using smart meters to protect one consumer could cost up to £2,000 (£20 x 100 properties) just considering the difference in cost of the equipment to be installed in consumers' premises. There would of course also potentially be additional installation, management and maintenance costs. Such meters would also be unlikely to be welcomed by the majority of households as not only would they cost more but their main purpose would be to enable the site to be remotely disconnected.
48. It would therefore seem likely such additional functionality of smart meters would only be installed if a strong business case existed for the Government to provide the funding or make a regulatory requirement to do so. No such business case can be readily seen to exist at the moment. However it is recognised that little is currently known about the capabilities, costs and consumer reaction to smart meters. It is therefore proposed that the potential use of smart meters to help

manage supply in the event of an emergency is reconsidered within 3 years.

Question 2:

- Do you agree that the potential use of smart meters to help manage supply in the event of an emergency should be reconsidered following the completion of planned smart meter pilot programmes?

49. Finally, it should also be noted that there are risks involved with all these options that could result in the rota disconnections either not working effectively or not working at all resulting in disconnection taking place for all consumers in that area with no notice at all. For example during rota disconnections:

- Protected consumers will generally have a single path of circuits feeding them with the alternative circuits that are normally available being connected to the consumers that are due to be disconnected – failure of any circuit will mean supply loss for some consumers
- A lot of switching will be taking place in a short time scale at a time when Network Operator staff are likely to have many urgent and difficult tasks to perform - this increases the risk for operator error and disconnecting consumers, including priority users, by mistake
- The network will be run in completely different ways from normal and there may be issues with the reliability of the equipment and the stability of the power supply as consumers are disconnected and reconnected.

Question 3:

- A) Do you agree that the requirement for a discrete feeder to (usually) be in place for priority users should remain?
- B) If not, do you have any suggestions as to how protection can be provided to a wider range of consumers without reducing the effectiveness of the rota disconnection arrangements?

## Should the scope of the Vital category be changed?

50. The criteria for priority user status were set in the 1970s when the Government owned the power industry and conditions were very different to today. These criteria may no longer be appropriate. In particular, the rationale for the Vital list of categories needs updating. In doing so, it is important that priority status cover is kept to a minimum. Otherwise this would reduce the effectiveness of rota disconnection as a means of reducing electricity demand and increase the burden on non-priority consumers by increasing the extent of electricity supply disruption that they will have to bear. The greater the number of priority users, the greater the burden of rota disconnection on each non-priority user and therefore the less effective the rota disconnections are.
51. With this in mind, we have looked at both the types of organisation within the existing Vital category and which new types of organisation could be added. We believe that the priority user arrangements will be most effective if they concentrate on protecting those sites where a disruption to the electricity supply caused by a rota disconnection could have a significant risk to public health and safety.
52. There are two groups that are not currently on the priority user list but do have a role to play in protecting public safety. These are:
- The emergency services i.e. police, fire service, ambulance, coastguard and mountain/mine rescue; and
  - Armed Forces sites that are involved in the defence of the UK, those that may assist with civil resilience and those that support such activities.
53. We expect that most of the sites providing such services would have their own contingency plans and arrangements in the event of local disruption but recognise that some may not. The consequences of a power failure to such sites could be severe for public safety and could disrupt the management of any wider incident that caused rota disconnections to be implemented. Allowing these services to be eligible for inclusion on the list would help minimise these risks. We therefore propose that sites providing such services should be eligible for inclusion on the Vital list as long as they meet the remaining criteria.

<p>Question 4:</p>
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| <ul style="list-style-type: none"><li>• Should the Vital category be extended to include emergency services and Armed Forces sites that meet the remaining criteria?</li></ul> |
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54. The Government takes very seriously the threat posed to the most vulnerable members of society posed by any disruption of electricity supplies, as of other essential services. We consider below the degree of risk to public safety of rota disconnections, and the feasibility of providing protection to the most vulnerable members of the community.

55. There is no universally agreed definition of vulnerable people. For the purposes of this consultation we will use the definition used by the NHS: "People who are unable to meet their own everyday needs due to a physical or mental health condition, for example frail older people. A wider definition includes people who are vulnerable because of their situation, for example homeless people". This gives us three broad groups to consider (in addition to hospitals that are dealt with separately below as they already on the Vital list):
- individuals living at home that are in some way vulnerable
  - residents in care homes
  - individuals that have no control over their circumstances e.g. those in some form of custodial care
56. Individuals living at home will receive power through a normal (low voltage 230V) domestic supply. We have already explored the feasibility of protecting consumers with a low voltage circuit from the substation that is shared with others and will now consider the implications of extending such protection to this vulnerable group.
57. The number of vulnerable individuals living at home in Great Britain is estimated to be approximately 3.5 million. Changing the electricity network infrastructure to protect such a large number of premises would cost approximately £350 thousand million (3.5m x £100,000). Even if smart meters are introduced that support remote switching the cost would still be in excess of £7 thousand million (3.5m x £2,000). This level of investment is not considered to be feasible. Not only would it be a considerable cost for each electricity consumer but it would only provide benefit to the vulnerable consumers in the event of an emergency of sufficient scale to justify rota disconnections; vulnerable individuals would nevertheless still have to cope with unplanned power cuts or pre-planned power outages which could last longer than a rota disconnection.
58. Trying to protect these consumers without the investment described above would render rota disconnections totally ineffective. If we were able to identify vulnerable individuals and consequently allow the circuits they are connected to not to be switched off during rota disconnections, given the fact that each circuit also serves approximately another 100 consumers, this would effectively mean that every circuit would have to be protected. In addition, identification, tracking and maintenance of any lists of such a large number of vulnerable consumers would be extremely time-consuming and expensive if at all possible.
59. While our conclusion is that the priority user arrangements are not suitable to protect these vulnerable people we do recognise that this group should be given as much protection as possible. All Network Operators currently allow those that consider themselves to be vulnerable to register the fact with the Network Operator in order to

receive news of routine power outages in advance. The regulatory framework also provides incentives to Network Operators to improve services to vulnerable and hard to reach customers. Although it would not be possible to contact all registered vulnerable consumers individually during the 48 hours before rota disconnections were implemented given the high number of such consumers, the electricity companies would hope to be able to contact the 'medically critical' individuals dependent on, for example, dialysis or life support to make them aware of the times that they are likely to be disconnected. This would allow them to make alternative arrangements in preparation for the duration of the planned outages.

60. Local authorities also plan for and respond to the needs of vulnerable people when preparing emergency response plans, including for an electricity outage. Local authorities furthermore coordinate the provision of care and welfare support by both the statutory and voluntary sector in such an emergency. Central Government provides policy advice and support on humanitarian issues to local authorities (and others) in times of emergency and would certainly offer this type of help in a prolonged electricity black-out. They would also represent the needs of those affected to central government crisis response machinery for extra assistance if they felt the emergency in question warranted it.
61. Cabinet Office is also working with the Local Government Association, Emergency Planning Society and others, including electricity industry representatives, to provide advice on ensuring assistance is in place for all those who may be vulnerable in these and some other circumstances. The work currently underway will assist them in meeting this responsibility. BERR will work with Cabinet Office, other Government Departments and the electricity industry to bring the new priority user arrangements, the need to plan for other causes of electricity supply disruption and protection options and help available to the attention of the local authorities and related bodies.
62. The position on care homes and those in custodial care is similar to that described above. Most of these organisations have a low voltage supply that cannot be isolated from that of the surrounding consumers. The same choice therefore exists as to whether to make additional investment in changing the network infrastructure or accept that additional non-priority consumers will not be disconnected thereby reducing the effectiveness of the rota disconnections.
63. There are approximately 20,000 care homes in Great Britain. Therefore the additional investment for changing the network would be in the region of £2 thousand million (20,000 x £100,000). The number of non-priority sites that would be exempt from rota disconnections would be 2 million (20,000 x 100) – approximately 10% of the consumers in the country.

64. We do not believe such investment would be proportionate because unlike a gas emergency, the power would not be off completely for an extended period. It would also only provide protection in the event of rota disconnection and not from the more likely causes of power cuts e.g. those caused by storms, technical malfunction or a cable being accidentally cut by a digger.
65. In addition better alternatives exist that can provide protection against these more likely causes of power cuts. For example, gas or diesel fuelled Combined Heat and Power (CHP) units are cost-effective solutions for community developments such as sheltered housing. A unit to provide heat and power for a small community complex can be installed for around £26,000, might provide savings of almost £3,000 per annum and delivers other benefits such as a 20% reduction in CO<sub>2</sub> output in addition to the resilience in the event of a power cut.
66. If it was accepted that power would be retained for the additional non-priority users there would obviously be a great deal of work for the Network Operators to cope with both the administration of such a large number of consumers on the priority user list and of course to execute this number of switching operations before and after each three hour disconnection period. There would also be an increased risk of mistakes being made and unplanned disruptions taking place.
67. But even if it was possible to do this, the effect of this many consumers being excluded from rota disconnections would be to proportionately increase the frequency of disconnections for all other consumers including the vulnerable members living in their own homes. Given that care homes represent a very small minority of the vulnerable individuals who reside within the community it is also unclear why they should receive preferential treatment at the cost of individuals resident within the community.
68. The addition of care homes, or others that do not have a discrete electricity supply, cannot therefore be justified against the consequential increase in frequency of rota disconnections that would result for everyone else including these vulnerable consumers. We also believe that residents of care homes and those in custodial care may be more effectively protected by concentrating the priority user arrangements on those that would provide them with assistance in the event of an emergency. We do not therefore propose that the Vital category is extended to such sites.

Question 5:

- A) Do you agree that we should concentrate on protecting sites where disruption could have the most significant risks to public safety?
- B) Do you agree that we should not extend protection to care homes and those in custodial care, relying instead on other measures?

69. We encourage all those sites considered in this section to develop, or review their existing, business continuity plans that protect themselves from normal, unplanned, power cuts. In addition to the technical alternatives outlined above some of these organisations may wish to consider reciprocal arrangements with other similar local institutions or local authorities where residents of care homes could be moved for the duration of the disconnection.
70. We will use this consultation process to raise awareness in the care home sector of the need for resilience planning for any extended period of power cuts and the alternative sources of power that are available.

Question 6:

- Is there anything else which could be done to help protect vulnerable groups from the effects of electricity disruptions generally and specifically in the event of rota disconnections?

71. We have also looked at those types of organisation already on the Vital list to assess the degree to which protecting those sites from a disruption to the electricity supply caused by a rota disconnection would risk public health and safety. As with organisations in other categories, our expectation is that all those sites of airports, air traffic control, railways, ports and docks, oil, gas and electricity provision, water, sewage, telecommunications, broadcasting and hospitals should have their own contingency plans and arrangements in the event of local disruption but recognise that some may not. However, the consequences of a power failure to such sites could be severe for public safety and could disrupt the management of, and recovery from, any wider incident that caused rota disconnections to be implemented. We therefore propose that these types of organisation should all be retained on the list if the provision of power during a rota disconnection enables them to continue those aspects of their operation that are related to public safety.
72. We will however be working with Network Operators, relevant Government Departments and bodies representing some of these organisations e.g. Strategic Health Authorities and the Department of Health, rail industry bodies and the Department for Transport to assess resilience in the event of electricity disruptions and seek to improve the contingency plans that exist.
73. Postal services are currently eligible for inclusion on the Vital list. We do not see a direct link for such sites between pre-notified disconnections and public safety. We therefore propose that postal services should be removed from the Vital list.

Question 7:

- Is the proposed scope of the Vital list right?
- Are there any other types of consumer that we should consider for inclusion on the Vital list? Please provide reasons for any

suggestion recognising that any broadening of the scope of the priority list will increase the burdens on those users who are not given priority status.

## Should Food remain as a separate category?

74. There are currently approximately 50 food manufacturers, processors or storers in the Food category of the priority user arrangements. As has already been pointed out, we believe that the priority user arrangements can be made more effective by concentrating them on helping those sites where a disruption could affect public safety. We believe that the disconnection of such sites for pre-notified 3 hour periods is not a public safety issue in the same way as those categories we have suggested should be on the Vital list.
75. While it is recognised that the implementation of rota disconnections will cause an interruption in the work of the food sites affected by that cut for its duration, other food sites in nearby areas will be able to continue to operate. At a later time of course depending on the scale of the emergency the position for the two sites could be reversed as the disconnections are applied to different areas over time. We believe that this interruption in the supply chain would result in a reduction of choice for consumers rather than an obvious health risk.
76. We have also found, as with gas and fuel priority user arrangements, that it is very difficult to identify priority users in the food sector due to the complexity of the supply, logistic and retail chains and the ability to substitute other products for what in the past may have been considered essential foodstuffs.
77. We also believe that those organisations in the food industry for which a disruption to their electricity supply would adversely impact their business should, like all other organisations, have or put in place business continuity plans to deal with such incidents. It is our understanding that any protection or arrangements put in place to help cope with the more usual causes of electricity supply disruption will also be effective in the event of rota disconnections being invoked.
78. We do not therefore see a good reason for food manufacturers, processors and storers to continue to exist as a separate category. Our proposal is to remove the separate Food list. This would mean that Network Operators would no longer accept companies onto this separate list but would consider applications in the same way as other commercial and industrial organisations for inclusion under the Other list.

### Question 8:

- A) Do you agree that Food should no longer be a separate category?
- B) Is it right to expect food industry sites to be treated in the same way as companies in other sectors? If not, what is it that makes some parts of the food industry different and how can they be defined?

79. Those food companies already on the list that do not meet the criteria for the new Other list would be moved to a new Transition list. Those sites on this list would retain the protection offered by inclusion on the priority user list for a period of up to 3 years. During this time they should assess the business case for protecting their electricity supply and take appropriate action in readiness for their removal from the list. BERR, the Network Operators and others will be able to provide help and advice during this period in particular on alternative sources of protection or other arrangements that can be made. Annex B provides some initial thoughts on possible options and their indicative costs.

Question 9:

- A) Should organisations that do not meet the new criteria for priority users be moved to a Transition list or removed immediately?
- B) Is the 3 year period for organisations to make alternative arrangements adequate? Is it too short or too long? Why?

## Should the scope of the Other category be changed?

80. The current criteria for inclusion on the Other list include a requirement that either (i) the consumer would suffer “substantial damage” if the site was subject to rota disconnections; or (ii) the consumer’s operation “involves a continuous manufacturing process”. The “substantial damage” and “continuous manufacturing process” concepts are vague. Furthermore, it is not clear why having a continuous manufacturing process should in itself justify priority status. This would only be a relevant consideration if disruption to electricity supply would cause substantial damage, but in such an instance it would be caught by criterion (i).
81. We propose replacing the requirements above with a criterion that disruption of electricity supply for pre-notified 3 hour periods would cause plant damage exceeding £50m either at that site or at one or more sites where, as a result of this interruption, there would be consequential damage on the same scale. This mirrors the approach proposed for the gas priority user arrangements. Those on the Other list would be expected to limit their electricity usage during rota disconnections to a pre-agreed level sufficient to avoid such damage.
82. We believe that this is a fairer way to allocate electricity in the event of an emergency; with the exception of those sites where there is a risk to public safety all available electricity would be shared between all domestic and business consumers.

### Question 10:

- A) Do you agree that we should amend the criteria for the Other list as described?
- B) Is £50m the appropriate threshold? If not, what would be an appropriate threshold? Please provide supporting evidence for your suggested alternative threshold.

83. We believe that most organisations that consider having a continuous electricity supply important for their business will have taken steps to protect it. Such plans and arrangements should be equally effective in the event of rota disconnections being implemented as they would be for the more likely causes of electricity disruptions such as severe weather or accidental damage.
84. For those organisations that do not yet have such plans it is for each of them to determine as part of their business continuity planning if a business case exists for investment to be made in appropriate protection or if alternative arrangements should be made. Those organisations in this position with sites currently on the list that would no longer be eligible would retain the protection offered by inclusion on the priority user list for a period of up to 3 years by being moved to a new Transition list. BERR, the Network Operators and others will be

able to provide help and advice during this period in particular on alternative sources of protection or other arrangements that can be made. Section 9 of the Impact Assessment at Annex B provides some initial thoughts on possible options and their indicative costs.

## **Should the requirement in relation to backup generation be changed?**

85. The current criteria for the electricity priority lists require that consumers do not have standby generation. The principle is sound: there is no point giving priority status if the consumers have alternative arrangements in place. However, we believe that this could also act as a disincentive to organisations from either investing in appropriate standby generation or insuring against the effect of power loss. Some organisations may be under the impression that inclusion on the priority user list gives them some form of guaranteed electricity supply no matter what the cause of the disruption to the supply.
86. We believe that businesses should make their own arrangements to ensure continuous electricity supply (eg. by installing standby generation) if a business case exists for doing so. This must be a commercial decision for the organisation. It is however important to note once again that the possibility of disruption from severe weather or accidental damage is far more likely than that caused by implementation of rota disconnections under the Government's emergency powers. Indeed by allowing those who do not have standby generation to benefit from inclusion on the priority user list while rejecting those that have made such arrangements, penalises the latter.
87. We therefore propose to retain the requirement for organisations to not have standby generation. In addition we believe that it should be extended so that all organisations should be expected to demonstrate why it is not feasible to install standby generation before being accepted onto the list. Priority list status should therefore be reserved for those exceptional circumstances where it is not feasible to install standby generation and, for those on the Other list, where there would be plant damage in excess of £50m.
88. Hospitals that carry out non-elective operations are an example of the exceptional circumstances mentioned above. Although many hospitals do have back up generation, they require at least two sources of electricity supply in order to carry out medical operations. In an event of a rota disconnection, if they were to use their back up generation they would not be able to carry out medical operations without having a back up to their back up. Clearly this will be difficult to achieve in many cases and so hospitals would remain on the list regardless of the fact that they have some standby generation.
89. There is also some clarification needed on the intention behind the statement in the ESEC that: "electricity generation equipment which is capable of providing a supply of electricity adequate for the continuation of activities which are the subject of the V and F lists or, as regards the O list, adequate to avoid damage to plant or for the operation of a continuous manufacturing process"

90. The statement has sometimes been misinterpreted such that the mere fact of having any alternative generation capability, even if it is insufficient to allow continued operation of the relevant activities, has led to priority status being denied. This has been a particular problem for some hospitals, which have to deal with the problem of overly strict interpretation of “stand-by generation”, we propose to make it explicit in the criteria that the stand-by generation must be sufficient to ensure continuation of the relevant activities with 3-hour rota disconnections on a daily basis over a period of 1 week.

Question 11:

- A) Do you agree that we should require potential priority users to demonstrate why it is not feasible for them to install standby generation? Please explain your answer. How in practice could “feasible” be decided?
- B) Do you agree that the criteria should explicitly only exclude consumers on the grounds of having stand-by generation if that generation is sufficient to ensure continuation of the relevant activities with 3 hour rota disconnections for on a daily basis over a three day period? Please explain your answer.

**Should the application process and the administration of the priority user arrangements be changed?**

91. We think we could improve the clarity of the administration of the scheme, in particular the registration process for priority users, and simplify the arrangements, which currently have three different lists and sets of criteria. We also need a well-defined appeals process.
92. Full details of the current process for agreeing who is included in each of the lists is contained within the relevant provisions of the ESEC as set out at Annex A. However, as a brief summary:
  - Consumers apply through their suppliers to the Network Operators for inclusion on the Vital list. If the Network Operator considers the application valid, the consumer will be included on the list. If the Network Operator is unsure about the validity of the application, or considers that the application is definitely not valid, it falls to central Government (BERR, in consultation with relevant other departments) to make the decision.
  - It is the responsibility of DEFRA (in England), the Scottish Executive or the National Assembly for Wales as appropriate to decide whether a consumer's site should be listed as a major location for food manufacture, processing or storing. In the first instance the Network Operator is responsible for monitoring whether the other criteria for inclusion on the Food list are fulfilled, but where it considers they are not the matter goes to BERR for resolution.
  - Consumers apply to the Network Operator for inclusion on the Other list. If the Network Operator doubts the validity of the case, it will seek additional information from the relevant regional Government Office (in England), the National Assembly for Wales or the Scottish Executive as appropriate. If the Network Operator is still not convinced the application is valid, it will take the matter to BERR for determination.
93. We propose that there should be a common streamlined process for applying for inclusion on the priority user lists. In brief the steps are:
  - Network Operators arrange for potentially eligible consumers to be informed of the priority user arrangements
  - Consumers who wish to apply for inclusion on the electricity priority users lists submit a standard application form, providing all relevant information including whether the consumer is applying for the Vital List or the Other list, to the Network Operator.

- The Network Operator can seek further information from the consumer if necessary, but it must come to a decision within 28 days:
    - if the Network Operator deems the application valid, he notifies the consumer, adds them to the priority list, updates the application form accordingly and sends a copy to BERR for its records
    - if the Network Operator deems the application invalid, it notifies the consumer by updating the application form with the reason for the rejection, and provides details of the appeals process
  - If the consumer wishes, it may appeal against the decision. The consumer must submit any appeal to BERR within 28 days of the date of being notified of refusal of priority status. The appeal must include a copy of the application form and set out clearly the reason
  - Within 28 days, BERR will invite the consumer, the Network Operator, and other government departments or devolved administrations as appropriate to submit further information (BERR will decide whether this should be verbally or in writing)
  - BERR will decide the appeal within 28 days:
    - if it upholds the Network Operator's decision, it will inform all parties and consumer and the process ends (though BERR's decision will be open to judicial review)
    - if it rejects the Network Operator's decision, it will inform all parties and the Network Operator will update its priority user lists to include the consumer.
94. We also propose that on an annual basis Network Operators should ask all registered priority users to confirm that they still meet the relevant criteria for inclusion on the list. Similarly we propose that, if all the proposed changes to the criteria set out are formally adopted, Network Operators should carry out such a review within 3 months of that date with each consumer on their list to assess whether the consumer meets the criteria to remain on their current list or be moved to the Transition list. Some of those on the Food list may meet the new criteria for inclusion on the new Other list and can be moved there. The remainder will be moved to the Transition list.

Question 12:

- A) Do you agree that the proposed new arrangements are more equitable and efficient than the current arrangements?
- B) If not, how could they be improved?
- C) Do you think someone other than BERR should hear appeals? Please give reasons for your view.
- D) Are the timescales proposed reasonable?
- E) Should regular reviews of the status of those on the list be held?

- F) Are there any other areas with respect to administration of the scheme that need to be addressed? How do you think they should be so?

## Other issues

95. We have identified a number of issues with the current electricity priority user arrangements, but we are aware that there may be others. We would be interested to hear your views.

Question 13:

- Are there any other problems or issues with the current electricity priority user list arrangements that we should consider?

## **ANNEX A - Protected Consumers – Provisions From ESEC**

### **"V" List**

1. A consumer shall only be listed in the "V" list if:
  - a) It has informed the Network Operator in writing that he considers his activities fall into one of the categories of vital services in outlined at para 16 below; and
  - b) The Network Operator agrees that the activities fall into one of the categories of vital services below; and
  - c) The consumer does not have standby generation; and
  - d) Either

It is connected to a discrete feeder; or

In the opinion of the Network Operator maintaining supply during rota disconnections would involve retention of not more than a marginal amount of associated load; or

The Network Operator has been required to list him by the DTI pursuant to paragraph 5 below.

2. If a Network Operator is unsure whether a consumer's activities fall within one of the categories of vital services below, he will inform the consumer accordingly. The consumer may (a) provide further clarification to the Network Operator as to why he believes his activities fall within one of the categories of vital services or (b) may approach the Government Department responsible for the service or the industry concerned which will advise the DTI if the consumer's activities fall within one of the categories of vital services and whether the consumer's site should be listed. Only upon instruction by the DTI will the Network Operator include the consumer on the list. Pending resolution of the matter the consumer shall not be listed.
3. If in the Network Operator's opinion the consumer's activities do not fall within one of the categories of vital services and the consumer disputes this, the Network Operator will refer the matter to the Government Department responsible for the service or industry concerned which will ask the DTI for determination, unless the consumer prefers himself to refer the matter to the DTI. The DTI will instruct the Network Operator whether the consumer should be listed. Pending resolution of the matter the consumer will not be listed. The consumer shall be informed, in a timely fashion, of the outcome of any referral.
4. If the Network Operator considers that the consumer's activities fall into one of the categories of vital services, and if the consumer does not have standby generation nor is he connected to a discrete feeder and if maintaining supply during rota disconnections would, in the opinion of the Network Operator, involve retention of more than a marginal amount of associated load, the Network Operator shall advise the

consumer that he should either pay for a new or modified connection by means of a discrete feeder or should install standby generation.

- 5 If the consumer is not prepared to install standby generation and is not prepared to pay for a discrete feeder the Network Operator will refer the matter to the DTI with an estimate of the amount of associated load which would need to be kept on supply if the consumer was to be protected. The DTI will consult with other departments concerned and with the Network Operator and will instruct the latter whether the consumer should exceptionally be listed, despite the retention, of the amount of associated load involved. Pending resolution of the matter, the consumer shall not be listed.

### **"F" List**

- 6 Regional Offices of DEFRA in England, the Scottish Executive or the National Assembly for Wales will consult with each Network Operator about consumers who should be listed in the "F" list as major food manufacturers, processors or storers. A consumers' site shall only be listed in the "F" list if:
  - The Regional Office of DEFRA, or the Scottish Executive or the National Assembly for Wales state that the consumer's site to be listed is a major location for food manufacture, processing or storing; and
  - The site does not have standby generation; and
  - Either
    - The site is connected to a discrete feeder; or
    - In the opinion of the Network Operator maintaining supply during rota disconnection's would involve retention of not more than a marginal amount of associated load; or
  - The Network Operator has been instructed to list him by the DTI pursuant to paragraph 8 below.
- 7 If the consumer's site is a location for major food manufacture, processing or storing, does not have standby generation and is not already connected to a discrete feeder, and if maintaining supply to that site during rota disconnections would, in the opinion of the Network Operator, involve retention of more than a marginal amount of associated load, the Network Operator will advise the consumer that he should either pay for a new or modified connection by means of a discrete feeder or should install standby generation.
- 8 If the consumer is not prepared to install standby generation and is not prepared to pay for a discrete feeder the Network Operator will refer

the matter to the DTI with an estimate of the amount of associated load which would need to be kept on supply if the consumer was to be protected. The DTI will consult DEFRA or the Scottish Executive or the National Assembly for Wales (as appropriate) and with the Network Operator and will instruct the latter whether the consumer's site should exceptionally be listed, despite the retention of the amount of associated load involved. Pending resolution of the matter, the consumer's site shall not be listed.

- 9 The DEFRA Regional Offices in England, the Scottish Executive and the National Assembly for Wales will review the need for protection annually and notify Network Operators of any changes they wish to make. If an emergency is imminent, and during an emergency, Network Operators may wish to consult with DEFRA regional offices in England, the Scottish Executive or the National Assembly for Wales on whether any further changes need to be made. The Network Operator will only make any change if it conforms to the arrangements outlined in the above "F" list paragraphs.
- 10 In preparing their plans, the DEFRA Regional Offices in England, the Scottish Executive and the National Assembly for Wales should take into account that, depending on the availability of certain foodstuffs, there may be a need for particular food producers to increase output during an emergency.
- 11 Due to the need to avoid maintaining more than a marginal amount of associated load, it will not normally be possible for Network Operators to provide protection from rota disconnections to abattoirs and to firms dealing with disposal of food waste. But, where notified of these sites by the DEFRA Regional Offices in England, the Scottish Executive or the National Assembly for Wales, the Network Operators' plans should take into account the need to give such sites adequate notice where practicable of rota disconnections.

#### **"0" List**

- 12 In the event of rota disconnections "O" list consumers would be directed to reduce their consumption in broad line with the level of disconnections. They may also be directed to reduce their consumption by a prescribed percentage in the event of Orders being made under the Energy Act (paragraph 21(b) refers). The procedure for issuing these directions to "0" list consumers is the same as that for rota disconnections [(see Annex 5)].
- 13 A consumer will be listed in the "0" list if;

It has informed the Network Operator in writing that either

Substantial damage would result if he was subject to rota disconnections; or

Its operation involves a continuous manufacturing process; and

The Network Operator has no reason to doubt the accuracy of the information; and

It does not have standby generation; and

It is connected to a discrete feeder; and

The consumer has informed the Network Operator in writing that he recognises he may be required to restrict his consumption during rota disconnections. In the case of a new consumer, if the Network Operator has reason to believe that the consumer might qualify for listing, he shall inform him of the above criteria for listing.

If a Network Operator doubts the accuracy of information provided under paragraph 13(a) above he should contact the Regional Nominated Co-ordinator (RNC) located at the relevant regional Government Office or the National Assembly for Wales or Scottish Executive's equivalent. The RNC may be able to provide additional information about the consumer to satisfy the Network Operator that the information provided by the consumer is accurate. If this is the case, the Network Operator will list the consumer in the "0" list provided that sub. paragraphs (b), (c) and (d) of paragraph 13 are satisfied. If the RNC is unable to provide information to the Network Operator, then the RNC should refer the matter to the relevant DTI sponsorship Directorate for determination. The Network Operator may decide to refer the matter direct to the DTI for determination. In this case, the sponsorship Directorate may seek the assistance of the relevant RNC in obtaining information on the consumer to assist in the determination. Pending resolution of the matter, the consumer will not be listed.

In the event of the Network Operator(s) being directed to make rota disconnections, it is expected that consumers in the "0" List would be directed to reduce their consumption by a percentage broadly commensurate with rota disconnections. The Network Operator(s) will be directed to provide details of consumption to the DTI for this purpose. [(A draft of the direction is at Annex 4.) Annex 5 describes the procedure for issue of directions to "0" list consumers by the DTI.]<sup>4</sup>

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More information on the Grid Code can be found at <http://www.nationalgrid.com/uk/Electricity/Codes/gridcode/><sup>44</sup>  
ESEC Annex 4 is not reproduced here. ESEC Annex 5 is as follows:

***"Issue of Statutory Directions to Group "O" List Consumers***

*Annex 2 Paragraph 12 of the Code explains that O list consumers would be directed by the Government to reduce their consumption in the event of rota disconnections being instituted.*

*Each direction to a consumer, before issue, will have to be signed individually by an authorised DEBRR official. Such officials are permanently authorised to sign on behalf of the Secretary of State.*

*Each direction will be delivered to the individual consumer at the premises to which the direction refers."*

## **'V' List Consumers : Vital Services**

Coal mines

Major airports and associated control facilities.

Railway operations.

Gas reception terminals; gas storage installations including gas boosting and compression equipment; gas compressor stations and principal development and control sites which provide facilities for the control of gas supply systems and emergency procedures.

Licensed Electricity generators, including nuclear stations so as to ensure the safety requirements of their nuclear licences continue to be met; electricity transmitters and distributors.

Essential water and sewerage installations.

Hospitals as agreed in consultation with health authorities and NHS trusts.

Ports and Docks.

Postal, telecommunications and broadcasting services

Oil refineries and vital oil pipeline pumping stations.

## **Issue of Statutory Directions to Group "O" List Consumers**

Paragraph 12 (above) explains that O list consumers would be directed by the DTI to reduce their consumption in the event of rota disconnections being instituted.

A direction will be issued to Suppliers requiring them to provide relevant details of consumption to the DTI. (See Annex 4) for an example of a direction).

Each direction to a consumer, before issue, will have to be signed individually by an authorised DTI official. Such officials are permanently authorised to sign on behalf of the SoS.

Each direction will be delivered to the individual consumer at the premises to which the direction refers.

## **ANNEX B - Impact Assessment**

### **1. Aim**

1. To ensure the Government has the right measures in place to protect essential sites from the effect of rota disconnection following a major disruption of electricity supplies.

### **2. Objectives**

2. The objectives are to:
  - Identify the consumers who need priority treatment in the event of major disruption of electricity supplies, and the measures needed to ensure they get it.
  - Inform consumers of measures they can take themselves to guard against disruption of electricity supplies, both major national disruption and more frequent local disruption.
  - Improve the overall effectiveness of emergency arrangements.

### **3. Background**

3. The Government has arrangements in place for identifying and protecting consumers who need priority treatment in the event of major disruption of electricity supplies. These date from 1973, have never been put into effect, and were last comprehensively reviewed in 1999. They take the form of identifying organisations which would be exempt from pre-notified rota disconnections in the event of the Government invoking Electricity Supply Emergency Code (ESEC) emergency powers. This priority user list currently includes three categories of non-residential consumers, defined as :
  - **Vital** –transport, hospitals, energy and water (approximately 460 organisations)
  - **Food** – production, processing and storage of food (approximately 50 organisations)
  - **Other** commercial organisations which would suffer ‘substantial damage’ in the event of electricity disruption or have operations which involve a “continuous manufacturing process” (approximately 410 organisations).
4. Government advice is that organisations should prepare for 3 scenarios that could cause disruptions to their electricity supply:
  - Unexpected loss of supply to city/town for up to 18 hours and some rural areas for up to one week.
  - Planned three hour rota cuts.

- Unexpected total shutdown of the grid. Power will begin to be restored within 12 hours, with recovery generally starting outside major conurbations, until power is restored across the grid over three days.
5. The measures covered in this paper are intended to respond only to major national or regional disruption, not to local transmission or distribution problems caused by the weather or accidental damage. Organisations on the list are not protected against these far more likely smaller-scale disruptions and should take other steps to protect their electricity supplies against disruptions of this kind.

#### **4. Consultation**

##### Within Government

6. This consultation follows consultation within Government with most relevant Departments, and in particular meetings with the Ministry of Defence, the Department of Health, the Department of the Environment, Food and Rural Affairs, the Department for Transport, the Department for Communities and Local Government and the Cabinet Office, as well as with the devolved administrations in Scotland, Wales and Northern Ireland.

##### Public Consultation

7. As well as issuing this consultation document, we will be holding briefing sessions during the consultation period to help inform consultees and hear their views.

#### **5. Purpose of the Impact Assessment**

8. This is not in our view an increase in the regulatory burden. The electricity priority user arrangements are designed to facilitate the efficient allocation of electricity in the event of major disruption of supplies. In consulting on possible changes to the system, we are not proposing any significant change to the level of burden on business or individual consumers. While new applicants for inclusion on the priority lists and those already on the list will have to provide more information than they have in the past, we are changing the process to make it easier to provide this information.
9. The main purpose of this consultation is to raise the profile of the issue of electricity resilience, and give consumers the opportunity to consider how they should weigh the options of :
- taking steps themselves to increase the resilience of their own electricity supplies and by doing so reducing their reliance on the Government's contingency measures in the event of major disruption, or

- continuing or seeking to rely on the Government's measures.
10. These are commercial decisions for the consumers based on risk and expenditure decisions, and for that reason we have not included a full Impact Assessment with the consultation. However, this document, which forms part of the consultation document, assesses the impact of various options to give those consulted the opportunity to comment.

## **6. Issues**

11. The Government proposes to make changes to the arrangements for ensuring that priority users retain electricity supply in the event of electricity shortages, with the aim of ensuring that everyone receives the degree of protection they need from electricity disruptions without putting the network at risk.
12. Our proposals focus on updating the current priority user lists, amending the eligibility criteria for priority user status, and simplifying the administration of the priority user scheme.

### Issue A - Should the requirement to have a discrete feeder be removed?

#### *Issue A - Background*

13. The current arrangements usually require anyone on the Priority User list to have a discrete feeder, that is, an electrical circuit from a substation which is used solely to connect an individual consumer, and is therefore not shared with other consumers as most are.
14. This is so that the consumer's electricity supply can be independently switched by the network operator and kept on while other consumers in the same rota disconnection area are disconnected.
15. In this document high voltage consumers are defined as those with a dedicated substation (typically taking supply at high voltage). Low voltage consumers are defined as those who do not have a dedicated substation and share that substation with typically up to 100 other consumers.
16. The vast majority of currently protected consumers are high voltage users. The removal of the requirement for a discrete feeder would enable the protection of more low voltage consumers that share a circuit with others in their area.
17. We consider below the following options :
- Option 1 – Remove requirement of discrete feeder, by :

- Option 1A – Using existing protection options – switching
- Option 1B – Recruiting and training more staff
- Option 1C – Installing Automated Equipment
- Option 1D – Disconnecting all consumers using the same low voltage feed as the protected consumer
- Option 2 – Leaving requirement for discrete feeder

*Option 1: Remove requirement of discrete feeder*

18. Removing the requirement to have a discrete feeder would allow all consumers who meet the other criteria to be included on the list. We consider below four options for supplying electricity to consumers without a discrete feeder.

*Option 1A: Use Existing Protection Options – Switching*

19. A Network Operator can switch circuits to disconnect some consumers and maintain power to others. This can be done remotely from the operator's control room for most primary substations, but usually has to be done manually at secondary substations.
20. In order to protect an individual site with a shared circuit, the operator would need to:
  - a. Switch off power to all circuits, except the one feeding the protected consumer at the primary substation, remotely (if possible) or manually;
  - b. Physically visit all other secondary substations on the same circuit between the primary substation and the protected consumer and switch off power to all unprotected consumers; and
  - c. (If the protected consumer is a low voltage user) keep power on to up to 100 other premises served by the same secondary substation as the protected consumer, since they could not be isolated from the latter.

*Option 1A: Costs*

21. In an urban substation with easy access, each switching process would take one person up to two hours to perform and with a restoration three hours later would effectively involve one person for most of the working day. If the disruption had affected traffic, for example by disconnecting traffic lights, it might take even longer.
22. For a rural substation such a course of action would not be practical. Health and safety requirements for pole-mounted

substations would mean that two people would need several hours to complete the switching at the start of the rota period and then several more hours to restore supply afterwards. This would therefore mean that two people would be needed for a day.

23. In both urban and rural cases where the protected consumer is a low voltage user, this action would, by allowing power to be maintained to up to 100 other premises served by the secondary substation, reduce the effectiveness of the rota disconnection arrangements and their ability to protect the highest priority users.

*Option 1A: Benefits*

24. There would be a benefit in terms of maintained supplies for a wider range and greater number of consumers.

*Option 1A: Conclusion*

25. Our view is that it is not feasible to do the switching needed to give individual consumers with shared circuits protection in the time available with current equipment and staffing levels. Indeed, the diversion of resources involved might well prove to be counter-productive by increasing risk and the load on the system.

*Option 1B: Recruit and Train More Staff*

26. Recruit and train more staff to carry out the work outlined in Option 1A.

*Option 1B: Costs*

27. This would involve recruiting, training and paying large numbers of staff for use in the event of disruption, at a time when there would be no scope to redeploy other staff. We estimate that because this process would need to be carried out in every location supplying power to a protected consumer, it could mean effectively one trained member of staff for each additional site to be protected. There is a significant safety risk in this approach in that these staff would not carry out routine high voltage electrical work and unless they received frequent refresher training they would not be experienced and confident enough to carry out these safety-critical tasks.

*Option 1B: Benefits*

28. There would be a benefit in terms of maintained supplies for a wider range and greater number of consumers.

*Option 1B: Conclusion*

29. It is not practical or cost-effective to keep staff with the necessary training for high-voltage electrical operations permanently on standby for use only in the event of unlikely major disruption, and staff without such training could not carry out such operations safely. Again, our view is that this course of action would not be practical and might be counter-productive.

*Option 1C: Install Automated Equipment*

30. Install automated equipment to carry out all switching at primary and secondary substations that provide power to a protected site.

*Option 1C: Costs*

31. The costs of doing this would be variable, but according to industry estimates it could cost as much as £100,000 per protected consumer to make changes to the primary and associated secondary substations serving each protected consumer.

*Option 1C: Benefits*

32. There would be a benefit in terms of maintained supplies for a wider range and greater number of consumers.

*Option 1C: Conclusion*

33. Our view is that the investment needed to do this would be a diversion from, and not cost-effective when compared to, more worthwhile resilience measures such as those outlined in section 8.

*Option 1D: Disconnect all consumers using the same low voltage feed as the protected consumer*

34. Disconnecting all other premises sharing the circuit from the secondary substation with the protected consumer manually would require visiting and gaining access to up to 100 premises, many of which have indoor meters, both before and after each three-hour rota disconnection. This is not feasible, and we do not propose to consider it further.
35. Alternatively, smart meter technology might be implemented which could be used to do this in the long term without each premises needing to be visited. This is therefore the option considered further.

*Option 1D: Costs*

36. While hard to say definitively, the cost of meters that, in the event of rota disconnections, enable remote disconnection or provision of exemption from disconnection for targeted consumers, is higher (we

estimate £20 per meter) than the cost of the meters likely to be chosen by suppliers to discharge their operating licence requirements. This would mean that using smart meters to protect one consumer could cost up to £2,000 (£20 x 100 properties): an inefficient use of resources to protect one property against a very unlikely event and one which would not offer any protection against the more common causes of electricity disruption. Consumers receiving the meters would also be reluctant to pay, as they would be paying for a facility which in effect would benefit someone else and damage their own position in the event of rota disconnection.

*Option 1D: Benefits*

37. There would be a benefit in terms of maintained supplies for a wider range and greater number of consumers.

*Option 1D: Conclusion*

38. We do not see the benefit to most consumers or suppliers which would encourage them to make the necessary additional meter investment, nor any case for the Government to intervene to do so. The technology would also require the expenditure set out in Option 1C. However, trials of smart meters are under way, and the position should be reviewed once these trials are complete.

*Overall Recommendation for Option 1*

39. We are not minded to pursue any of these options, which would require heavy additional investment, and might in the event of disruption prove counter-productive. In some cases other consumers not on the priority list would also receive electricity, thus reducing the efficiency of the rota disconnection, and the greater activity needed would also increase the risk of the rota disconnections either not working effectively or not working at all, and thereby making the situation worse for the consumers that the system is intended to assist.

*Option 2: Leave requirement for discrete feeder*

40. By leaving the requirement that a consumer usually needs to have a discrete feeder in order to be considered for the Priority User list, the protection will continue to be afforded mainly only to high voltage consumers.

*Option 2: Costs*

41. Only providing protection to those consumers who have a discrete feeder will result in lost output for others who may otherwise have been eligible for protection. It is very difficult to place a monetary value on this lost output as knowledge of each type of organisation

and its corresponding gross value added for the duration of the disconnection would need to be known.

42. It is and would remain open for such consumers to pay for a discrete feeder to be installed. The cost of such a circuit would depend on the power required, the voltage of the connection, whether the substation needs to have civil works carried out and how far it is from a source of supply. Although costs would vary widely in individual circumstances, an indicative cost for an 11 kV supply would be approximately £300,000 – approximately £200,000 for 2.5 km 11 kV cable in surfaced roads / footpaths and approximately £100,000 for additional switchgear at primary substation and the consumer's substation.

#### *Option 2: Benefits*

43. Retaining the requirement for a discrete feeder would in our view avoid the costs and issues outlined in Option 1 above associated with providing electricity to low voltage consumers, and would not increase the risk of reducing the effectiveness of the arrangements for protecting essential sites.

#### *Conclusion of Option 2*

44. Our view is that continuing to restrict protection to high voltage consumers with discrete feeders will make it easier to implement emergency measures in the event of disruption, and reduces the risk of these measures failing, thus providing a greater level of protection for key sites.

#### *Issue A: Overall Conclusion*

45. Our recommendation is to retain the requirement for priority users to have a discrete feeder, but we are happy to consider any counter-arguments. We also intend to review the position on smart meters at a future date.

### Issue B: Should the criteria for the Vital category of consumer be changed?

#### *Issue B: Background*

46. Under current arrangements, to be eligible for the Vital list, a consumer must :
- usually have a discrete feeder,
  - not have standby generation,
  - operate in one of the following categories:
    - Coal mines
    - Major airports and associated control facilities.
    - Railway operations.

- Gas reception terminals; gas storage installations including gas boosting and compression equipment; gas compressor stations and principal development and control sites which provide facilities for the control of gas supply systems and emergency procedures.
- Licensed Electricity generators, including nuclear stations; electricity transmitters and distributors.
- Essential water and sewerage installations.
- Hospitals as agreed in consultation with health authorities and NHS trusts.
- Ports and Docks.
- Postal, telecommunications and broadcasting services
- Oil refineries and vital oil pipeline pumping stations.

47. We consider below whether we should add any categories to the list, or remove any currently on it.

#### *Prospective Organisations*

48. Although our view is that we should not remove the requirement for priority users to have a discrete feeder we wish to consider all potential categories for addition to the list, whether they have or are likely to have discrete feeders or not.
49. In general our approach here is that consumers who wish to avoid any interruption to their supplies should have invested in back-up generation or made other contingency plans (see Sections 8 and 9). However, we consider below various groups of people or businesses who are either vulnerable, or are critical parts of the national infrastructure, and whether these factors justify their addition to the priority users list.

#### *Vulnerable people and care homes*

50. The Government takes very seriously the threat to the most vulnerable members of society posed by any disruption of electricity supplies, as of other essential services. There is no recognised definition which includes all such people, but the National Health Service has proposed “People who are unable to meet their own everyday needs due to a physical or mental health condition, for example frail older people”. The electricity industry offers its customers the opportunity to register as vulnerable, which they define as the elderly, the disabled and those with supply critical medical needs. Based on the numbers on such lists, we understand that there are about 3.5 million people over the age of 65 who live alone in the UK, or are in some other way vulnerable, and that about 500,000 old people live in one of almost 20,000 registered care homes. In view of the NHS definition we have concentrated on these two categories. However, we should be happy to consider proposals on behalf of other vulnerable groups.

## *B.1 Vulnerable people living alone*

### *Option 1: Add vulnerable people living at home to the list of Vital consumers*

#### *Option 1: Costs*

51. Supply to these consumers could be maintained by a low-voltage circuit from a secondary substation providing power to an area. However, if supply to all 3.5 million consumers was maintained then, as it is likely that each main supply line has at least one vulnerable consumer. It would therefore be impossible to disconnect anyone during a rota disconnection. The most likely result of this would be a complete collapse of the system and no electricity for anyone.
52. It would be possible to protect individual consumers through the options outlined of retaining or ending the requirement for a discrete feeder. For instance, there is the possibility of installing a discrete circuit (£300,000 per property), smart metering (£2,000 per property), automated switching (£100,000 per property), or to train one extra staff per property to carry out the rota disconnections through manual switching. But the costs of doing this would as already noted be very high and an inefficient allocation of resources. Even if these costs were met, this would do nothing to protect consumers from local disruptions caused by weather or accident, which are much more likely to happen, and which potentially last longer than the 3 hours imposed for each rota disconnection.

#### *Option 1: Benefits*

53. The benefits of adding this group of consumers to the list are that 3.5 million vulnerable people would be protected from rota disconnections.

### *Option 2: Do not add vulnerable people living at home to the list of Vital consumers*

#### *Option 2: Costs*

54. In the event of a disruption of electricity supplies big enough to justify rota disconnections, there is of course a risk of injury to vulnerable people living alone, especially at night and especially if combined with disruption of health services. Such risks are very difficult to quantify.

#### *Option 2: Benefits*

55. Not adding vulnerable people to the list would allow the rota disconnection to work effectively and concentrate on maintaining

vital services. This is likely to be of more benefit to those at risk of injury or illness than attempting in effect to maintain supplies to the entire population and risking there being no supplies for anyone.

### *Conclusion*

56. Our view is that it would not in practice be possible to maintain supplies to as large a proportion of the population without maintaining supplies to the entire population. A rota disconnection would only take place during a period of serious electricity shortage; trying to do this would render the rota disconnection ineffective, with a counter-productive impact on those we would be trying to help.
57. In the event of such disruption, all consumers would be informed in advance of a rota disconnection, which would help them prepare and therefore reduce the impact of any loss of supply. In addition the electricity industry would do their best to provide information directly to their most vulnerable customers, including those at home with medical needs. Advance information is not possible in the event of the much more likely local supply disruptions caused by weather or accident.

### *B.2 Residents of care-homes*

#### *Background*

58. Care homes will naturally be concerned about the impact on their residents of local disruption of electricity supplies and should already have their own contingency plans. However, they might be protected from a rota disconnection by maintaining supplies on the circuit from which they are supplied.

#### *Option 1: Add care homes to the Vital list*

##### *Option 1: Costs*

59. Most care homes do not have a high voltage supply and are unlikely to be on a discrete feeder. Unless the care home has a discrete feeder, maintaining supplies to the home would have to be done by installing automatic switch-gear as described in Option 1C of Issue A. Using the figures given there, this would cost approximately £2 billion (£100,000 for each of 20,000 care homes). This would make the rota disconnection more severe for others who are not protected, with the possibility that all other consumers would need to endure a longer rota disconnection to supply the care-homes. Many of these consumers could themselves be vulnerable.

##### *Option 1: Benefits*

60. Adding care homes to the list would improve their protection in the event of a rota disconnection.

*Option 2: Not add care homes to the Vital list*

*Option 2: Costs*

61. As with vulnerable people living at home, in the event of a disruption of electricity supplies big enough to justify rota disconnections, there is of course a risk of injury to those people living in care homes. However, residents of care homes will continue to have the benefit of supervision from care-workers.

*Option 2: Benefits*

62. Not adding care homes to the list would allow the rota disconnection to concentrate on maintaining vital services such as those described previously. This is likely to be of more benefit to those in care homes than attempting to maintain supplies to them.

*Recommendation*

63. Our view is that maintaining supply to each care home would severely impact the efficiency of any rota disconnection and increase the risk to other consumers, many of whom will themselves be vulnerable.

*Courts and Prisons*

*Option 1: Add courts and / or prisons to the Vital list*

64. Prisoners can be counted as vulnerable, as having limited control over their lives or their access to electricity supplies. There is also some risk to public safety from any disruption of the activity of courts and prisons. We therefore consider whether courts and prisons should be included on the Vital list.

*Option 1: Costs*

65. Unless the court or prison has a discrete feeder, maintaining supplies will require installing automatic switch-gear. Using the figures given in the option of retaining or ending the requirement for a discrete feeder, this would cost approximately £100,000 for each court or prison. Doing this would also mean an additional load which would make the rota disconnection more severe for others who are not protected, with the possibility that all other consumers would need to endure a longer rota disconnection to supply these organisations.

*Option 1: Benefits*

66. Adding courts and / or prisons to the priority user list will ensure minimal disruption to the judicial system or to order in prisons during a rota disconnection.

*Option 2: Do not add courts and / or prisons to the Vital list*

*Option 2: Costs*

67. There is some risk to public safety from any disruption of the activity of courts and prisons for which is difficult to add a monetary value. However, a rota disconnection will be known about in advance, and measures could be taken in good time to guard against the risk. We also think that courts and prisons should invest in their own contingency plans, if they have not done so already, to guard against local disruptions of supplies which are likely to last longer than a rota disconnection

*Option 2: Benefits*

68. Not adding these organisations to the list will help ensure that the list remains focused on protecting public safety.

*Conclusion*

69. Our view is that courts and prisons should invest in their own contingency plans, if they have not done so already, to guard against local disruptions of supplies which are likely to last longer than a rota disconnection, and that in the event of rota disconnection we should continue to concentrate on existing activities where assistance is likely to be most needed.

*Emergency services*

*Option 1: Add emergency services to the Vital list*

*Option 1: Costs*

70. Adding emergency services to the Vital list would reduce the system's effectiveness for other priority users.

*Option 1: Benefits*

71. Although emergency services (police, fire service, ambulance, coastguard and mountain/mine rescue) usually have their own contingency plans in the event of local disruption, some may not. The consequences of electricity disruption to such sites could be severe for public safety and could disrupt the management of the

disconnection itself. Adding these services to the list would help minimise these risks.

*Option 2: Do not add emergency services to the Vital list*

*Option 2: Costs*

72. Not adding emergency services to the Vital list risks an impact on public safety in the event of disruption, and an impact on the management of the disconnection.

*Option 2: Benefits*

73. Not adding emergency services to the list would leave the system's effectiveness unchanged.

*Conclusion*

74. On balance our view is that the importance of the emergency services in responding to any disruption means that we should include them on the Vital list.

*Postal services and other organisations already on the Vital list*

75. We have also reviewed categories of organisation that are already on the Vital list to see whether they should continue to be so. With one exception we have decided that all organisations currently on the Vital list should continue to be so. The exception is postal services, where we think that three-hour disruptions of postal supplies cannot have any implication for public health and safety. We therefore intend to remove postal services from the Vital list.
76. In general, as noted elsewhere, our view is that organisations who want to be sure of uninterrupted electricity supply should obtain where feasible their own back-up generation, and thus remove the need for them to be on the priority list. We note here that this does not apply to hospitals, which need to be assured of two separate supplies of electricity at all times in order to perform medical operations.

Issue C - Should the criteria for the Other list be changed?

*Issue C: Background*

77. Sections 8 and 9 set out the principle that consumers who value uninterruptible electricity supply can invest in back-up generation with the expectation that it can be used in the event of a rota disconnection. This suggests that qualification for inclusion on the Other list should be tightened as in general consumers who wish

to be on the list should instead, where possible, provide their own back up generation

78. We have found that some consumers do not understand that inclusion on the Other list provides protection only in the event of a rota disconnection and not against the much more frequent and likely forms of more local disruption. Making this clear will enable an organisation to decide what level of protection is required for their needs.

*Implications for different types of organisations*

79. The existing criteria for being on the Other list includes a requirement that either the consumer would suffer “substantial damage” if they were subject to rota disconnections; or the consumer’s operations “involves a continuous manufacturing process”. The words “substantial” and “continuous” are clearly open to interpretation. This review provides an opportunity to change these criteria and its impacts on the following types of organisations:

1. An organisation wishing to apply for a place on the list who has (or is willing to provide) their own contingency arrangements to deal with likely types of local disruption that will also provide protection during a rota disconnection.

2. An organisation wishing to apply for a place on the list who has (or is willing to provide) their own contingency arrangements to deal with local disruptions but does not believe they will be effective for rota disconnections.

3. An organisation wishing to apply for a place on the list that cannot provide their own contingency arrangements and does not meet the criterion that rota disconnection would cause physical plant damage of £50 million or more.

4. An organisation wishing to apply for a place on the list who does not want to provide their own contingency arrangements to deal with local disruptions.

5. An organisation that does not wish to apply for a place on the list but who provides their own contingency arrangements to deal with more frequent causes of disruption.

6. An organisation that does not wish to apply for a place on the list and does not have contingency arrangements to deal with more frequent causes of disruption.

80. We propose that the conditions of “substantial” damage or “continuous manufacturing process” be replaced by one of physical

plant damage of £50 million or more. The impact on these forms of business would be as follows.

**Organisation 1: An organisation wishing to apply for a place on the list who has (or is willing to provide) their own contingency arrangements to deal with likely types of local disruption that will also provide protection during a rota disconnection**

81. This organisation currently has contingency arrangements for a local disturbance that will also provide continuous electricity supply as a result of an ESEC invoked rota disconnection. Our view is that this organisation therefore does not need to apply for priority user status.

*Costs*

82. This organisation will not incur any costs from this policy as they are already protected as a result of their own contingency arrangements.

*Benefits*

83. This organisation will benefit from the knowledge that they do not need to apply for Priority User status as they are already protected; this will reduce their administrative burden. The priority user arrangements will benefit as a possible priority user no longer requires protection as a result of increased knowledge, this will increase the efficiency of the system.

*Conclusion*

84. The organisation and other consumers will benefit.

**Organisation 2: An organisation wishing to apply for a place on the list who has (or is willing to provide) their own contingency arrangements to deal with local disruptions but does not believe they will be effective for rota disconnections.**

85. We propose that this organisation should be required to demonstrate why the contingency arrangements in place do not provide protection from rota disconnection and also prove that they meet the other criteria i.e., that rota disconnection would involve them in physical plant damage of £50 million or more.

*Costs*

86. This organisation will have a slight increase in administration costs as it will be required to demonstrate why the protection they are considering will not suffice during a rota disconnection.

### *Benefits*

87. If the organisation meets the requirements then it will receive protection against ESEC invoked rota disconnection. The organisation will be better informed and able to take a decision on what alternative arrangements it should make as a result of reviewing the position if it does not meet the criteria.

### *Conclusion*

88. This organisation will have some additional administrative burden, but the information received will improve their decision making and encourage them to provide the correct level of protection for their requirements.

**Organisation 3: An organisation wishing to apply for a place on the list that cannot provide their own contingency arrangements and does not meet the criterion that rota disconnection would cause physical plant damage of £50 million or more.**

89. This organisation cannot provide their own form of back-up generation and as a result wishes to apply for the priority user status; however, it does not gain access as it does not meet the £50 million criterion.

### *Costs*

90. The cost to the organisation is the value of the foregone output as a result of interruption. There is also a consequent cost to the UK economy.

### *Benefits*

91. The benefits accrue to the priority user arrangements as this organisation will not require protection, meaning either that more scarce electricity can be distributed to other consumers on the priority list, or that rota disconnections need not be so long for other users.

### *Conclusion*

92. The organisation wishes to be placed on the list and cannot feasibly provide back-up generation; it will therefore suffer physical plant damage as a result of the policy.
93. The basis of our system is that if a consumer's activities are not essential for public safety, then access to electricity must be shared with other consumers. We must therefore have some threshold to ensure that the scheme runs effectively. Any reduction in the threshold would admit more organisations to the list and reduce the

overall effectiveness of the system. The £50 million cut-off point is in line with the Gas Priority User Scheme.

94. We are, however, prepared to consider proposals for a different threshold.

**Organisation 4: An organisation wishing to apply for a place on the list who does not want to provide their own contingency arrangements to deal with local disruptions**

95. This organisation has clearly identified itself as an organisation that does not value protection from a disruption in electricity supply due to their unwillingness to purchase their own protection against more likely causes of disruption.

*Costs*

96. The organisation will lose the benefit of inclusion on the list. However by not making arrangements to respond to a far more likely cause of disruption they would appear to place a low value on secure supplies.

*Benefits*

97. Clearer guidance on the position will benefit this organisation by showing them the advantages of developing appropriate contingency plans. Developing such plans would benefit the organisation and business overall.

*Conclusion*

98. This organisation will see its refusal as a cost. However it has not provided its own form of back-up generation so therefore does not appear to value continuous electricity supply highly. If this is not the case and they were just unaware of the different types of disruption and the different types of protection available, then the knowledge received will enable them to make a better informed business decision.

**Organisation 5: An organisation that does not wish to apply for a place on the list but who provides their own contingency arrangements to deal with more frequent causes of disruption**

*Costs*

99. This organisation will have no additional costs, as they are not applying and are already protected from disruptions.

*Benefits*

100. The policy will have no impact on this organisation

*Conclusion*

101. This organisation does not wish to apply for a place on the list so is therefore not impacted by the policy.

**Organisation 6: An organisation that does not apply for inclusion on the list and does not consider providing their contingency arrangements to deal with more frequent causes of disruption**

*Costs*

102. This organisation will not have any additional costs as they are not applying to be on the priority list and are not considering obtaining protection.

*Benefits*

103. They may benefit if as a result of this policy as they are made aware of the different forms of disruption and may use this to make business decisions regarding future contingency measures.

*Conclusion*

104. This company, at no additional costs, could benefit as a result of government providing information to business.

*Overall Summary and Recommendation*

105. In summary, by tightening entry to the priority user list, those organisations that value the service, do not have the ability to make their own contingency measures plans and who would incur physical plant damage of £50 million or more will have the benefit of the priority list.

106. Organisations that cannot provide their own back-up generation and in the event of rota disconnection would suffer a loss that was substantial but less than £50 million will be disadvantaged. However, we think we should give more weight to the need to concentrate on consumers whose activities are essential for public safety.

Issue D - Should food be retained as a separate category?

107. Food is currently a separate category in the priority user scheme and this covers food manufacturers, processors or storers. We propose ending the separate treatment for these organisations by removing the separate food list , and allowing food businesses to

apply for inclusion on the Other list on the same basis as businesses in other sectors. Companies on the Food list that do not meet the criteria for the Other list would be moved to a new Transition list. They would retain the protection offered by inclusion on the priority user list for a period of up to 3 years. During this time they should assess the business case for protecting their electricity supply and take appropriate action in readiness for their removal from the list.

*Option 1: Retain separate Food category*

*Option 1: Costs*

108. The costs of retaining the separate Food list would be to reduce the priority user system's ability to supply other consumers whose activities were more essential for public safety.

*Option 1: Benefits*

109. These consumers would retain the benefit of priority treatment in the event of rota disconnection.

*Option 2: End separate Food category*

*Option 2: Costs*

110. These consumers would lose the benefit of priority treatment in the event of rota disconnection.

*Option 2: Benefits*

111. We believe that a separate Food list is no longer relevant. The complexity of the food production and distribution chain and the extent of competition is such that it would be difficult to identify the right businesses for inclusion on such a list. The current list covers only a small number of sites, excluding the vast majority of food organisations. We do not think that 3 hour disruptions of supplies to the sector would have a significant impact, on public safety particularly as a rota disconnection would not affect all such businesses at the same time, and such businesses are likely to have back-up arrangements of their own.

*Conclusion*

112. On balance we favour ending the separate Food list, giving companies on it the opportunity to apply for inclusion on the Other list.

Issue E: Should the requirement in relation to backup generation be changed?

113. Currently, admission onto the priority user list requires that consumers do not have back-up generation. We could retain this policy, remove this condition, or adapt it by requiring organisations to justify why installing back up generation is not feasible as a condition for inclusion on the list.
114. Consumers currently have a choice regarding installing back up generation to cover outages caused by local disruption (once every 445 days for an average length of 88 minutes over the period for 2001 – 2006).

*Option 1: Keep the requirement not to have back up generation*

*Option 1: Costs*

115. Keeping the policy the same provides incentives to businesses not to obtain back-up generation in order to maintain priority user status. Overall this reduces consumer protection as consumers will not have protection against more likely local disruptions. It also penalises the businesses that have provided their own back up generation.

*Option 1: Benefits*

116. There is no reason to grant Priority User status to consumers that have back up generation. This option would continue to ensure that this unnecessary duplication of effort does not happen.

*Option 2: Remove the requirement to not have back up generation*

*Option 2: Costs*

117. There is no reason to grant Priority User status to consumers that have back up generation that could be used in the event of rota disconnection.

*Option 2: Benefits*

118. Removing this requirement will mean that consumers, regardless of their own contingency plans, will be able to apply for priority user status.

*Option 3: Require consumers to demonstrate why they cannot feasibly obtain back-up generation as a condition for inclusion on the priority list.*

*Option 3: Costs*

119. Consumers that currently receive protection from rota disconnections and have chosen not to provide their own standby generation, but that could feasibly do so, would be removed from the list and the protection it provides. There would also be some additional administrative effort associated with showing why back-up generation was not feasible.

*Option 3: Benefits*

120. Although consumers that are able to install back up generation will be able to apply for priority user status, by being refused admission to the list they will be made aware of the need for back-up generation and better informed to make the necessary business decision.
121. By keeping such consumers off the list it will also improve the effectiveness of the arrangements for those that cannot feasibly use standby power.

*Conclusion*

122. Our view is that the requirement should be maintained and amended by requiring consumers to show why it is not feasible to obtain generation back-up when applying for inclusion on the priority list. This will ensure that consumers who are unable to obtain back up generation retain eligibility to apply to the list. It will also avoid the false sense of security which can arise from the view that inclusion on the list protects against more frequent local disruption.

Issue F - Should the Government make more explicit the purposes of the priority user list?

123. Although this is not a point we have stressed in the consultation document we would welcome views on whether more publicity on the priority user list and its benefits and constraints are desirable in addition to this consultation. We think that some currently on the list may be under the false impression that this provides protection against all disruption, when it only provides protection against rota disconnections. These consumers may therefore choose not to provide their own back up generation because they think this is unnecessary.

*Costs*

124. The costs of providing further information, perhaps through the BERR website, or through working with the electricity industry and consumer representatives, should be negligible.

### *Benefits*

125. There is potential for greater protection for organisations which should be on the priority user list but currently are not. It would also increase awareness of the need for organisations to make their own arrangements to protect their supplies against the much more likely occurrence of smaller-scale local disruption.

### *Conclusion*

126. We think we should consider what steps we could take and would appreciate any suggestions.

## **7 - Impact on Small Firms**

127. They will be minimal changes for small firms as a result of the proposals in this consultation following this policy change. However, by making the system fairer for all, small firms, who previously, due to technical reasons, would not have been on the priority user list may have had larger competitors that benefited from protection – under the new arrangements both small and large companies will be treated in the same way and potentially gain access to more electricity during a shortage.

## **8 - Cost of providing back up generation**

### Background

128. Organisations can develop their own contingency plans for local disruption which could also be used to provide electricity supply during rota disconnections. We provide here some indicative costs of suitable back up for different sized industrial users that they themselves can provide. This guidance may help organisations decide whether they should consider providing back up generation, based on size of peak demand and their willingness to pay for continuous electricity supply. However, it should be noted that these are indicative figures intended to help consumers reach their own conclusion.
129. This section and also Section 9 use the following classification of industrial users based on peak demand loads, taken from BERR Quarterly Energy Prices (Table 5.4).

Table 1 – Category of industrial user

	Peak electricity demand (kW)
Small industrial	500
Medium industrial	4,000
Large industrial	10,000
Extra large industrial	80,000

130. To measure the monetary amount that continuous electricity supply is worth to a consumer, estimates of the Willingness to Pay is used. Willingness to pay is defined<sup>5</sup> as “The amount an individual is willing to pay to acquire some good or service”, in this instance it is with respect to avoiding disruption of electricity supply and is also known as the Value Of Lost Load (VOLL). Section 9 discusses the concept further and also outlines the caveats of using such a value, for instance different consumers will place a different value on lost load depending upon their use, and the value will also alter depending upon time of day that it is measured at. However, recent studies have estimated this value at around £35/kWh for one hour for average industrial users. Using this figure, and the peak demand loads, it is possible to quantify the benefits of avoiding an electricity disruption,
131. Below we describe measures that different sized industrial organisations can take to avoid interruptions to their electricity supply. These options and costs are approximations and do not take account of running costs, the practicality of implementing each option and the ability to build/operate the plant.

### Large User

132. Large industrial consumers that do not meet the criteria of £50 million or more financial loss might find it difficult to obtain sufficient back up generation to maintain their full production. However, these users are kept off the list to ensure that the priority user scheme runs efficiently. Even though it may not be possible to provide back-up generation, it may be possible for some of these sites to use Combined Heat and Power (CHP) to provide all of their power and heat requirement.
133. CHP provide several benefits. CHP's high energy efficiency levels can cut energy costs for UK businesses, increasing their competitive edge. Community Heating schemes using CHP take disadvantaged people out of fuel poverty, providing affordable warmth and cheaper electricity from a secure, local source, supporting sustainable community development. And CHP reduces

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<sup>5</sup> Definition from the European Environment Agency

carbon emissions substantially, playing a vital part in combating climate change.

#### *Costs*

134. A significant investment would be needed, in the region of £5m for a 10,000kW CHP plant. CHP is not the equivalent of an 'uninterruptible power supply' because the CHP itself can fail and there is also a risk of failure of gas supply to the site, which would remove both heat and power. But it does give some additional security.

#### *Benefits*

135. Building a CHP plant would provide cheaper power, be more resilient because there would then be two sources of energy and the consumer would therefore be less affected by grid issues and be more carbon friendly due to the capture of heat. It has been established that an organisation can expect to lose power for 88 minutes on average 0.82 times a year. Using the VOLL and peak demand figures, table 2 illustrates what the cost of a disruption would be for a large user (£512k) and weights this by the probability of an interruption occurring in a year (0.82), this then gives the expected cost per output per annum (£420k). This loss could potentially be avoided if a CHP plant was built.

#### *Conclusion*

136. If an organisation were subject to the average disconnection a CHP plant would pay for itself in 12 years (£5 million investment which avoids a £0.4 million cost per annum) purely in respect of the resilience provided and not taking into account the other benefits provided by CHP such as cheaper power and less CO2 emissions due to the capture of heat. See Table 2 for these calculations. This does not include the additional benefits that would accrue if it were to provide protection from a rota disconnection.

#### Medium User

137. A medium sized industrial user (peak demand of 4,000kW) could invest in back up generation – typically diesel powered.

#### *Costs*

138. A medium sized industrial consumer would need to spend approximately £1m on backup generation.

#### *Benefits*

139. Providing back up generation would mean that the consumer would not be affected by local disruptions. Based on the same assumptions as before, an 88 minute disruption with a probability of

0.82 per annum would result in an expected cost of £170,000 and this would be avoided through providing back up generation.

### *Conclusion*

140. An investment of £1 million in back up generation would pay for itself in 6 years assuming a probability of disconnection of 82%. This does not include the additional benefits that would accrue if it were to provide protection from a rota disconnection. See Table 2 for calculations.

### Small User

141. A small industrial user (peak demand of 500kW) could invest in back up generation – typically diesel powered.

### *Costs*

142. A small sized industrial consumer could provide back up generation for £100,000.

### *Benefits*

143. Providing back up generation would mean that the consumer would not be affected by local disruptions. Based on the same assumptions as before, an organisation will have an expected cost of lost production of £21,000 and this would be avoided through providing back up generation.

### *Conclusion*

144. We estimate that an investment of £100,000 in back up generation would pay for itself in 5 years, this does not include the additional benefits that would accrue if it were to provide protection from a rota disconnection. See Table 2 for calculations. Please note that these are crude figures as they do not for example take account of the costs associated with installing, maintaining or running backup generation. They do however provide an indication of the relative scale of these costs.

Table 2 – Cost of back up generation

	<b>Small Industrial</b>	<b>Medium Industrial</b>	<b>Large Industrial</b>
Peak electricity demand (MW)	0.5	4.0	10.0
Electricity consumption (MWh) lost during average disruption (88 mins) per annum	0.7	5.8	14.6
Value of Lost Load (£/kWh)	35	35	35
<b>Cost of average disruption (£k)</b>	<b>26</b>	<b>205</b>	<b>510</b>
Probability of disconnection per year	0.82	0.82	0.82
<b>Expected cost from average disruption (£k)</b>	<b>21</b>	<b>170</b>	<b>420</b>
Approximate cost of backup (£k)	100	1,000	5,000
<b>Breakeven point (years)</b>	<b>5</b>	<b>6</b>	<b>12</b>

### Other Users

145. Organisations that use less electricity than these are, for technical reasons, unlikely to be on the priority user list. They would, however, still benefit from being aware of the need to have contingency plans to protect themselves from disruptions in their electricity supply. These face similar choices to those outlined above i.e., CHP or back up generation but at much lower costs. E.g.: a unit to provide heat and power for a small community complex can be installed for around £26,000, while providing cost and CO<sub>2</sub> savings in addition to the resilience in the event of a power cut. There is of course also the option of having non-technical contingency arrangements e.g. mutual aid whereby similar organisations in different rota disconnection blocks assist each other.

### **9. - Calculating the Value of Continuous Electricity Supply**

146. During an ESEC invoked disconnection it is proposed that supply is limited to those organisations whose use of electricity affects public safety. The wider the range of those included in the priority list, the greater the impact on those not protected.

147. Ofgem report that on average a consumer has its electricity supply disconnected 0.82 times per year, and that 93% of these disconnections are unplanned. The average disconnection period is 88 minutes, see table below<sup>6</sup>. The average consumer can therefore expect to be disconnected every 445 days and therefore for those that value uninterrupted electricity supply a form of back up generation would be expected to have been installed.

<sup>6</sup> Source: Ofgem, Quality of Supply 2001-2006, each report available at - <http://www.ofgem.gov.uk/ofgem/work/index.jsp?section=/areasofwork/qualityservice/qualityofsupply>

Table 3 – Average consumer disruptions, GB

	2001/02	2002/03	2003/04	2004/05	2005/06	Average
Annual average interruptions per customer	0.87	0.86	0.83	0.78	0.74	0.82
% of interruptions that are unplanned	94%	94%	91%	95%	92%	93%
Customer Minutes Lost per annum	84	110	81	94	69	88

148. Back up generation that is installed to provide supply during a limited local disruption would also be effective in providing supply during an ESEC invoked rota disconnection. Therefore, the consumer that places a high value on uninterrupted supply by providing their own back up generation does not need to be placed on the Priority User List as they already have contingency plans in place.
149. Those consumers that have not provided back up generation to cover disturbances that occur during normal operations have not done so as they do not feel such contingency arrangements represents value for money. These consumers are more likely to feel this way regarding the less probable risk of an ESEC invoked disconnection. It is therefore not felt necessary to protect these consumers from rota disconnections.
150. ESEC is invoked during a period of national electricity shortage. It follows that the allocation of this scarce resource, during a period of disruption, should go to the organisations most crucial to public safety and then if possible, to those consumers who value it the greatest, and where it adds the greatest value to the UK economy. Consumers who value continuous electricity supply highly should already be protected as a result of contingency plans for more likely causes of disconnections, and consumers who have not provided their own contingency arrangements should not be protected because of the low value they place on continuous electricity supply.
151. Protecting additional consumers uses scarce resources and will lengthen the time that non-priority users will need to be disconnected. For this reason, we should not add additional consumers to the list if the value they receive from it is negligible. It is not possible to calculate the impact that providing protection to an individual additional user would have.

*How valuable is uninterrupted electricity supply?*

152. For an organisation to calculate whether it is in their interests to purchase protection against local disruption, some knowledge of the benefits gained is required. The following section sets out the calculations required; it is not part of the Government cost benefit analysis but rather a guide for firms to reach their own conclusion as to how valuable back up generation is to them.

*How often can the average consumer expect to be disconnected?*

153. It has been established (Table 3), taking the average for the last 5 year period, that the average consumer will be interrupted 0.82 times per annum (or once every 445 days) for approximately 88 minutes. This is an average and it would be expected that there would be a large variance from the mean - for example consumers in some remote parts of Scotland may have more disruptions per annum and be interrupted for longer periods due to the greater remoteness of some consumers and more variable weather. Conversely, those with two or more supplies may suffer less disruption.

*How valuable is continuous electricity supply?*

154. Using estimates of the willingness to pay to avoid disconnection (also known as Value of Lost Load, VOLL) and knowing that the average consumer is going to be disconnected once every 445 days for approximately 88 minutes it is possible to estimate the cost to that consumer of a local disruption. The maximum amount that a consumer would pay for some form of protection can be calculated via the consumption of electricity (see Table 1) that would have occurred under business as usual throughout those 88 minutes.
155. The VOLL is a measure for the value derived from continued electricity consumption. This is dependent upon a number of factors, such as:
- Type of consumer – households and businesses face different costs of avoidance and costs to industries vary depending upon the production process used.
  - Outage frequency and anticipation – if an outage is expected or is following a systematic pattern, then costs are lower as consumers can plan for the outage.
  - Duration – some industries will be greatly affected by even a small outage, whereas some others will be less impacted.
  - Timing – weekend outages will have a lower impact on businesses, but a higher impact on domestic users' leisure time. The time of the day will also have an impact – for example, an outage at midnight would cause lot less disruption than a midday outage.
156. Recent studies suggest that the average VOLL estimate for industrial consumers is in the region of £35/kWh for a 1 hour interruption and this is the value used in this analysis, but as mentioned above this will vary greatly according to several factors and so is therefore just a useful estimate. This analysis only considers industrial firms, but the same principle will apply to other consumers.
157. Before considering impact of a disruption of electricity supply it is worth explaining how this has been calculated. The average

electricity consumption (kWh) for each industrial category is calculated for the length of time of the average disruption (88 minutes, this is however for all consumers, not just for non-domestic). This is then multiplied by the VOLL for each kW during those 88 minutes; this gives a total value of the willingness to pay for a consumer to avoid the average disruption. However, a disruption only happens every 445 days (or 0.82 times per year), therefore this value needs to be weighted to give an expected value of the cost of a disruption, and hence what protection from this disruption would be worth for the average of each type of consumer per year.

$$\text{Lost Consumption (kWh)} \times \text{VOLL (£/kWh)} = \text{£ Willingness to Pay (i.e., cost)}$$

$$\text{£ Willingness to Pay} \times \text{Probability of Interruption} = \text{£ Expected Cost}$$

158. Table 4 illustrates the expected cost of the average outage for different size industrial firms. The expected cost of the average disruption (88 minutes) is the total cost for the relevant industrial category weighted by the probability of a disruption in any one year.

Table 4 - Willingness to pay to avoid average disruption, VOLL £35/kWh, 88 minutes

	<b>Small Industrial</b>	<b>Medium Industrial</b>	<b>Large Industrial</b>	<b>Extra Large Industrial</b>
Peak electricity demand (MW)	0.5	4.0	10.0	80.0
Electricity consumption (MWh) lost during average disruption (88 mins) per annum	0.7	5.8	14.6	117.0
Value of Lost Load (£/kWh)	35	35	35	35
<b>Cost of average disruption (£k)</b>	<b>26</b>	<b>205</b>	<b>510</b>	<b>4,100</b>
Probability of disconnection per year	0.82	0.82	0.82	0.82
<b>Expected cost from average disruption (£k)</b>	<b>21</b>	<b>170</b>	<b>420</b>	<b>3,400</b>

159. Table 4 shows what each industrial user group would be willing to pay per year to avoid a disruption and thus maintain levels of peak electricity demand. For instance, an extra large industrial user would be willing to pay approximately £3.4 million per annum to avoid a disruption, whereas a small industrial is prepared to pay £21,000 per annum if the VOLL is £35/kWh. However, this is only based on peak consumption figures and does not take into consideration some of the caveats outlined above, i.e., a small industrial firm could have a much higher or lower VOLL than other companies in the same category due to the machinery or processes they use, and/or their actual peak demand figures could be very different. It should also be noted that this is for the average length of electricity supply disruption and not the period of time production is lost (i.e., processes may take extra time to return to full power). Given these caveats; this analysis should be taken as indicative and should not be construed as a Government recommendation.

*Costs of output lost and costs of back up generation*

160. The information in Table 4 (VOLL = £35/kWh) provides the expected costs of a disruption. Table 5 compares these expected costs with the costs of back-up generation as discussed in Issue 6 [need to change this text if we are moving Issue 6 around].
161. Table 5 – Cost of lost output and cost of back up generation

	<b>Small industrial</b>	<b>Medium industrial</b>	<b>Large industrial</b>	<b>Extra large industrial</b>
Expected cost from average disruption (£k)	21	170	420	3,400
Costs of back up generation (£k)	100	1,000	5,000	Not applicable

162. A small or medium sized industrial user can provide insurance against electricity interruptions via diesel powered back up generation for £100,000 and £1 million respectively as outlined in Issue 6, whilst large users could build a CHP plant for £5 million. It is recognised that an extra large user may not be able to practically build back-up generation or have any alternative sources of supply due to the amount of electricity required and the costs involved.
163. A small industrial user could avert the expected loss from a disruption of £21,000 per annum for a cost of £100,000, meaning that the investment would pay for itself in 5 years. This only considers a disruption under normal circumstances but this investment would also avoid any loss in output that would result from an ESEC invoked rota disconnection. A medium sized industrial user can insure against the loss of £0.17 million for an investment of £1 million, a pay back period of 6 years. Whilst a large user can build a CHP plant for £5 million to protect it from an expected loss of £0.42 million, pay back of 12 years but this does not include the other benefits associated with CHP plants.
164. Back up generation can be cost-effective for an industrial consumer given the load profiles outlined above, the VOLL of £35/kWh assumed and the average length of disruption. However, these figures and the appropriate pay back period will vary according to different consumers, their value of lost load and the length of time of an outage. A different value VOLL and varying lengths of time are considered below.

*What if the organisation does not place a high value on continuous electricity supply?*

165. If a firm does not value uninterruptible electricity supply highly (i.e. a lower VOLL) then it would not have such a high potential loss. Consider Table 6 with an industrial firm whose VOLL is around £15/kWh; the expected loss for an extra large industrial is only £1.4

million pounds per annum. This consumer would not necessarily be willing to provide back-up that costs £2 million per annum, whereas if their VOLL is £35/kWh then they would obtain back-up as a loss would have an expected cost of £3.5 million and therefore they would receive a £1.5 million benefit from being protected.

166. Table 6 - Willingness to pay to avoid average disruption, VOLL £15/kWh, 88 minutes

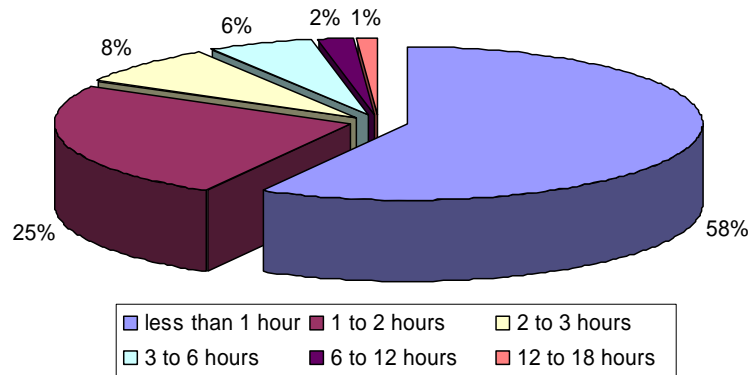
	Small industrial	Medium industrial	Large industrial	Extra large industrial
Peak electricity demand (MW)	0.5	4.0	10.0	80.0
Electricity consumption (MWh) lost during average disruption (88 mins) per annum	0.7	5.8	14.6	117.0
Value of Lost Load (£/kWh)	15	15	15	15
<b>Cost of average disruption (£k)</b>	<b>11</b>	<b>88</b>	<b>220</b>	<b>1,750</b>
Probability of disconnection per year	0.82	0.82	0.82	0.82
<b>Expected cost from average disruption (£k)</b>	<b>9</b>	<b>72</b>	<b>180</b>	<b>1,400</b>

*What length of time can be expected until reconnection?*

167. An organisation would also be interested in the impact of outages longer than 88 minutes. There are some occasions when reconnection can take up to or more than 18 hours, see Figure 1 below<sup>7</sup>.

168. Figure 1 – Time taken for reconnection, 2005/06

Note: Does not include incidents caused by bad weather



The majority (58%) of consumers who experienced disruptions were reconnected within the hour. However, when deciding upon contingency plans consumers should take into account the possibility that interruptions from electricity supply can last much longer than the 88 minutes analysed previously and hence the cost of such an outage would be greater,

## Summary

<sup>7</sup> Source: Ofgem Electricity Distribution Quality of Service Report, available at: [http://www.ofgem.gov.uk/Networks/ElecDist/QualofServ/QoSIncent/Documents1/16330-204\\_06.pdf](http://www.ofgem.gov.uk/Networks/ElecDist/QualofServ/QoSIncent/Documents1/16330-204_06.pdf)

169. A disruption of electricity supply under normal circumstances is far more likely than a disconnection as a result of ESEC. Organisations are recommended to make their own decisions as to whether or not to insure against interruptions of electricity supply using the approach discussed above with the relevant value of continuous electricity supply, load values and length of time of which disconnection could occur for each consumer. Organisations can then reach their own conclusion regarding insurance against disconnection, and if it is concluded that organisations sufficiently value uninterruptible electricity supply then the provision of back-up generation will also provide protection against an ESEC invoked interruption.

## **ANNEX C - Summary of proposals**

We propose:

- For all priority users, to retain the requirement that consumers must be high voltage users with a discrete feeder.
- For all priority users, to retain the general requirement that consumers must be without back-up generation to be included on the list, but extend this to require consumers to demonstrate that it is not feasible for them to obtain back-up generation.
- To leave the Vital categories list unchanged other than to:
  - add emergency services (police, fire service, ambulance, coastguard and mountain/mine rescue)
  - add Armed Forces sites that are involved in the defence of the UK, those that may assist with civil resilience and those that support such activities.
  - remove postal services
- Abolishing the Food list, and :
  - Allowing organisations on the Food list to apply for inclusion on the Other list.
  - Placing organisations on the Food list that do not qualify for the Other list on a new Transition list for three years to give them time to make other arrangements.
- Changing the criteria for the Other list by :
  - Replacing the requirement for consumers to suffer “substantial damage” in the event of rota disconnection or to have a “continuous manufacturing process” with a requirement that they suffer physical plant damage (either on the protected site or a directly related one) of £50 million or more.
- Simplifying the application process and making the appeal procedure more transparent.

It is also our intention that the consultation is an opportunity to:

- Raise the profile of the scope of the priority user arrangements.
- Encourage consumers to have comprehensive contingency plans and arrangements to protect them from all causes of disruption to their electricity supply.

## **ANNEX D – Glossary**

<b>CHP</b>	Combined heat and power plant
<b>BERR</b>	Department for Business, Enterprise and Regulatory Reform
<b>Discrete Feeder</b>	An electrical circuit, usually high voltage, which is only used to provide electricity supply to one consumer, and allows the supply to other consumers to be interrupted from the control centre while supply to the consumer with the discrete feeder (usually a protected consumer) to be maintained.
<b>ESEC</b>	Electricity Supply Emergency Code
<b>High and low voltage consumers</b>	For the purpose of this document, high voltage consumers are defined as those with a dedicated substation and low voltage consumers as those embedded on low voltage distribution networks.
<b>High voltage</b>	Voltage greater than 1000 volts
<b>kV</b>	1000 volts
<b>kW</b>	1000 watts
<b>Network Operator</b>	Any public electricity supplier and any person who is authorised by a licence to transmit electricity
<b>Primary Substation</b>	A substation that transforms extra high voltage to high voltage, typically 33,000 volts to 11,000 volts
<b>Secondary Substation</b>	A substation that transforms high voltage to low voltage (230 volts)