OFGEM

INFORMATION AND INCENTIVES PROJECT

DEFINITION OF INPUT AND OUTPUT MEASURES

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1. INTRODUCTION

Ofgem has initiated a number of workstreams associated with the Information and Incentives Project (IIP) to introduce financial incentives on quality of supply outputs and published a consultation paper on output measures in June 2000. An associated report by PB Power on the Review of the PES Measurement Systems was published in July 2000. The PB Power Report (Workstream A) considered the accuracy and consistency of network performance data reported to Ofgem under Licence Condition 9 (England and Wales) and 6 (Scotland) based on a questionnaire and visits to distribution companies. It concluded that there were significant inaccuracies and inconsistencies in reporting arising from definitions of input and output measures and company systems of reporting. This report concerns Workstream B of the IIP project with the objective of defining two of the output measures proposed by Ofgem, and associated inputs, namely, the number of interruptions to supply and the duration of those interruptions, shown in (Appendix A). The third output measure, customer satisfaction, is not considered in this report. A working draft of this report has been circulated to companies and formed the basis for a workshop session with companies held on 24 August 2000. This report takes into account the output from the workshop and subsequent written responses. A summary of the written responses from companies is given in Appendix B.

Any comments on the Ofgem Final Proposals September 2000 and this P B Power report should be received by 30 October. They should be sent to: Cemil Altin, Ofgem, Stockley House, 130 Wilton Road, London, SWIV 1LQ, Email cemil.altin@ofgem.gov.uk Fax 020 79321675, Tel 020 79326301. Ofgem will consider the views of respondents in these areas in drawing up detailed regulatory reporting guidance for the IIP, which it intends to produce in draft form in November 2000.

Current Licence Condition 6/9 reports, quality of supply reports and GS and OS standards are based on data from the long standing electricity industry National Interruption and Fault Reporting Scheme (NaFIRS) 1990, operated by the Electricity Association (EA). Definitions and guidance are given on reporting to NaFIRS in EA documents Engineering Recommendation G43/2 and TR/17 together with Guides to the associated Microsoft Access based NaFIRS computer system. Network performance monitoring is complex and G43/2 arrangements have become the de facto standard for reports to Ofgem. All companies base their network performance reporting on G43/2, with minor variations, although not all contribute to NaFIRS nationally.

The proposals in this report have had regard to the information that may be required for Guaranteed Standards and Overall Standards of Performance (GS and OS standards) proposed for the distribution businesses in the last distribution price control review, in particular the proposed GS and OS standards on multiple interruptions (worse served customers). In drawing up regulatory guidance Ofgem has indicated that it wishes to maintain consistency where appropriate in the information required under IIP, Condition 6/9 and GS and OS standards and to avoid duplication of information. It would also be desirable to keep industry and Ofgem reporting requirements in step as far as possible

2. SUMMARY OF PROPOSALS

Appendix A of this report sets out definitions of output measures to be reported as part of the IIP, together with the definitions of the input measures required to derive the outputs. The proposals are also compatible with the information requirements for Guaranteed and Overall Standards.

The main proposals are:

A. The output measure for the duration of interruptions should continue to be based on the current measure of Average Customer Minutes Lost per Connected Customer.

B. The output measure for frequency of interruptions should be based on a new measure of Number of Customers Interrupted per 100 Connected Customers. This differs from the existing measure of Number of Interruptions per 100 Customers, as the proposed measure excludes re-interruptions during the same Incident. This will provide a more meaningful, consistent and auditable measure and avoid certain perverse drivers.

C. Customers and Customer Numbers have in the past been derived from supply business customer information systems. A new definition of Customer is proposed based on all metered connection points identified from Metering Point Administration Numbers (MPANs), taking into account multiple MPANs at the same connection point.

D. It is proposed that the Customers and Customer Numbers Involved in Incidents are identified from a connectivity model within Fault Management Systems/ Network Management Systems (FMS/NMS), preferably based on Customers being linked to the network at the level of the LV circuit emanating from distribution substations (HV/LV transformers). This will improve the accuracy and consistency of reporting Customer numbers and will assist the identification of Customers for GS payments, including automatic payments.

E. Reportable Incidents are redefined as all those Incidents which lead to interruptions to supply (or certain other circuit disconnections) of three minutes or longer, compared with the present threshold of one minute. This will better align reporting with European standard EN50160 and provide an incentive for system automation schemes that will speed up restoration of supply for some customers.

F. The definition of Incidents is otherwise little changed but is clarified in places. It is proposed to adopt the existing condition 6/9 categories of disaggregation for reporting under the IIP i.e. by voltage (132kV EHV, HV and LV/Services, Pre-arranged Interruptions, and Incidents arising on other networks (NGC/Transmission, Embedded Generators, and Other Systems). Any exclusions associated with Incentives will be identified later in the IIP project.

G. Companies have adopted various methods for reporting Short Interruptions (transients) in Quality of Supply Reports. It is proposed that the definition be standardised in IIP and be based on the Customer effects of all Short Interruptions less than three minutes, disaggregated by type. As indicated in the Ofgem Final Proposals, Short Interruptions reported under IIP will not count toward duration or frequency of interruptions and will not be subject to financial incentives.

H. A minimum level of regular company checks is proposed to ensure accuracy of reporting although Ofgem has indicated that it will also be introducing periodic audits.

3. PROPOSED OFGEM REPORTING REQUIREMENTS FOR INCENTIVES

3.1 Ofgem Performance Measures for Incentive Scheme

The Performance Measures proposed by Ofgem in the June 2000 Initial Proposals consultation paper are:

1. the number of interruptions to supply experienced by individual Customers

2. the duration of those interruptions per Connected Customer; and

3. the response that Customers receive when their supply is interrupted.

The first two performance measures are defined below. The issues and definitions associated with the third measure are being dealt with directly by Ofgem.

3.2 Definition of Output Measures

This section defines network performance indicators in line with the Ofgem Initial Proposals consultation paper dated June 2000 and are consistent with performance indicators required for Licence Condition 6/9 reports to Ofgem.

The output measures are derived from Fault and Interruption Reporting Systems (FIRS) which identify the number of Customers restored in each Restoration Stage of an Incident and the duration of each Restoration Stage.

3.2.1 Frequency of Interruptions – System Security

The average frequency of interruptions is expressed as the Number of Customers Interrupted per 100 Connected Customers and defines the first output measure. The proposed measure differs from the measure currently in use for reasons explained below.

Number of Customers Interrupted per 100 Connected Customers =

$$\frac{\text{The sum of the Number of Customers Interrupted for all Incidents X 100}}{\text{The Number of Connected Customers}}$$

The Number of Customers Interrupted in an Incident is the same as the number of Customers affected by the Incident, i.e. Number of Customers Involved in all Restoration Stages minus the Number of Customers Involved who were interrupted in earlier Restoration Stages of the same Incident. (Some Customers may be interrupted more than once during the same Incident and these re-interruptions are discounted.)

Incentives based on the current measure of Customers Interruptions (see below) would not be satisfactory because of inconsistency in reporting, which cannot easily be resolved and may become more of a problem as the threshold for long interruptions is extended from one minute to three minutes.

For comparison the current measure of frequency of interruption is defined as:

Number of Customer Interruptions per 100 Connected Customers =

$$\frac{\text{The sum of the Number of Customers Involved in all Restoration Stages for all Incidents X 100}}{\text{The Number of Connected Customers}}$$

This measure includes all Customer Interruptions experienced by Customers during the course of an Incident including re-interruptions.

Number of Customer Interruptions per 100 Connected Customers should continue to be monitored for a period of 5 years.

The new measure should be adopted for the following reasons:

a. Restoration of supply and fault location involves reconfiguration of the network which often leads to a number of restorations and re-interruptions over a relatively short period. Companies and individual reporters adopt different practices in reporting Restoration Stages, which leads to inconsistency in reporting. A more consistent measure of frequency of interruptions is required for the Incentive Scheme. Improvements in reporting procedures and definitions may improve consistency but differences will remain. A count of Customers affected by an Incident is not dependent on reporting all Restoration stages and the proposed measure will be more accurate and more easily audited. Some companies have already adopted the practice of discounting re-interruptions during an Incident in order to obtain a more stable measure when setting improvement targets for frequency of interruptions and worst served customers.

b. An incentivised measure which includes re-interruptions may lead to a perverse driver for companies not to provide temporary restoration of supply, e.g. by mobile generators which require short interruptions to other Customers for connection and disconnection.

c. The proposed measure is considered more meaningful, as Customers expect a number of interruptions during the course of an Incident. The number of Incidents affecting them over the reporting year is a more significant measure.

d. The proposed measure is also more appropriate for identifying worst served customers which Ofgem has indicated will be subject to an Overall and Guaranteed Standard of Performance. Re-interruptions could contribute significantly to any target and obscure the identification of truly worst served customers, i.e. those affected by most Incidents.

e. A single simple approach is required for all performance measures related to frequency of interruptions.

3.2.2 Duration of Interruptions – Availability

Availability is defined as the Average Number of Customer Minutes Lost per Connected Customer and is unchanged from current practice and defines the second output measure.

Average Customer Minutes Lost per Connected Customer =

$$\frac{\text{The sum of the Customer Minutes lost for all Restoration Stages for all Incidents}}{\text{The Number of Connected Customers}}$$

Where Customer Minutes lost in a Restoration Stage = the Number of Customers Involved in the Restoration Stage multiplied by the duration of the Restoration Stage in minutes calculated from the Date and Time of Restoration minus the Data and Time of Interruption for that stage.

In this case the measure is defined so as to include Customer Minutes rescued during temporary restorations which will incentivise temporary restorations. However there is inconsistency in reporting temporary restorations and it is proposed to include all temporary restorations of three minutes or longer. It is also recommended that there are no restrictions on the number of Restoration Stages available in Company reporting systems, again to improve the consistency of reporting.

One suggestion has been made to adopt a measure which defines the average duration of interruption experienced by Customers Interrupted. This measure is not recommended as an apparent improvement in this performance measure can occur when the average Customer Minutes lost are increasing. This would mean that it would not be clear if performance had improved even if the indicator had fallen. It could also provide a perverse incentive to increase interruptions to give an apparent improvement in performance.

3.2.3 Short Interruptions

Short Interruption is defined as an interruption to Customers due to a disconnection in the circuit upstream of the Customers Involved followed by the restoration of supply to all or some of the Customer Involved within a period of three minutes. The measure adopted for monitoring Short Interruptions includes the Customer effects of the Short Interruption as follows:

Number of Customer Short Interruptions per 100 Connected Customers =

$$\frac{\text{The sum of the Number of Customers Interrupted by Short Interruptions X 100}}{\text{The Number of Connected Customers.}}$$

3.2.4 Reliability

Reliability is defined as the number of reportable Incidents affecting plant and equipment expressed as:

a. Number of faults per unit length of circuit classification (per 100 km); and

b. Number of faults per unit of equipment classification (per 1000 Units)

Reliability is currently reported in Licence Condition 6/9 reports as a figure for the total network, excluding Services and is of limited value. Reliability issues are covered in Workstream C which deals with Medium Term Performance. Ofgem will include further information on monitoring Medium Term Performance in the draft reporting guidance which is expected to be produced in draft form in November 2000.

4. INPUT MEASURES

4.1 Input Measures to be defined

The main input measures defined include:

a. **Customers** and **Customers Involved** in **Incidents** and **Restoration Stages** and the annual average total number of **Connected Customers** connected to the distribution network required for producing standardised average output measures, e.g. **Average Customer Minutes Lost per Connected Customer** (CMLs) and **Customer Interruptions** per 100 Customers (CIs).

b. **Reportable Incidents** and the way these are disaggregated for setting Incentives.

c. **Incident** times, including, **Date and Time of Incident**, **Report Received Time** and **Restoration Stage Data** including **Data and Time of Interruption** and **Date and Time of Restoration**.

d. **Units of Plant and Equipment**: required for calculating reliability indices as Faults per 100 km and Faults per 1000 units of equipment.

4.2 Definition of input measures

4.2.1 Customers and Customer Numbers

Customers and Customer Numbers have in the past been derived from the supply business customer information systems. A new definition of Customer is proposed based on all metered connection points (exit and entry points) identified from Metering Point Administration Numbers (MPANs), excluding multiple MPANs at the same connection point.

Companies have developed one method for identifying metered Customers from MPANs and this is included as an example in the definitions in Appendix A. However some companies are not able to adopt the methodology shown in the example and the definition makes provision for companies to adopt different methods, based on MPANs, subject to the agreement of Ofgem.

Most companies accept a definition based on MPANs. One company has invested heavily in a GIS System for mains records and identifies Customers by means of Ordnance Survey Address Points and would have difficulty reconciling this data with MPANs. The company suggests that the criteria for identifying Customers should be based on accuracy criteria. However, the OS data does not match with MPANs and Customers Involved are systematically under-reported.
It is proposed by some companies that Customer numbers should exclude de-energised MPANs. However, this is a technical state, which is not applied or notified consistently by Suppliers. A definition, which excludes de-energised services, would require considerable effort to monitor, as there are frequent changes. This may lead to a higher chance of error and more complex audit

arrangements. The output measures for incentives are normalised and will be virtually the same whether or not de-energised MPANs are included.

It is therefore recommended that the number of Customers be based on all energised and de-energised metered connection points (exit and entry points). The proposed definition does not preclude companies from identifying de-energised Customers in order to avoid inappropriate payments under Guaranteed Standards of Performance.

A definition of Customer based on all metered connections identified from MPANs lends itself to use in other regulatory returns and simplifies overall audit arrangements.

Total Connected Customers are identified from a count of Customers as at 30 September in the reporting year to give a mid-year average, in line with current practice. This would not preclude companies using figures based on other dates for their own internal reporting throughout the year.

4.2.2 Customers and Numbers of Customers Interrupted

The proposals for identifying Customers and Customer Numbers are included in the definitions as follows:

a. Customers Involved in each Restoration Stage shall be identified from a connectivity model in which Customers are individually linked with the section of network to which they are connected. Best practice is where low voltage Customers are linked with the low voltage circuit emanating from the associated distribution substation, (or sub circuit if the company so wishes). The Customer connectivity model shall be such as to provide a minimum accuracy of 95% overall and 90% for the LV aggregate.

b. The Number of Customers Involved for single phase and two phase LV faults may be calculated on a pro-rata basis, i.e. 1/3 or 2/3 of the total number of Customers connected to the LV circuit, or part of circuit, affected.

c. Individual Customer phase connections do not need to be identified but the phases involved in each Restoration Stage shall be recorded in order to facilitate the identification or confirmation of individual Customers Involved for the purposes of payments under GS standards, including automatic payments where applicable.

d. Customers Involved for HV, EHV and 132 kV Restoration Stages shall be identified from a connectivity model which is based on the model at successive lower voltage levels and shall take account of the real time changes to 132kV/EHV/HV network configuration during restoration.

e. The connectivity model shall be maintained up to date and the numbers of Customers in the model shall be reconciled with the total number of Connected Customers on a monthly basis.

Four companies currently have LV connectivity models, seven have connectivity models based on Customers linked to HV/LV transformers or substations and the remaining three companies base Customer numbers on average number of Customers per transformer or type of transformer.

The benefits of a LV Connectivity model are as follows:

i. Most LV Incidents involve disconnection of one or more phases at the source substation and LV connectivity provides a pre-determined value for Customer numbers, pro rata for one and two phase faults. Customer numbers on all LV circuits are reconciled with the total LV Connected Customers and errors due accuracy of customer numbers and phasing self cancel at the aggregate level with no systematic bias. The alternative is to rely on estimates made on site or in offices or numbers based on averages. This leads to significant inaccuracies for individual incidents and these may contain bias such that errors to not cancel at the aggregate LV level.

ii. Companies argue that the contribution of LV faults to the proposed output measures is relatively low, i.e. 5% to 40%. However the proportion is increasing due to the improvements to HV network performance and a regime needs to be established to meet future requirements for accuracy.

iii. It is anticipated that Ofgem will set IIP incentive targets on overall network performance measures. However in setting targets it may be necessary to consider the relative performance at a disaggregated level which will require a minimum level of accuracy at each level regardless of its contribution to the overall measure.

iv. A LV connectivity model enables individual Customers to be identified with an Incident to facilitate identification of Customers for Guaranteed Standards payments, including automatic payments. This will become more important with the introduction of Guaranteed and Overall Standards for worst served customers.

v. LV connectivity models enable Customers to be identified for notification of Pre-arranged outages and provision of information in response to no-supply calls, which are subject to existing or proposed Overall or Guaranteed Standards.

vi. Companies with accurate links to LV circuits may feel disadvantaged when compared in an Incentive Scheme with companies with less accurate systems. Most companies experience a step change in output measures (up to 30% adverse) when more accurate methods are introduced.

vii. Existing connectivity models based on HV/LV transformers are mainly based on geographic links to substations and do not always accurately reflect connectivity. Accuracy is likely to drift if there is no sound basis for change management and such models are not easily audited. Customers involved in LV Incidents are based on estimates, which are not reconciled against the total number of Connected Customers, and systematic errors will not cancel at the aggregate LV level. The most accurate method of developing and maintaining a Connectivity model is by means of an accurate record of Customer connections to the network, which is mostly at LV.

viii. Customer connectivity based on geography and average Customers per transformer does not produce output measures to the required accuracy. Inaccuracies arise for example because faults are more likely on longer than average LV circuits, with more Customers and on old HV and LV networks with higher Customer density. One company has reported 10% inaccuracies in output measures based on averages.

ix. The current condition 6/9 reports indicate a significant variation in LV network performance ranging from 4% to 20% (excluding London 40%). Some of this variation indicates inconsistency in LV reporting and improvements can only be expected if all companies adopt accurate LV connectivity models.

Companies' estimates of costs of introducing LV connectivity models are of the order of £2-3m upwards. Some of these estimates are considered high as they include the cost of introducing full GIS mains records systems. GIS systems are not necessary for LV connectivity models and some companies already have LV connectivity models, which are not linked to full GIS records. Introducing LV connectivity models may involve some modification of FMS systems, estimated at up to £0.25m and development of IT systems for data collection to establish the LV model, estimated at £0.25m. Fixed costs may therefore be up to £0.5m with an additional cost of £0.50 per customer for capture of customer connectivity to populate the LV connectivity model. The additional cost for companies currently replacing FMS systems is likely to be lower as the FMS systems and LV connectivity model can be introduced from new.

Identification of phases is not proposed at this stage although many companies have some record of phases (up to 85% in some companies) which will contribute further to accuracy. Phase data could be collected later or progressively over time. The cost of LV connectivity will not be stranded if phase identification is required later, as this can be collected independent of connectivity.

However should companies develop new or improved HV connectivity models, the costs would be stranded if it later became necessary to replace these with LV connectivity models as the HV models do not capture the connection to the LV network. It is important that the methods adopted for IIP are robust over time.

4.2.3 Reportable Incidents

Reportable Incidents are shown diagrammatically in Figure 1. This is based largely on existing reporting requirements for Licence Condition 6/9 reports and company options within NaFIRS.

The most significant change comes from the proposal that reportable Incidents are defined as all Incidents which lead to interruptions in Supply to Customers (and certain other circuit disconnections) of three minutes of longer, compared with the present threshold of one minute. This is in line with European Standard EN50160 and provides an incentive for system automation schemes, which will speed up restoration of supply. One company says that this will be of particular benefit to Customers in rural areas.

EN50160 defines an interruption in terms of the voltage falling to below 1% of nominal voltage. The definition for Ofgem reports is based on a physical disconnection in the circuit upstream of Customers, in line with historic UK reporting practice. The EN50160 definition can lead to ambiguity where the voltage may not fall to below 1% for all circumstances leading to a disconnection.

Consideration has been given as to whether this change will lower the incentive to minimise interruptions of up to three minutes for operational convenience, e.g. Short Interruptions for the operation of embargoed switchgear. It is considered that this concern will be met by proposals for reporting Customer Short Interruptions.

The definition of Incidents is otherwise little changed but in some cases has been clarified. It is proposed that 132 kV Short Interruptions are not in future counted as sustained Incidents and other

aspects of 132 kV and EHV/HV Incidents have been aligned. Definitions make it clear that Incidents involving meters, timeswitches, and cut outs, including cut out fuse operations are excluded.
Some companies have suggested that certain other Incidents should be excluded for the purposes of the incentive scheme e.g. third party damage, industrial action and severe weather. No additional exclusions to existing definitions are proposed at this stage, in line with Ofgem initial proposals.

It is proposed to adopt the existing Licence Condition 6/9 categories of disaggregation by voltage categories (132kV EHV, HV and LV/Services, Pre-arranged Interruptions, and other networks (NGC/Transmission, Embedded Generators, and Other Systems) for IIP. A proposed definition is included for the classification of LV Service Incidents, based on the current practice of classification of the main equipment involved. Ofgem has also put forward proposals to collect output measures at the HV circuit level.

The definition of Pre-arranged Incidents now excludes interruptions less than three minutes (previously five minutes) to bring it into line with other Incidents. Pre-arranged interruptions also exclude interruptions agreed with individual Customer for work on services.

4.2.4 Incident Times

The existing terminology and definitions have been retained for Date and Time of Incident, and Report Received Time. The existing fault reporting arrangements make provision for a best estimate to be made of the Date and Time of Incident, which by definition is the date and time of the first interruption for Customer Involved Incidents. This allows companies to accurately record the time of an interruption where this is earlier than the Report Received Time. The difference between Incident Time and Report Received Time is about two minutes on average (with one outlier of 10 minutes).

Companies are concerned that they may be disadvantaged by best estimates in an incentive regime. However the difference is small and companies should be encouraged to accurately record times provided by Customers in good faith as this information may well be relevant to providing good customer service. If an estimate becomes too subjective, companies should adopt the Report Received Time as they do now.

No changes are therefore proposed to existing definitions and practices.

4.2.5 Restoration Stage Data

There are significant differences between companies in reporting Restoration Stage data, both in terms of company policy, the capability of information systems and practices of reporters. These differences are mainly associated with the number of Restoration Stages reported, the derivation of the number of Customers Involved and suppression by some companies of re-interruptions following temporary restorations. Different practices can have a significant impact on consistency of data. For example, companies report increases in CMLs of 30% by improving the accuracy of reporting Customer numbers. Companies estimate that suppressing re-interruptions during temporary Restoration Stages can decrease Customer Interruptions per 100 Customers by 20%.

Consistency in reporting will be improved by the following:

a. There should be no limit to the number of Restoration Stages reported.

b. The measure of frequency of interruptions should be based on Customers Interrupted during an Incident by discounting re-interruptions.

c. Customer minutes supplied during temporary restorations of three minutes or more should be taken into account in reporting Customer Minutes Lost.

There is some ambiguity in the current definitions about the circumstances under which a new Incident is reportable. The proposed definitions make it clear that concurrent Incidents can exist on the same section of network. An additional requirement is proposed that a new Incident should be reported when Customers are re-interrupted after all Customers have been restored from the network for a period of 3 hours.

4.3 Short Interruptions (Transients)

A Short Interruption is defined as an interruption to Customers, due to a disconnection in the circuit upstream of the Customers Involved, followed by the restoration of supply to all or some of the Customer Involved within a period of three minutes. The output measure to be reported is Customer Short Interruptions per 100 Connected Customers.

It is proposed to monitor Short Interruptions due to all causes and the definitions in Appendix A describe three categories for disaggregating Short Interruptions in order to monitor the affect of different drivers. However, it is not proposed to report all Short Interruptions during fault sectionalising, (after the operation of any initial restoration in the first three minutes) as these are viewed differently by Customers and will distort the figures. It would be an anomaly to count Short Interruptions during fault sectionalising when longer re-interruptions are being discounted.

Where reclosing circuit breakers are not monitored by SCADA it is not possible to identify the number of reclosures required for a successful auto-reclose. In these cases the number of Customer Short Interruptions reported will need to be based on the number of circuit breaker operations recorded on counters over the course of a year, less any lock outs that are identified as long interruptions.

5. QUALITY CONTROL

Formal quality procedures are required to ensure that companies use consistent and auditable processes for the collation of input and output measures. The formal procedures should reflect the definitions set out by Ofgem and the particular types and the level of integration of the IT systems employed by the companies. The procedures should cover the quality of the information set out below.

5.1 Critical Information Flows

The accuracy and consistency of the following information flows are fundamental to the proposed Ofgem output measures:

a. 132 kV, HV and LV Incident Capture

b. 132 kV, HV and LV Customer Numbers

The formal procedures should include guidelines to personnel responsible for the processing of the above information and the systems, whether fully computer-based or pencil-and-paper based, should

include requirements for checking and "sign-off" of each FIRS report by appropriate staff and also the audit arrangements.

5.2 Controls on Reportable Incidents

There should be a monthly reconciliation of the total number FMS and NMS Reportable Incidents with the total number of Reports in FIRS, where these are separate. In addition there should be a random sample audit of 5% of HV Incidents and 1% of LV Incidents to check accuracy and consistency of reports. There should be a formal company report on the outcome of the reconciliation and sample audit that can be made available for external audit purposes.

Incidents of all types captured in FMS and NMS should be arranged to automatically set up Incidents in FIRS at the appropriate level of disaggregation.

5.3 Controls on Customer Numbers and Connectivity

The updating of the Customer to network LV connectivity model should be continuous with formal procedures linking the connectivity model to all relevant customer management processes. There should be a monthly reconciliation of the total number of Customers in the connectivity model with the total number of Connected Customers from MPRS. There should be a formal company report on the outcome of the reconciliation that can be made available for external audit purposes.

5.4 Controls on Circuit Lengths and Equipment Numbers

The Circuit Lengths and Equipment Numbers (disaggregated in accordance with reporting requirements) required for producing standardised data should be based on the total numbers at 30 September in the reporting year. There should be a formal company report on the total numbers that identifies the additions and deletions to the totals for the previous September for each of the disaggregated items. This report should be made available for external audit purposes.

6. DOCUMENTATION

Consideration is required as to the form of reporting instructions for Ofgem reporting for both the existing licence condition and the proposed incentive scheme. Ofgem will specify its reporting requirements separately and definitions could be included in a document similar to the “OFFER Guidance and Proposals for Best Practice” for GS and OS Performance Standards.

However it would also be appropriate for companies to consider aligning the industry and company reporting instructions, including G43/2 and associated PC NaFIRS information systems and company instructions for those companies not a party to NaFIRS. This should ideally identify any differences between NaFIRS, company level and Ofgem reporting requirements to ensure that there is clarity, consistency and accuracy in Ofgem reporting.

It would also be helpful if the PC NaFIRS system continues to be capable of producing all the Ofgem reports (GS/OS, Licence Condition 6/9 performance reports and reports for the proposed incentives scheme). The clarity of instructions and documentation adopted by companies and compliance of information systems and the understanding of staff involved in reporting would be a part of the Ofgem audit process.

APPENDIX A

Input and Output Measures for Ofgem Incentives

APPENDIX A
INPUT AND OUTPUT MEASURES FOR OFGEM INCENTIVES

A1. OUTPUT MEASURES

The measures set out below are defined for the purposes of Licence Condition 6/9 reporting and Incentives.

A1.1 Duration of Interruptions

Average Customer Minutes Lost per Connected Customer =

The sum of the Customer Minutes lost for all Restoration Stages for all Incidents
The Number of Connected Customers

Where Customer Minutes lost in a Restoration Stage = the Number of Customers Involved in the Restoration Stage multiplied by the duration of the Restoration Stage in minutes calculated from the Date and Time of Restoration minus the Data and Time of Interruption for that stage.

A1.2 Frequency of Interruptions

Number of Customers Interrupted per 100 Connected Customers =

The sum of the Number of Customers Interrupted for all Incidents X 100
The Number of Connected Customers

Where the Number of Customers Interrupted in an Incident = the number of Customers affected by the Incident, i.e. Number of Customers Involved in all Restoration Stages minus the Number of Customers Involved who were interrupted in earlier Restoration Stages of the same Incident, (some customers may be interrupted more than once during the same Incident and these re-interruptions are discounted).

For comparison the current measure of frequency of interruption is defined as:

Number of Customer Interruptions per 100 Connected Customers =

The sum of the Number of Customers Involved in all Restoration Stages for all Incidents X 100
The Number of Connected Customers.

The Number of Customers Involved in each restoration stage in this case includes all re-interruptions.

Number of Customer Interruptions per 100 Connected Customers shall continue to be monitored for a period of 5 years.

A1.3 Short Interruptions

A Short Interruption is defined as an interruption to Customers due to a disconnection in the circuit upstream of the Customers Involved followed by the restoration of supply to all or some of the

Customers Involved within a period of three minutes. The measure adopted for monitoring Short Interruptions includes the Customer effects of the Short Interruption as follows:

Number of Customer Short Interruptions per 100 Connected Customers =

$$\frac{\text{The sum of the Number of Customers Interrupted by Short Interruptions X 100}}{\text{The Number of Connected Customers.}}$$

A1.4 Reliability

Reliability is defined as the number of reportable Incidents affecting plant and equipment expressed as:

a. Number of faults per unit length of circuit classification (per 100 km); and

b. Number of faults per unit of equipment classification (per 1000 Units)

A2. CUSTOMERS AND CUSTOMER NUMBERS

A2.1 Customer

A Customer is defined as:

Energised and De-energised metered connection points supplied from the distribution network as identified from Metering Point Administration Numbers (MPANs). Only one Customer shall be identified at each connection point by taking account of the multiple MPANs that may be associated with a single connection point due to the type of tariff and/or metering arrangements.

One method of identifying Customers is as follows:

a. Primary MPANs in respect of profile classes 1-4, excluding related/subsequent MPANs (determined using Line Loss Factor Class); and

b. The premises within profile classes 5 – 8 and Half hourly metered Customers.

Only one “tariff” per premise to be counted (i.e. MPANs in respect of additional concurrent meters to be ignored).

Some companies do not identify primary MPANS and are investigating the possibility of identifying these Customers from meter timeswitch codes within the Metering Point Registration System (MPRS).

The method adopted by companies to identify Customers shall be agreed with Ofgem.

This definition does not preclude companies from identifying de-energised Customers in order to avoid inappropriate payments under guaranteed standards of performance.

A2.2 Number of Connected Customers

Number of Connected Customers is defined as:

The total number of Customers connected to the company's distribution network as at 30 September in the reporting year.

A2.3 Customers Involved in a Restoration Stage

Customers Involved in a Restoration Stage is defined as the Customers connected to that part of the distribution network restored in the Restoration Stage, including certain temporary restorations e.g. mobile generators. See Section 3.3.4

Customers Involved in each Restoration Stage shall be identified from a connectivity model in which Customers are individually linked with the section of network to which they are connected. Best practice is where low voltage Customers are linked with the low voltage circuit emanating from the associated distribution substation, (or sub circuit if the company so wishes). The Customer connectivity model shall be such as to provide an overall accuracy for the output measures of 90% for the aggregate of LV Incidents and 95% overall.

The Number of Customers Involved for single phase and two phase LV faults may be calculated on a pro-rata basis, i.e. 1/3 or 2/3 of the total number of Customers connected to the LV circuit, or part of circuit, affected.

Individual Customer phase connections do not need to be identified but the phases involved in each Restoration Stage shall be recorded in order to facilitate the identification or confirmation of the individual Customers Involved for the purposes of payments under GS standards, including automatic payments where applicable.

Customers Involved for HV, EHV and 132 kV Restoration Stages shall be identified from a connectivity model which is based on the model at successive lower voltage levels and shall take account of the real time changes to 132kV/EHV/HV network configuration during restoration.

The connectivity model shall be maintained up to date and the numbers of Customers in the model shall be reconciled with the total number of Connected Customers on a monthly basis.

A2.4 Number of Customer Interruptions in an Incident

The Number of Customer Interruptions in an Incident is defined as the sum of the Numbers of Customers Involved in each Restoration Stage of an Incident.

Note: This is the current measure for frequency of Interruption in which some Customers may be counted more than once where they are re-interrupted (and re-restored) during the course of the same Incident.

A2.5 Number of Customers Interrupted by an Incident

Customers (and Number of Customers) Interrupted in an Incident is defined as the Customers (and Number of Customers) that experience one or more interruptions during the course of the same Incident. i.e. the number of Customers affected by the Incident. It is calculated from the Number of

Customers Involved in an Incident minus the Number of Customers Involved who were interrupted in earlier Restoration Stages of the same Incident.

A3. INCIDENT

A3.1 Definition of an Incident

Incidents involve a physical break in the circuit upstream of the Customers Involved, due to automatic or manual operation of switchgear or fusegear, or due to any other open circuit condition and include:

a. Any occurrence on the distribution system of three minutes duration or longer, which:

i Results in an interruption of supply to Customer(s).

OR

ii. Prevents a circuit or item of equipment from carrying normal load current or being able to withstand through fault current.

b. The urgent unprogrammed isolation of any circuit or item of equipment, energised at power system voltage, for reasons other than routine maintenance.

c. Failures of non-system equipment (e.g. pilot cables, oil and gas alarms, voltage control equipment etc) which result in the disconnection of equipment energised at power system voltage.

d. Incorrect operations of protection equipment which result in the interruption of a circuit energised at power system voltage.

e. Failures to operate by protection equipment. This includes Incidents where the main protection fails to operate and a fault clearance is initiated by back-up protection or protection at another point on the network.

f. Any interruption to supplies to Customers caused by Incidents on systems owned by the National Grid Company/Transmission Company, other Distribution Company, embedded generator, or arising from loss of supply to these systems. Such Incidents are not included in reliability indices but the customer effects are reportable and should be separately classified as attributable to “NGC/Transmission Company”, “Other systems” or “Embedded Generator”.

g. Any Pre-arranged Incident which involves interruption of supply to Customer(s) for three minutes or longer for which statutory notification has been given to all Customers affected at least 48 hours before the commencement of the earliest interruption. Such Incidents and customer effects are reportable and should be separately identified as “Pre-arranged”.

A Pre-arranged Incident which requires a number of switching operations involving the loss of supply to Customers should be treated as a single Incident provided that the outage times are within the period stated on the statutory notice.

The following Incidents are NOT reportable:

a. Maintenance outages and malfunctions of non-system equipment (e.g. pilot cables, etc) which do not result in the disconnection of equipment energised at power system voltage.

b. Any incident involving equipment beyond the boundary of the distribution system e.g. on Customers' equipment or other authorised electricity operator's system, which is cleared by the correct operation of the distribution company's protection and which does not interrupt the supply to other Customer(s).

c. Pre-arranged Incidents affecting single Customers for the purposes of meter changes, voltage standardisation, maintenance of service cables and the Distribution Company's protective devices are not reportable.

An Incident is considered complete when supplies are restored to all Customers Involved in the Incident and all the equipment involved in the Incident is returned to service or permanently disconnected from the network. This does not require the restoration of the normal network configuration and open points.

Repair times are often longer than restoration times and a new Incident must be raised in the event that a further interruption is required to carry out repairs after all Customers Involved have been permanently restored from the network for a period of 3 hours or longer, i.e. excluding restorations by generators or temporary connections.

A further Incident must be raised if another reportable Incident occurs which affects part of the network and/or Customers already affected by an Incident. Two or more Incidents may then be active concurrently and Customer effects shall be attributed as appropriate.

A3.2 Disaggregation of Incidents

Incidents and associated customer effects shall be disaggregated as follows:

a. Pre – arranged

b. Other Systems

c. National Grid Company/Transmission Company

d. Embedded Generators

The remaining fault Incidents shall be disaggregated in the following classifications:

i. 132 kV

ii. EHV

iii. HV

iv. LV

v. LV Services

A3.2.1 Boundaries

Boundaries are defined below.

A3.2.1.1 132 kV Boundary

The "lower boundary" of the 132 kV system should be taken as the supply terminals of the Distribution Company's Customers supplied at 132 kV or the load side terminals of switchgear controlling the secondary (lower voltage) side of 132 kV transformers. If no switchgear exists between the secondary side of the 132 kV transformer and the primary side of an EHV or HV system transformer then the "lower boundary" should be taken as the secondary side terminals of the 132 kV transformer. The lower voltage busbars and their protection equipment at 132 kV/lower voltage substations are NOT included.

The "upper boundary" of the 132 kV system should be taken as the point at which ownership of the 132 kV circuit or plant becomes the responsibility of the Distribution Company.

A3.2.1.2 EHV and HV Boundaries

An HV system is one which operates at a nominal voltage in excess of 1000 V but less than 22 kV. An EHV system is one which operates at a nominal voltage equal to or greater than 22 kV, but less than 132 kV.

The "lower boundary" of HV and EHV systems should, for the purposes of this Scheme, be taken as the supply terminals of consumers supplied at HV or EHV, and in other situations as the load side terminals of the protection equipment connected to the secondary side (low voltage) of distribution transformers. The "upper boundary" should in general be taken as the busbar side of lower voltage switchgear of transformers whose primary voltage is 132 kV or above and whose secondary voltage is EHV or HV. If no secondary switchgear exists, the "upper boundary" should be taken as the secondary side terminals of the transformer; faults on the system connected to the secondary voltage terminals of the transformer should be reported as EHV/HV faults and not as 132 kV faults.

In practice companies will normally report and disaggregate by each discrete voltage level in order to report to the above classifications.

A3.2.1.3 LV Boundaries

For the purposes of this Scheme, a LV system is one that operates at a nominal voltage of 1000 V or less.

The upper boundary should be taken as the load side terminals of the protection equipment connected to the secondary side (low voltage) of distribution transformers, the lower boundary being the Distribution Company's side terminals of the Distribution Company's own protective devices to Customer (e.g. cut-outs or fuses). For the purposes of incident reporting the LV system excludes cut outs, metering equipment, time-switches and associated wiring.

A3.2.1.4 LV Services

Within the LV classification above, LV Services are defined according to the function and size of the main equipment involved in the Incident as follows:

a. Cables, overhead lines or surface wiring having a copper equivalent cross sectional area of less than 50 $mm^{2,}$ which provide the final connection to Customer(s).

b. Cables, overhead lines or surface wiring of any size which provide the final connection to a single Customer.

Note that incidents on meters, time-switches and cutouts, including cut out fuse operations are excluded from Licence Condition 6/9 and Incentives reporting requirements and the definition of Services therefore excludes this equipment. (Cut out fuse replacements are however separately monitored for GS standards reporting and penalty payments.)

A3.2.2 Company Options

Options may be exercised by individual Distribution Companies to separately monitor incidents involving unmetered services, meters, timeswitches, cut outs and cut out fuse operations.

A3.3 Incident Times

A3.3.1 Date and Time of Incident

The date and time of the occurrence is the earlier of:

a. The time at which Customers lose normal supply

OR

b. The time at which the circuit is automatically or deliberately disconnected

In the case of third party damage or decay and deterioration, the Date and Time of the Incident is not necessarily that at which the damage or defect occurred, but the time at which Customers were affected or the circuit disconnected.

Because of the way an Incident is defined, the Date and Time of Incident is always the same as the Date and Time of the First Interruption for Customer Involved Incidents.

When the actual Date and Time of Incident is not known from alarms or reports from operators, a best estimate should be made based on all information available, taking into account reports from Customers and circumstances such as weather and operating conditions.

Where the Date and Time of Incident is based on the time the Incident was reported, i.e. Report Received Time, it shall be based on the earliest report of the Incident. Some companies wait for a second report before initiating action but the Date and Time of the Incident shall be based on the first report.

A3.3.2 Report Received Time

This is the time that the company first becomes aware of an Incident and may be:

a. The time at which a Customer (or other persons) first contacted the Company to advise of no-supply or of some suspected abnormality.

b. The time at which an alarm was received by the Distribution Company indicating an abnormality.

c. The time at which a Distribution Company employee or agent identified the existence of an abnormality.

The Report Received Time will normally equal or follow the date and time of the first interruption (e.g. when an alarm is received from supervisory equipment or where no-supply calls from consumers are the first indication received of an abnormality). The Report Received Time may precede the time of the first interruption only when deliberate disconnection is later carried out by the Distribution Company or in the case of some Arc Suppression Coil held faults.

A3.3.3 Date and Time of Completion of the Incident

An Incident is considered complete when supplies are restored to all Customers Involved in the Incident and all the equipment involved in the Incident is returned to service or permanently disconnected from the network. (See also A3.1)

A3.3.4 Restoration Stages and Date and Time of Interruption and Date and Time of Restoration

A Restoration Stage is defined as a stage of an Incident where Customers (and/or a circuit or part of a circuit) are re-energised, excluding any re-energisation which is immediately followed by a circuit trip. The key performance indicators are influenced by the number of Restoration Stages reported and companies IT systems, pro formas etc. should not limit the number of Restoration Stages reported.

The Date and Time of Interruption and the Date and Time of Restoration must be recorded for each Restoration Stage. The Numbers of Customers Involved and the elapsed time in each Restoration Stage shall be used to calculate performance measures of Average Customer Minutes Lost per Connected Customer and Number of Customer Interruptions per 100 Connected Customers and Number of Customers Interrupted per 100 Connected Customers.

All restoration stages shall be recorded and those involving re-interruptions of Customers previously interrupted in the same incident shall be separately identified in order to calculate the Number of Customers Interrupted per 100 Connected Customers by discounting those re-interruptions.

The restoration stage data shall be recorded such that it is possible to identify and count the customer minutes rescued during temporary restorations of three minutes or more and discount those of less than three minutes.

A4. SHORT INTERRUPTION

A Short Interruption is defined as an interruption to Customers due to a disconnection in the circuit upstream of the Customers Involved followed by the restoration of supply to some or all of the

Customers Involved within a period of three minutes and includes the following occurrences, which shall be separately classified.

a. Interruptions, of less than three minutes, due to a fault on the distribution network where some or all the Customers Involved are successfully restored by automatic switching within three minutes of the first interruption.

   In the case of multi-shot reclosing schemes, only one Short Interruption is to be counted where the successful restoration is achieved by a sequence of multiple operations, where these are identifiable. Where the sequence of operations is not identifiable, then a simple count of all operations of automatic reclosing device(s) is to be used.

b. Interruptions, of less than three minutes, due to a fault on the distribution network where some or all the Customers Involved are successfully restored by manual or remote control switching within three minutes of the first interruption.

   This definition includes only the initial restoration. Subsequent short interruptions during the subsequent stages of fault sectionalising are not included.

c. Interruptions, of less than three minutes, due to other causes such as deliberate disconnection for operational or emergency reasons. The definition excludes interruptions due to incidents on the networks of NGC/Transmission, Other network operators and Embedded Generators.

Customers Involved are identified in the same way as for normal Incidents.

The date and time of Short Interruptions is not required as some may need to be identified from a periodic count of circuit breaker operations. Where this is the case the counter shall be read annually between 1 January and 31 March to ensure a reasonable approximation to a 12-month total.

APPENDIX B

Summary of Company Responses on Definitions

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Summary of Company Responses on Definitions

Output Measures

Proposal	Company Responses	Comments
Simple definition adopted using current terminology.	Yorkshire – Use familiar measures to define inputs and outputs.	IEC definitions may not provide the precision required and are not easily understood.
Use existing definition of CMLs and count CMLs rescued during temporary restorations of three minutes or more.	Eastern – Agrees EME- Agrees London – Agrees Include CMLs during temporary restorations Midlands – Agrees Include CMLs during temporary restorations Northern – Agrees Include CMLs during temporary restorations Norweb - Agrees Include CMLs during temporary restorations with no time limit Seeboard – Agree Include CMLs during temporary restorations Southern/Hydro – Agrees Include CMLs during temporary restorations – currently use 10 minute rule Swalec - Agrees ScottishPower/Manweb – Agrees Minimum time for temporary restorations (10 or 15 minutes) Western – Disagrees – Prefers CAIDI (average duration of interruption) as a measure. Alternatively CML should be the sole measure as it includes duration and frequency. Include CMLs during temporary restorations. Yorkshire – Agrees but suggests that CMLs in temporary restorations less than one hour would not be counted.	Three-minute rule for counting CMLs during temporary restorations is somewhat arbitrary but provides consistency. CAIDI is not a reliable indicator as it can decrease due to a large number of short interruptions when CMLs are increasing. The frequency element of CMLs is not so easily understood.

Frequency of interruptions based on customers interrupted during an incident not customer interruptions i.e. excludes all re-interruptions in the same incident. **Continue to monitor, but not report, the current measure based on number of customer interruptions per 100 connected customers.**	Eastern – Agrees but there needs to be some time limit after which a new incident is reported. EME – Agrees and this is the basis of current reports on worst served customers London – Agrees Continue to monitor current measure. Some time limit required after which a new incident is reported. Midlands – Agrees – Some companies already report on this basis Northern – Agrees Norweb - Agrees Seeboard – Agrees Southern/Hydro – Agrees Scottish Power/Manweb – Agrees – more reliable indicator of security. Swalec – Record all re-interruptions to maintain trend data. Base measures for worst served customers on HV interruptions only. Western – Agrees Yorkshire - Agrees Suggests all interruptions over three minutes in 24 hours are treated as same incident but only one counts towards CIs.	It is not possible to define granularity of reporting re-interruptions sufficiently to obtain consistency in reporting if current measure is used. Proposed measure will be more accurate and consistent, less volatile and more appropriate and credible for incentives and worst served customers. Different measures for condition 6/9 incentives and worst served customers would be confusing. There will be less opportunity for gaming. There will be no disincentive for temporary restorations. Measure is more simple and understood by customers who expect multiple interruptions during an outage. Present inconsistencies will require targets to be rebased anyway. Three-minute rule proposed for temporary restorations not re-interruptions. Time limit for reporting new incident/interruptions is covered in proposed definition of incident.

Customers and Customer Numbers

Proposal	Company Responses	Comments
Customers based on MPAN numbers taking account situations where more than one MPAN is associated with a connection point. **An example method of identifying customers is given but not prescribed.**	Eastern – Agrees but companies need to confirm accuracy EME – Agrees London – Agrees Midlands – Agrees Northern – Agrees Norweb – No comment thought to agree Seeboard – Agrees but cannot use proposed method and is investigating alternative based on MPRS timeswitch codes. Southern/Hydro – Agrees ScottishPower/Manweb – Agrees Western – Agrees but proposes a more general definition excluding single site duplicates. Yorkshire – Disagrees Proposes less prescriptive definition based on accuracy requirements. OS Address Points will give 9 5% accuracy.	A more general definition has been developed which would allow options for identifying connection points (exit and entry) from MPANs to be agreed for each company by Ofgem. There is no match between OS Address Points and MPANs or connection points and accuracy cannot be assured or audited. 9 5% accuracy on customer numbers will not give 95% accuracy on overall measure due to other inaccuracies of incident count and restoration times.
Customer numbers based on De-energised and Energised MPANs	Eastern – Disagrees EME – De-energised status driven by suppliers and not consistent London – Disagrees Midlands – not specific Northern – Agrees Proposes De- Energised and Energised connections. Numerator and denominator should be from same source for CMLs and CIs. Norweb – no comment Seeboard- Agrees Energised and De-energised MPANs are easier to count with fewer changes. Suppliers have different approach to de-energisation. No difference in normalised indicator. Number can be used for other regulatory purposes. Southern/Hydro – Use of de-energised MPANs in real time is complex more research required on practicality ScottishPower/Manweb – no comment Western – Disagrees Yorkshire – Accuracy can be achieved from OS address codes.	The use of De-energised MPANs was the view of the workshop. However this measure is virtually the same as one based on all MPANs which is not so volatile and is more easily measured and audited and is likely to be more accurate. Separate arrangements can be made to avoid inappropriate GS payments. Northern, Seeboard and Southern arguments are persuasive and may be readily accepted by others.

Customers and Customer Numbers based on LV Connectivity model (or LV node if a company so desires). Dynamic model (at HV) required for HV incidents **Record phase affected for LV incidents (but not HV)**	Eastern – Disagrees due to cost and accuracy EME – Agrees London – Disagrees due to complexity of network and cost of data collection and low number of worst served customers. Alternative method of LV connectivity being explored. Midlands – Agrees and should apply to all PES. Phase connectivity requires further assessment. Northern – Record LV phase but not HV phase affected Norweb – Disagrees too expensive and inaccuracies remain. Difficulties mapping from MPANs to mains records. GIS system is required. Agree need to record LV phase affected but not at HV. Seeboard – Disagrees with LV connectivity but agrees recording LV phase affected (not HV) Southern/Hydro – Disagrees but agrees with recording both LV and HV phase affected. ScottishPower /Manweb – Disagrees due to cost. GIS system would be required. Swalec – Disagrees LV connectivity will not improve accuracy and would require full GIS platform. Western – No comment (outside scope?) Yorkshire – Agrees but suggests monitoring single phase HV faults which only affect 66% of customers	More accurate means of deriving connectivity model at any level, including change management. Many HV connectivity models are based on historic data which is not accurate or auditable and amenable to change management. In many cases the original connectivity to the network (LV) is not available. Provides a readily available accurate count of customers affected by one or more LV fuse operations (pro- rata if appropriate) The alternative of estimates made at the time or average customers per transformer is not accurate. Enables individual customers to be identified for GS payments and maintains a historic record for individual customers. Enables individual customers to be identified for notification of pre-arranged outages Provides information for response to no-supply calls. GIS system is not considered to be necessary for recording LV connectivity. Provides consistent information for audit of customer numbers used for other regulatory purposes and to audit DUOS. Monitoring HV phases not included as affect on customers is uncertain.
Customers Connected (Indicator Denominator) based on numbers at 30 September in the reporting year.	Northern – Disagrees Proposes 31 March in preceding year to give consistency of reporting during the year.	Ofgem reports are based on annual figures and 30 September count is most accurate and is in line with current practice. This does not preclude companies using other figures for internal periodic reports.

Incidents

Proposal	Company Response	Comments
Definition based on occurrences resulting in interruptions of three minutes or more whether or not resulting from fault or automatic switching or restoration of supply or other switching. **132 kV incidents aligned with other voltages and 132kV short interruptions excluded.** **By definition a new concurrent incident is recorded in the event of a subsequent reportable incident.** **Definition now also includes a requirement to record a new incident (and Interruption) if supplies, previously fully restored from the network, are re-interrupted within 3 hours for repair work.**	Interruption based on three minutes or more: Eastern – Agrees but there needs to be some time limit after which a new interruption is reported. EME – Agrees London – Agrees but suggests that final restoration time is not required for Ofgem reports. Midlands – Agrees but there is a need to define when a new incident arises. Northern – Agrees Norweb Agrees Seeboard – Agrees and also with alignment of 132 kV incidents Southern/Hydro – Agrees ScottishPower/Manweb – Agrees. Swalec – Agrees except for manual interventions Western – Agrees Yorkshire – Agrees	The definition of short interruption put forward to the workshop proposed that interruptions less than three minutes not associated with automatic restoration of supplies are counted as normal interruptions to place an incentive to reduce interruptions for operational convenience. The definition reflected the EN50160 definition which attributes short interruptions to faults. However there are ambiguities in EN50160 definition of long and short interruptions. The definition now proposed is based on a simple threshold of three minutes. Shortcomings are partly offset by proposals for monitoring short interruptions. Final restoration time is required to identify subsequent incidents which occur within the proposed three-hour limit.
Incident definition based on a disconnection in the circuit upstream of customers involved and not the EN50160 definition which refers to voltage falling to 1% of nominal or less.	London- Agrees Northern – Disagrees Prefers EN50160 definition Norweb - Agrees Seeboard – Agrees Southern/Hydro - Agrees ScottishPower/Manweb – Agrees Western – Agrees	The EN 50160 definitions of long and short interruptions are ambiguous and open to interpretation. Not all disconnections result in voltage falling to 1% of nominal.
Disaggregate by 132kV, EHV, HV, LV, Services and Pre-arranged in line with current G43/2. Separately identify incidents due to NGC/Transmission, Other Systems, and Embedded Generators for exclusions from reliability indices and possible exclusion from incentives and GS standards. **LV boundaries and Services defined.**		No incidents are excluded at this stage but an appropriate level of disaggregation is recommended in line with current condition 6/9 practice. Reportable and non-reportable Service Incidents are clarified through definitions of incidents, boundaries and disaggregation requirements.

Definition excludes incidents on meters, timeswitches, cut outs and protection operations at the customer interface which do not affect other customers.	Eastern – Agrees - Exclude other incidents outside its control. EME – Agrees - Exclude pre-arranged outages London – Agrees - Need to define disaggregation requirements. Midlands – Agrees – Also exclude non attributable events and Pre-arranged Northern - Agrees Norweb – Agrees - but propose that all interruptions to individual customers be excluded. Seeboard – Agrees - No exclusions in data collection Exclusions to be considered with incentives. Southern/Hydro – Agrees ScottishPower/Manweb – Agrees - Exclude NGC faults and Pre-arranged Swalec – Agrees - Exclude non attributable incidents from incentives Western – Agrees – Exclude Pre-arranged interruptions Yorkshire – Agrees - Include all incidents with right to seek determination for exceptional events.	Exclusions are a matter for the incentive scheme and will be considered later.
Incident Time based on alarms, first customer call or best estimate.	Eastern - Silent EME - Agrees except for block reporting London – Disagrees as too subjective. Time should be based on alarms or second call – as for GS payments. Midlands – Disagrees with best estimate Northern – Disagrees with best estimate Norweb - Disagrees Seeboard – Disagrees with best estimate as it is subjective. Southern/Hydro – Disagrees - subjective ScottishPower/Manweb – Disagrees and suggests incident time is based on best estimate but Interruption time is based on time company first becomes aware Western – Disagrees with best estimate Yorkshire – Disagrees with best estimate	Companies' responses are understood but companies need to be able to report the most accurate time, including times provided in good faith by customers. Use of best estimates makes little difference to averages except for one outlier. Best estimate is not subjective for customer reports made in good faith or other obvious indicators. Where it becomes subjective companies should use report received time. Incident time defined by first not second customer report. Proposal by ScottishPower is inconsistent with long established definition and would cause confusion.

Short Interruptions

Proposal	Company Responses	Comments
Measure is Short Customer Interruptions per 100 Connected Customers.	London – Agrees with MAIFI i.e. includes customer effects ScottishPower/Manweb – Agrees	An index which includes customer effects is important.
Count all short interruptions of less than three minutes regardless of cause, except short interruptions after the first three minutes of an incident. **Disaggregation by type recommended - short interruptions due to operational switching will be separately reported.** **Short Interruptions are characterised by a disconnection upstream of customers involved.**	Define short interruptions as disconnection of less than three minutes regardless of cause. Eastern – Agrees EME – Agrees - but will impact on their historic record and threshold for worst served customers London – Agrees - Short interruptions for operational convenience to be monitored separately Midlands – Agrees but lower limit to duration is required Northern – Agrees but lower limit to duration is required. Include deliberate disconnections. Norweb - Agrees Seeboard – Agrees Southern - Agrees ScottishPower/Manweb – Agrees but implies support for reporting short interruptions during fault sectionalising. Swalec – Agrees except for manual interventions Western – Agrees Yorkshire – Agrees	It will not be practical to achieve consistent reporting of short interruptions during fault sectionalising and reporting short interruptions but not long interruptions during this period would be inconsistent. However the short interruptions in the first three minutes will be counted. These include normal successful automatic reclosures and also manual, remote control and sequence switching restorations. Lower time limit is not required as definition refers to a disconnection upsteam of customers involved which eliminates dips from faults on other circuits.
Where short interruptions cannot be identified a simple unadjusted count of circuit breaker operations is proposed.	Northern – Estimates number of shots taken for a successful reclose on multi-shot schemes Norweb – Agrees Seeboard – Method inaccurate Southern – Agrees ScottishPower/Manweb – Disagrees as it is not accurate Western – Agrees - treat multi –shot schemes as single shot and disaggregate Yorkshire – no benefit in recording unmonitored downstream reclosures	A simple count is likely to be more consistent than adjusted figures, although not strictly accurate. Definition allows accurate reporting where information is available. No alternative is suggested for counting successful reclosures on unmonitored circuit breakers

Audit

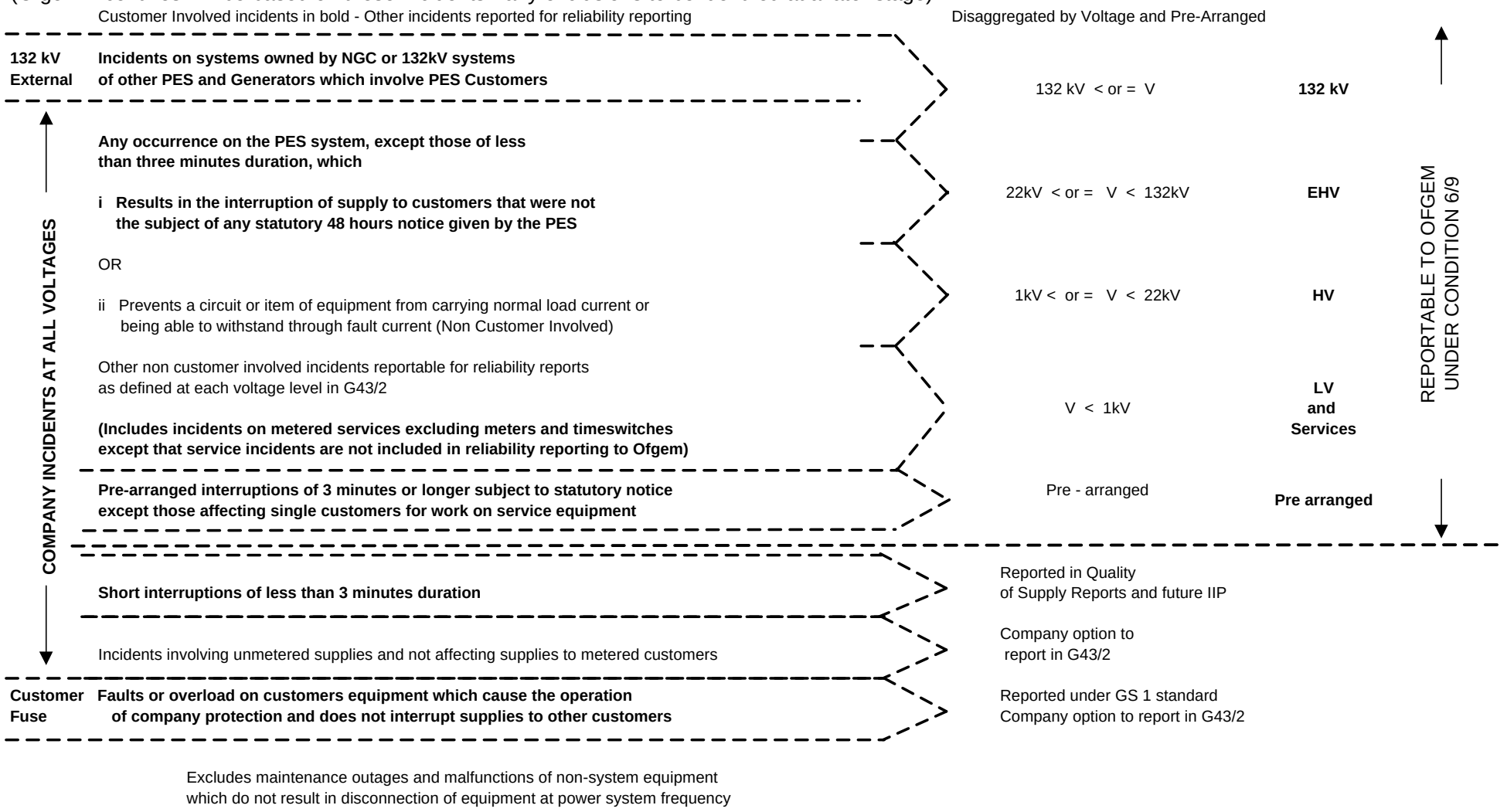
Proposal	Company Responses	Comments
Monthly audit of 5% HV and 1% LV reports recommended. **Fault reports to be automatically initiated from FMS/NMS systems.**	Eastern – Disagrees with 105 audit EME – Agrees 5% HV 1% LV aligns with best ISO practice. London – 10% sample too onerous. Midlands – Agrees 5% HV 1% LV Northern – Disagrees - Audit the process Norweb – Agrees 5% HV 1% LV Seeboard – Agrees 5% HV and 1% LV Also agrees that HV faults should automatically initiate fault report. Southern/Hydro – Agrees 5% HV 1% LV ScottishPower/Manweb – Proposes 6% HV 3% LV Western – No comment (Outside scope?) Yorkshire – 95% confidence on 15000 records would require samples of 0.5% to 2.5%. 99% confidence would require samples of 0.8% to 4.2%	5% HV and 1% LV is a more appropriate sampling rate than 10% put forward at the workshop and is more in accord with statistical approach but remains simple to apply. Automatic initiation of fault reports is recommended for both HV and LV.
Periodic audit recommended for customer numbers.	Seeboard – Disagrees as this is a continuos process	Provides confidence in customer numbers. Many HV connectivity models are based on historic models and require audit.

Figure 1

Proposed Reportable Incidents

PROPOSED REPORTABLE INCIDENTS **FIGURE 1**

(Ofgem Incentives will be based on these Incidents - any exclusions to be identifed at a later stage)



Excludes maintenance outages and malfunctions of non-system equipment which do not result in disconnection of equipment at power system frequency