CODE OF PRACTICE FIVE

CODE OF PRACTICE FOR THE METERING OF ENERGY TRANSFERS WITH A MAXIMUM DEMAND OF UP TO (AND INCLUDING) 1MW COVERED BY THE POOLING AND SETTLEMENT AGREEMENT

Issue 4

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Code of Practice Five

CODE OF PRACTICE FOR THE METERING OF ENERGY TRANSFERS WITH A MAXIMUM DEMAND OF UP TO (AND INCLUDING) 1MW COVERED BY THE POOLING AND SETTLEMENT AGREEMENT.

1. Reference is made to the Pooling and Settlement Agreement for the Electricity Industry in England and Wales dated 30th March 1990, and as amended and restated in 17th October 1996 and, in particular, to the definitions of "Code of Practice" and "Synopsis of Metering Codes" in clause 1.1 thereof.

2. Subject to Part 5 of Schedule 21 of the Pooling and Settlement Agreement, this Code of Practice shall apply to Metering Equipment comprising Metering Systems entered on to the Register on or after 1st July 1997.

3. This Code of Practice has been approved by the Executive Committee, the Settlement System Administrator and the Ancillary Service Provider.

For and on behalf of the Executive Committee.

For and on behalf of the Ancillary Service Provider.

For and on behalf of Energy and Information Services Limited as Settlement System Administrator.

AMENDMENT RECORD

ISSUE	DATE	VERSION	CHANGES	AUTHOR	APPROVED
1	04/12/92	v 1.00	Approved by Suppliers in General Meeting	CoP5 WG	
2	12/08/94	v 1.03	Revisions following comments from MSC	MSC-WG	At MSC 1/9/94
3	20/03/96	v 1.04	Revision for NPG	NPG-WG	MDC 63
4	26/10/96	v 1.06	Editorial Changes	MDC-WG	MDC 71

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FOREWORD

This Code of Practice defines the minimum requirements for the Metering Equipment required for the measurement and recording of electricity transfers at Defined Metering Points where the Maximum Demand does not exceed 1MW.

Energy Settlements and Information Services Limited, as Settlement System Administrator ("SSA") shall retain copies of, inter alia, the Code of Practice together with copies of all documents referred to in them, in accordance with the provisions of the Pooling and Settlement Agreement ("P&SA").

1. SCOPE

This Code of Practice states the practices that shall be employed, and the facilities that shall be provided for the measurement and recording of the quantities required for Settlement purposes.

This Code of Practice specifically applies to the Metering Equipment to be installed on each circuit where the Maximum Demand of the electricity being transferred does not exceed 1MW. Where summation current transformers are being utilised the references in the text to "each circuit" shall be interpreted as the output from each summation current transformer.

This Code of Practice applies equally to "whole current" metering and metering supplied via measurement transformers operating at high or low voltages.

It derives force from the metering provisions (Part XV) of the P&SA, to which reference should be made. It should also be read in conjunction with the relevant Agreed Procedures for, inter alia, operation of the data collection systems.

This Code of Practice does not contain the calibration, testing and commissioning requirements for Metering Equipment used for Settlement purposes. These requirements are detailed in Code of Practice Four - "Code of Practice for Calibration, Testing and Commissioning Requirements for Metering Equipment for Settlement Purposes".

Dispensations from the requirements of this Code of Practice may be sought in accordance with the P&SA and the relevant Agreed Procedure (AP32).

In the event of an inconsistency between the provisions of this Code of Practice and the P&SA, the provisions of the P&SA shall prevail.

2. REFERENCES

The following documents are referred to in the text:-

BS EN 61036	AC Static Watthour Meters for Active Energy(Classes 1 and 2)
BS 5685 Part 1	Specification for Class 0.5, 1 and 2 Single-Phase and Polyphase, Single Rate and Multi-Rate Watt-Hour Meters
Draft IEC Standard 1268	Alternating Current Static Var-Hour Meters for Reactive Energy (Classes 2 and 3).
BS 5685 Part 4	Specification for Class 3 Var-Hour Meters
IEC Standard 185	Current Transformers
IEC Standard 186	Voltage Transformers
BS EN 61107	Data Exchange for Meter Reading, Tariff and Load Control. Direct Local Exchange.
Pooling and Settlement Agreement	Definitions, Part XV and Agreed Procedures
Code of Practice Four	Code of Practice for Calibration, Testing and Commissioning Requirements for Metering Equipment for Settlement Purposes
Electricity Act 1989	Schedule 7, as amended by Schedule 1, to the Competition and Services (Utilities) Act 1992.
Consultative Committee International Telegraphs and Telephony Recommendations :-	
CCITT V24	List of definitions for interchange circuits between data terminal equipment and data circuit-termination equipment (i.e. modem).
CCITT V28	Electrical characteristics for unbalanced double current interchange circuits.

3. DEFINITIONS AND INTERPRETATIONS

Save as otherwise expressly provided herein, words and expressions used in this Code of Practice shall have the meanings attributed to them in the P&SA.

The following definitions, which also apply, supplement or complement those in the P&SA and are included for the purpose of clarification.

3.1 Active Energy

Active Energy means the electrical energy produced, flowing or supplied by an electrical circuit during a time interval, and being the integral with respect to time of the instantaneous power measured in units of watt-hours or standard multiples thereof, that is:-

1,000 Wh = 1 kWh
1,000 kWh = 1 MWh
1,000 MWh = 1 GWh
1,000 GWh = 1 TWh

3.2 Active Power

Active Power means the product of voltage and the in-phase component of alternating current measured in units of watts and standard multiples thereof, that is:-

1,000 Watts = 1 kW
1,000 kW = 1 MW
1,000 MW = 1 GW
1,000 GW = 1 TW

3.3 Actual Metering Point

Actual Metering Point means the physical location at which electricity is metered.

3.4 Apparent Energy

Apparent Energy means the integral with respect to time of the Apparent Power.

3.5 Apparent Power

Apparent Power means the product of voltage and current measured in units of volt-amperes and standard multiples thereof, that is:-

1,000 VA = 1 kVA
1,000 kVA = 1 MVA

3.6 Central Data Collection System (CDCS)

Central Data Collection System means the computer system located at a central point which contains a national data base which is regularly updated from the Settlement Instations to which it has dedicated communications links.

3.7 CTN

CTN means the Electricity Supply Industry (ESI) corporate telephone network.

3.8 De-Energised

De-Energised means the temporary (i.e. the main circuit connections to the Host PES Distribution Business's network are still made) removal of the supply at a Defined Metering Point such that all or part of the Metering Equipment is considered to be temporarily "inactive" for the purposes of settlement. e.g. unoccupied premises where the incoming switchgear has been opened or the cut-out fuse(s) removed.

3.9 Defined Metering Point

Defined Metering Point means the physical location at which the overall accuracy requirements as stated in this Code of Practice are to be met. The Defined Metering Points are identified in Appendix A.

3.10 Demand Period

Demand Period means the period over which Active Energy, Reactive Energy or Apparent Energy are integrated to produce stored energy values. For Settlement purposes, unless the context requires otherwise, each Demand Period shall be of 30 minutes duration, one of which shall finish at 24:00 hours.

3.11 Demand Values

Demand Values means, expressed in kW, kvar or kVA, twice the value of kWh, kvarh or kVAh recorded during any Demand Period. The Demand Values are half hour demands and these are identified by the time of the end of the Demand Period.

3.12 Electricity

"electricity" means Active Energy and Reactive Energy.

3.13 Export

Export means, for the purposes of this Code of Practice, an electricity flow as indicated in Figure 1 of Appendix B.

3.14 Import

Import means, for the purposes of this Code of Practice, an electricity flow as indicated in Figure 1 of Appendix B.

3.15 Interrogation Unit

Interrogation Unit means a Hand Held Unit "HHU" (also known as Local Interrogation Unit LIU") or portable computer which can enter Metering Equipment parameters and extract information from the Metering Equipment and store this for later retrieval.

3.16 Maximum Demand

Maximum Demand expressed in kW or kVA means twice the greatest number of kWh or kVAh recorded during any Demand Period.

3.17 Meter

Means a device for measuring electrical energy.

3.18 Metering Equipment

Metering Equipment means Meters, measurement transformers (both voltage and current), metering protection equipment including alarms, circuitry and their associated data collection outstations and wiring which are part of the Active Energy and Reactive Energy measuring equipment at or relating to a Site.

3.19 Meter Register

Meter Register means a device, normally associated with a Meter, from which it is possible to obtain a reading of the amount of Active Energy, or the amount of Reactive Energy that has been supplied by a circuit.

3.20 Outstation

Outstation means on-site equipment which receives and stores data from a Meter(s), and may perform some processing of the data before transmitting the metering data to the Settlement Instation on request. These functions may be facilitated in one or more separate units or be integral with the Meter.

3.21 Outstation System

Outstation System means one or more Outstations linked to a single communication line.

3.22 Password

Password means a string of characters of length no less than six characters and no more than twelve characters, where each character is a case insensitive alpha character (A to Z) or a digit (0 to 9) or the underscore character (_). Passwords must have a minimum of 2,000,000,000 combinations, for example six characters if composed of any alphanumeric characters or eight characters if composed only of hexadecimal characters (0 to F).

3.23 PSTN

PSTN means the public switched telephone network.

3.24 Rated Measuring Current

Rated Measuring Current means the rated primary current of the current transformers in primary plant used for the purposes of measurement.

3.25 Reactive Energy

Reactive Energy means the integral with respect to time of the Reactive Power.

3.26 Reactive Power

Reactive Power means the product of voltage and current and the sine of the phase angle between them measured in units of volt-amperes reactive and standard multiples thereof, that is:-

1,000 var = 1 kvar
1,000 kvar = 1 Mvar

3.27 Settlement Instation

Settlement Instation means a computer based system which collects or receives data on a routine basis from selected Outstation Systems, and which is linked to CDCS.

3.28 Second Tier Data Collection System (STDCS)

Second Tier Data Collection System means those parts of the Settlement System which relate to the obligations of the Settlement System Administrator under this Agreement in relation to collecting, estimating and aggregating data as may be required for the proper functioning of Settlement from Metering Systems at the point of connection between the Distribution System of a Public Electricity Supplier and:-

(i) a Second Tier Customer;

(ii) the System of an Authorised Electricity Operator other than the Public Electricity Supplier;

(iii) an Embedded Generator not subject to Central Despatch; and

(iv) the Distribution System of another Public Electricity Supplier,

and providing such data to the Settlement System Administrator.

3.29 UTC

UTC means Co-ordinated Universal Time based on atomic clocks as distinct from Greenwich Mean Time (GMT).

4. MEASUREMENT CRITERIA

4.1 Measured Quantities.

For each circuit the following energy measurements are required for Settlement purposes:-

(i) Import kWh }
}*
(ii) Import kvarh. }

(iii) Export kWh }
}*
(iv) Export kvarh. }

* Import and/or Export metering need only be installed where a Party specifically requires this measurement to meet system or plant conditions.

Where Import and Export metering is installed gross Import and gross Export Active Energy shall be recorded separately for Settlements. For multiple circuit connections between parties the configuration of the Metering Equipment shall be agreed with the SSA prior to installation.

4.2 Accuracy Requirements

4.2.1 Overall Accuracy

The overall accuracy of the energy measurements at or referred to the Defined Metering Point shall at all times be within the limits of error as shown:-

(i) Active Energy

CONDITION	LIMIT OF ERRORS AT STATED SYSTEM POWER FACTOR	
Current expressed as a percentage of Rated Measuring Current *	Power Factor	Limits of Error
100% to 20% inclusive	1	± 1.5%
Below 20% to 5%	1	± 2.5%
100% to 20% inclusive	0.5 lag and 0.8 lead	± 2.5%

* for whole current metering percentage relates to I_{max}.

(ii) Reactive Energy

CONDITION	LIMIT OF ERRORS AT STATED SYSTEM POWER FACTOR	
Current expressed as a percentage of Rated Measuring Current *	Power Factor	Limits of Error
100% to 20% inclusive	Zero	± 4.0%
100% to 20% inclusive	0.866 lag and 0.866 lead	± 5.0%

* for whole current metering percentage relates to I_{max}.

These limits of error for both (i) and (ii) above shall apply at the Reference Conditions defined in the appropriate Meter specification.

Evidence to substantiate that these overall accuracy requirements are met shall be available for inspection to the SSA or its agent .

4.2.2 Compensation for Measurement Transformer Error

To achieve the overall accuracy requirements it may be necessary to compensate Meters for the errors of the measurement transformers and the associated leads to the Meters. Values of the compensation shall be recorded and evidence to justify the compensation criteria, including wherever possible test certificates, shall be available for inspection by the SSA or its Agent.

4.2.3 Compensation for Power Transformer and Line Losses

Where the Actual Metering Point and the Defined Metering Point do not coincide then, where necessary, compensation for power transformer and/or line losses shall be provided to meet the overall accuracy at the Defined Metering Point.

The compensation may be achieved either within the Metering Equipment or by software within CDCS or STDCS.

Where compensation is applied the values used shall be recorded and supporting evidence to justify the compensation criteria shall be available for inspection by the SSA or its Agent.

5. METERING EQUIPMENT CRITERIA

Although for clarity this Code of Practice identifies separate items of equipment, nothing in it prevents such items being combined to perform the same task provided the requirements of this Code of Practice are met.

Metering Equipment other than outdoor measurement transformers, shall be accommodated in a clean and dry environment.

For each circuit, other than one which is De-Energised or disconnected, the voltage supply to any Meters, Displays and Outstations shall be connected such that it is normally energised to facilitate reading of the Meter Register(s) and Local and Remote Interrogation of the Outstation. (see Appendix D).

Where an Outstation is storing data for more than one circuit and the voltage supply is from these circuits then a voltage selection relay scheme using each circuit involved shall be provided.

5.1 Measurement Transformers

The terms "current transformer" and "voltage transformer" used below do not preclude the use of other measuring techniques with a performance equal to that specified for such measurement transformers.

For each circuit where current transformers (CT) and/or voltage transformers (VT) are used, they shall meet the requirements set out in clauses 5.1.1 and 5.1.2. Additionally, where a combined unit measurement transformer (VT & CT) is provided the 'Tests for Accuracy' as covered in clause 8 of IEC Standard 44-3 covering mutual influence effects shall be met.

Where current transformers are used on low voltage installations, the voltage supply to the Metering Equipment shall be fused as close as practicable to the point of that supply.

Where current transformers are used, a voltage selection relay scheme shall be installed where there is a choice of voltage supply to the Meter provided that such a supply is fed from a common primary source.

5.1.1 Current Transformers

Where required, one set of current transformers to IEC Standard 185 with a minimum standard of accuracy class 0.5, shall be provided per circuit. Preferably, the current transformers shall be dedicated for Settlement purposes, but the CTs may be used for other purposes provided the overall accuracy requirements in clause 4.2.1 are met and evidence of the value of the additional burden is available for inspection by the SSA or its agent. The additional burden shall not be modified without prior notification to the SSA, and evidence of the value of the modified additional burden shall be available for inspection by the SSA or its Agent.

CT test certificates showing errors at the overall working burden or at burdens which enable the working burden errors to be calculated shall be available for inspection by the SSA or its agent.

The total burden on each current transformer shall not exceed the rated burden of such CT.

5.1.2 Voltage Transformers

Where required a voltage transformer to IEC Standard 186 with a minimum standard of accuracy class 1 shall be provided for the metering of a circuit. The voltage transformer may be used for other purposes provided the overall accuracy requirements in clause 4.2.1 are met and evidence of the value of the additional burden is available for inspection by the SSA or its Agent. The additional burden shall not be modified without prior notification to the SSA, and evidence of the value of the modified additional burden shall be available for inspection by the SSA or its Agent.

A VT test certificate(s) showing errors at the overall working burden(s) or at burdens which enable the working burden errors to be calculated shall be available for inspection by the SSA or its Agent.

The total burden on each secondary winding of a VT shall not exceed the rated burden of such secondary winding.

The VT supplies to the Meter(s) shall be fused. In addition any other burdens shall be separately fused.

5.1.3 Measurement Transformers Installed on Existing Circuits

Where circuits, other than those newly installed, are to be metered to this Code of Practice and where the installed measurement transformers do not comply with the accuracy classes specified in clauses 5.1.1 & 5.1.2, then such measurement transformers may be used providing the following requirements and those in clause 4.2.1 are met.

(i) Where subsequently a significant alteration to the primary plant (e.g. a switchgear change) is carried out, new measurement transformers as detailed in clauses 5.1.1 and 5.1.2, shall be provided.

(ii) In all other respects the requirements of clauses 5.1.1 and 5.1.2 are met, except that where test certificates are not available other documentary evidence as referred to in clause 4.2.2 shall be available.

5.2 Testing Facilities

Where current and/or voltage transformers are used, testing facilities shall be provided close by the Meters of each circuit, which enables such Meters to be routinely tested and /or changed safely with the circuit energised.

5.3 Meters

The Meters may be either static or induction disc types.

For each circuit Active Energy Meters shall be supplied which shall meet the requirements of either BS EN 61036 Class 2 or BS 5685 Part 1 Class 2.

Active Energy Meters provided for the metering of Second Tier Supplies shall be in accordance with Schedule 7 of the Electricity Act 1989.

For each circuit Reactive Energy Meter(s) shall be supplied which shall meet the requirements of either the Draft IEC Standard 1268 Class 3.0 or BS 5685 Part 4.

Active Energy Meters shall be configured such that the number of measuring elements is equal to or one less than the number of primary system conductors. These include the neutral conductor, and/or the earth conductor where system configurations enable the flow of zero sequence energy.

All Meters supplied via measurement transformers shall be set to the actual measurement transformer ratios. For Meters separate from the display and/or Outstation the ratios shall be recorded on the nameplate of the Meter. For static Meters combined with the display and/or the Outstation the ratios shall be displayed and downloaded during the interrogation process.

All Meters shall include a non-volatile Meter Register of cumulative energy for each measured quantity. The Meter Register(s) shall not roll-over more than once within the normal Meter reading cycle.

Meters which provide data to separate Outstations shall for this purpose provide an output per measured quantity.

For Meters using electronic displays due account shall be taken of the obligations of the SSA to obtain readings from the Meter Register(s).

All Meters shall be labelled or otherwise be readily identifiable in accordance with Appendix B.

5.4 Displays and Facilities for Registrant(s) Information

5.4.1 Displays

The Metering Equipment shall display the following primary information (not necessarily simultaneously):-

(i) measured quantities as per clause 4.1

(ii) current time ("UTC") and date;

(iii) the CT and/or VT ratios that the Meter has been programmed to, where appropriate (see clause 5.3); and

(iv) the compensation factor that has been applied for measurement transformer errors and/or system losses, where this is a constant factor applied at security level 3. (i.e. where the Meter is combined with the display and/or Outstation).

The Metering Equipment shall be capable of enabling the display of the following information, as specified by the Registrant(s):-

(i) Maximum Demand ("MD") for kW per programmable charging period, i.e. monthly or statistical review period;

(ii) Maximum Demand ("MD") for kVA per programmable charging period, i.e. monthly or statistical review period;

(iii) twice the kWh advance since the commencement of a current Demand Period, (i.e. "kW rising demand");

(iv) twice the kVAh advance since the commencement of a current Demand Period, (i.e. "kVA rising demand");

(v) cumulative MD;

(vi) number of MD resets;

(vii) multi-rate display sequence as specified by Registrant(s), with a minimum of 8 rates selectable over the calendar year; and

(viii) indication of reverse running for Active Energy, where appropriate.

MD shall be resettable at midnight of last day of charging period. Also resettable for part chargeable period demands. If a manual reset button is used then this shall be sealable.

5.4.2 Facilities

The Metering Equipment shall be capable of providing a minimum of three pulse outputs for use locally by the Customer or Registrant(s), configured to their requirements from the following taking account of the measured quantities (see clause 4.1):-

(i) impulsing for Import kWh, Export kWh, Import kvarh, Export kvarh and kVAh - all to be voltage free contacts with a pulse rate at full load of between 0.1 and 2 pulses per second with a nominal duration of 80mS per pulse; and

(ii) a 30 minute reset pulse, within a tolerance of +/- 0.1% of the Demand Period, from voltage free contacts with a minimum duration of 0.5 second and a maximum duration of 10 seconds.

Additional pulsing need only be provided where specifically requested by the Customer or the Registrant(s).

5.5 Outstation

An Outstation System shall be provided which transfers data to and receives data from a Settlement Instation(s).

Outstations shall comply with the relevant requirements contained within BS EN 61036 for indoor conditions.

Where multiple Outstations are installed in the same locality and are of the same type/manufacturer, facilities shall be provided to utilise one communication line.

The Outstation data shall be to a format and protocol approved by the SSA or its Agent.

Normally metering data will be collected by the Settlement Instations by a daily interrogation, but repeat collections of metering data shall be possible throughout the Outstation data storage period.

The Outstation shall have the ability to allow the metering data to be read by instations other than the Settlement Instation provided the requirements of Section 7 of this Code of Practice are satisfied.

For the purpose of transferring stored metering data from the Outstation to the Settlement Instation, a unique Outstation identification code shall be provided.

If not integral with the Meter, a separately fused supply shall be provided for each Outstation.

Where a separate modem associated with the Outstation System is used, then it shall be provided with a separately fused supply. Alternatively, line or battery powered modem types may be used.

5.5.1 Data storage

Data storage facilities shall be provided as follows:-

(i) metering data shall either be in engineering units or pulse counts. If the latter, unit per pulse information shall be provided to all those entitled to the data;

(ii) a storage capacity of 48 periods per day for 20 days for Import and/or Export kWh measurements, where appropriate (see clause 4.1). The stored values shall be integer multiples of kWh;

(iii) the resolution of the Active Energy transferred into the demand registers shall be within ±0.1% (at full load) of the amount of Active Energy measured by the associated Meter.

(iv) the value of energy measured in a Demand Period but not stored in that Demand Period shall be carried forward to the next Demand Period;

(v) where a separate Outstation is used, cumulative register values shall be provided in the Outstation which can be set to match and increment with the Meter Registers;

(vi) in the event of an Outstation supply failure, the Outstation shall protect all data stored up to the time of the failure, and maintain the time accuracy in accordance with clause 5.5.2;

(vii) partial stored energy values in which an Outstation supply failure and/or restoration occurs, and zero values associated with an Outstation supply failure, shall be marked so that the Settlement Instation can identify the relevant Demand Period(s);

(viii) to cater for continuous supply failures, the clock, calendar and all data shall be supported for a period of 20 days without an external supply connected;

(ix) any "read" operation shall not delete or alter any stored metered data; and

(x) an Outstation shall provide all the metered data stored from the commencement of any specified date upon request by an Instation.

5.5.2 Time Keeping

(i) The Outstation time shall be set to Co-ordinated Universal Time (UTC). No switching between UTC and British Summer Time (BST) shall occur for settlement data storage requirements.

(ii) Time synchronisation of the Outstation shall be maintained within ± 20 seconds of UTC. This may be performed remotely by the Settlement Instation as part of the normal interrogation process or locally by an Interrogation Unit.

(iii) When time synchronisation occurs the relevant period(s) shall be marked with an alarm indication, as outlined in clause 5.5.3.

(iv) The overall limits of error for the time keeping allowing for a failure to communicate with the Outstation for an extended period of 20 days shall be:-

(a) the completion of each Demand Period shall be at a time which is within ± 20 seconds of UTC; and

(b) the duration of each Demand Period shall be within ± 0.6 %, except where time synchronisation has occurred in a Demand Period.

5.5.3 Monitoring Facilities

Monitoring facilities shall be provided for each of the following conditions and shall be reported, as separate alarm indications, tagged to the relevant Demand Period(s), via on-line communications and the local Interrogation Unit:-

(i) phase failure of any one or combination of phases;

(ii) Metering Equipment resets caused by other than a supply failure (where fitted);

(iii) battery monitoring (where battery fitted);

(iv) interrogation port access which changes time and/or date;

(v) where different from (iv), Demand Period(s) which have been truncated or extended by a time synchronisation;

(vi) interrogation port access which changes data other than time and/or date; and

(vii) reverse running (where Import and Export Active Energy not being measured).

In addition to (ii), detected errors in Metering Equipment functionality should be recorded as an event alarm with date and time.

Any alarm indications shall not be cancelled or deleted by the interrogation process and shall be retained with the data until overwritten. The alarm shall reset automatically when the abnormal condition has been cleared.

5.6 Communications

The Outstation shall accommodate both local and remote interrogation facilities, from separate ports.

To prevent unauthorised access to the data in the Metering Equipment a security scheme, as defined below and in Appendix C, shall be incorporated for both local and remote access. Separate security levels shall be provided for the following activities:-

(i) Level 1 - Password - Read only of the following metering data, which shall be transferable on request during the interrogation process:-

(a) Outstation ID;

(b) half hourly values of Import and/or Export Active Energy;

(c) total cumulative Import and/or Export Active Energy;

(d) total cumulative Import and/or Export Reactive Energy;

(e) Maximum Demand (MD) for kW or kVA per programmable charging period i.e. monthly, statistical review period;

(f) multi-rate cumulative Active Energy as specified by the Registrant(s);

(g) the measurement transformer ratios, where appropriate (see clause 5.3);

(h) the measurement transformer error correction factor and/or system loss factor, where this is a constant factor applied to the entire dynamic range of the Meter and the Meter is combined with the display and/or Outstation;

(I) alarm indications; and

(j) Outstation time and date.

(i) Level 2 - Password -

(a) corrections to the time and/or date; and

(b) resetting of the MD.

(Iii) Level 3 - Password - Programming of :-

(a) the Displays and Facilities as defined in Section 5.4;

(b) the measurement transformer ratios, where appropriate (see clause 5.3);

(c) the measurement transformer error correction and/or system loss factor where this is a constant factor applied to the entire dynamic range of the Meter and the Meter is combined with the display and/or Outstation; and

(d) the passwords for levels 1, 2 and 3.

In addition, it shall be possible to read additional information within the Metering Equipment to enable the programmed information to be confirmed.

(iv) Level 4 - Password or removal of Metering Equipment cover(s) necessitating the breaking of a seal for:-

(a) calibration of the Metering Equipment;

(b) setting the measurement transformer ratios, where appropriate (see clause 5.3);

(c) setting the measurement transformer error correction and/or system loss factors where this is other than a single factor; and

(d) programming the level 3 password and the level 4 password, if appropriate.

In addition to the functions specified for each level it shall be feasible to undertake the functions at the preceding level(s). e.g. at level 3 it shall also be possible to carry out the functions specified at levels 1 and 2. This need not apply at level 4 when access is obtained via removing the cover.

Different Passwords shall be utilised for each level, which shall only be circulated in accordance with the Agreed Procedures.

5.6.1 Local Interrogation

An interrogation port shall be provided which preferably shall be an opto port to BS EN 61107, and with a serial protocol such as BS EN 61107.

5.6.2 Remote Interrogation

An interrogation facility shall be provided for remote interrogation and it shall not be possible to disconnect this link at the Outstation without the breaking of a Settlement seal.

Any port for connection to external data communications equipment shall be compatible with CCITT V24 and CCITT V28.

Error checking facilities shall be provided between the Outstation and the Settlement Instation.

Interrogation of an Outstation shall be possible using one of the following media:

(i) Switched telephone networks e.g. PSTN or CTN;
(ii) Public data networks e.g. PSN;
(iii) Radio data networks e.g. Paknet or any equivalent;
(iv) Customer own network;
(v) Mains signalling / power line carrier;
(vi) Low power radio;
(vii) Satellite; or
(viii) Cable TV.

In addition any further media may be used as approved by the SSA or its Agent.

The actual media employed shall be in accordance with the requirements of the SSA or its Agent.

The data shall be to a format and protocol approved by the SSA or its Agent.

5.7 Sealing

All Metering Equipment shall be capable of being sealed in accordance with the Agreed Procedures.

6. ASSOCIATED FACILITIES

6.1 Interrogation Unit

The Operator may interrogate the Metering Equipment using an Interrogation Unit (IU). The Interrogation Unit may be used for programming, commissioning, maintenance/fault finding and when necessary the retrieval of stored metering data. The data retrieved by the Interrogation Unit shall be compatible with the Settlement Instation.

The IU shall have a built-in security system, such as a password, so that the IU becomes inoperative and non-interrogatable if it is lost, stolen, etc.. The password can be applied at power-on of the device and/or on entry to the IU software application.

6.2 Additional Features

Additional features may be incorporated within or associated with the Metering Equipment provided but these must not interfere with or endanger the operation of the Settlement process.

7. ACCESS TO DATA

Access to metering data shall be in accordance with the provisions of the P&SA and the Agreed Procedures referred to therein. Such access must not interfere with or endanger the security of the data or the collection process for Settlement purposes.

Access to stored metering data in Outstations shall also be the right of the Registrant and any party who has the permission of the Registrant.

APPENDIX A

DEFINED METERING POINTS

For transfers of electricity between the following parties the Defined Metering Point (DMP) shall be at one of the following locations:-

1. For transfers between The National Grid Company plc and a single Public Electricity Supplier where no other Party(s) are connected to the busbar, the DMP shall be at the lower voltage side of the supergrid connected transformer.

2. For transfers between The National Grid Company plc and a single Public Electricity Supplier where other Party(s) are connected to the busbar, the DMP shall be at the circuit connections to the Public Electricity Supplier.

3. For transfers between The National Grid Company plc and more than one Public Electricity Supplier, the DMP shall be at the circuit connections to the Public Electricity Suppliers.

4. For transfers between Public Electricity Suppliers not including a connection to the transmission system of The National Grid Company plc, the DMP shall be at the point of connection of the two Public Electricity Suppliers.

5. For transfers between The National Grid Company plc and Generators, the DMP shall be at the high voltage side of the generator transformers and station transformer(s).

6. For transfers between Public Electricity Suppliers and Generators, the DMP shall be at the point(s) of connection of the generating station to the Public Electricity Supplier.

7. For transfers between the Distribution System of a Public Electricity Supplier and a Second Tier Supplier or Second Tier Customer or Non-Pooled Generator, the DMP shall be at the point of connection to the Distribution System of the Public Electricity Supplier.

8. For transfers between The National Grid Company plc and a Second Tier Supplier or Second Tier Customer, the DMP shall be at the point of connection to The National Grid Company plc.

APPENDIX A (cont'd)

9. For transfers between The National Grid Company plc and Externally Interconnected Parties the DMP shall be as follows:-

   (i) For the Scottish links, the busbar side of the busbar disconnectors at:-

      (a) Harker 400 kV Substation
      (b) Harker 275 kV Substation
      (c) Harker 132 kV Substation
      (d) Stella 275 kV Substation
      (e) Stella 400 kV Substation

   (ii) For the EDF link the busbar side of the busbar disconnectors at the Sellindge 400 kV Substation.

In the case of (5) and (6) above the following shall also apply:-

Each Generating Unit which is subject to Central Despatch shall have Metering Equipment which identifies uniquely the electricity transfers of the despatched unit. In the case of range Combined Cycle Gas turbines metering shall be installed on each Combined Cycle Gas Turbine Unit for aggregation in Settlement.

APPENDIX B

LABELLING OF METERS FOR IMPORT AND EXPORT

1. A standard method of labelling Meters, test blocks, etc. is necessary and based on the definitions for Import and Export the required labelling shall be as follows.

2. ACTIVE ENERGY

Meters or Meter Registers shall be labelled "Import" or "Export" according to the electricity flow definitions as in paragraphs 3.12 and 3.11.

This convention is based on "Import" and "Export" being from the viewpoint of the Registrant of the Metering System.

3. REACTIVE ENERGY

Within the context of this code the relationship between Active Energy and Reactive Energy can best be established by means of the power factor. The following table gives the relationship:-

Flow of Active Energy	Power Factor	Flow of Reactive Energy
Import	Lagging	Import
Import	Leading	Export
Import	Unity	Zero
Export	Lagging	Export
Export	Leading	Import
Export	Unity	Zero

Meters or Meter Registers for registering Import Reactive Energy should be labelled "Import" and those for registering Export Reactive Energy should be labelled "Export".

APPENDIX B (cont'd)

IMPORT AND EXPORT ACTIVE ENERGY FLOWS FROM THE VIEWPOINT OF THE REGISTRANT.

This convention is based on "Import" and "Export" being from the viewpoint of the Registrant of the Metering System.

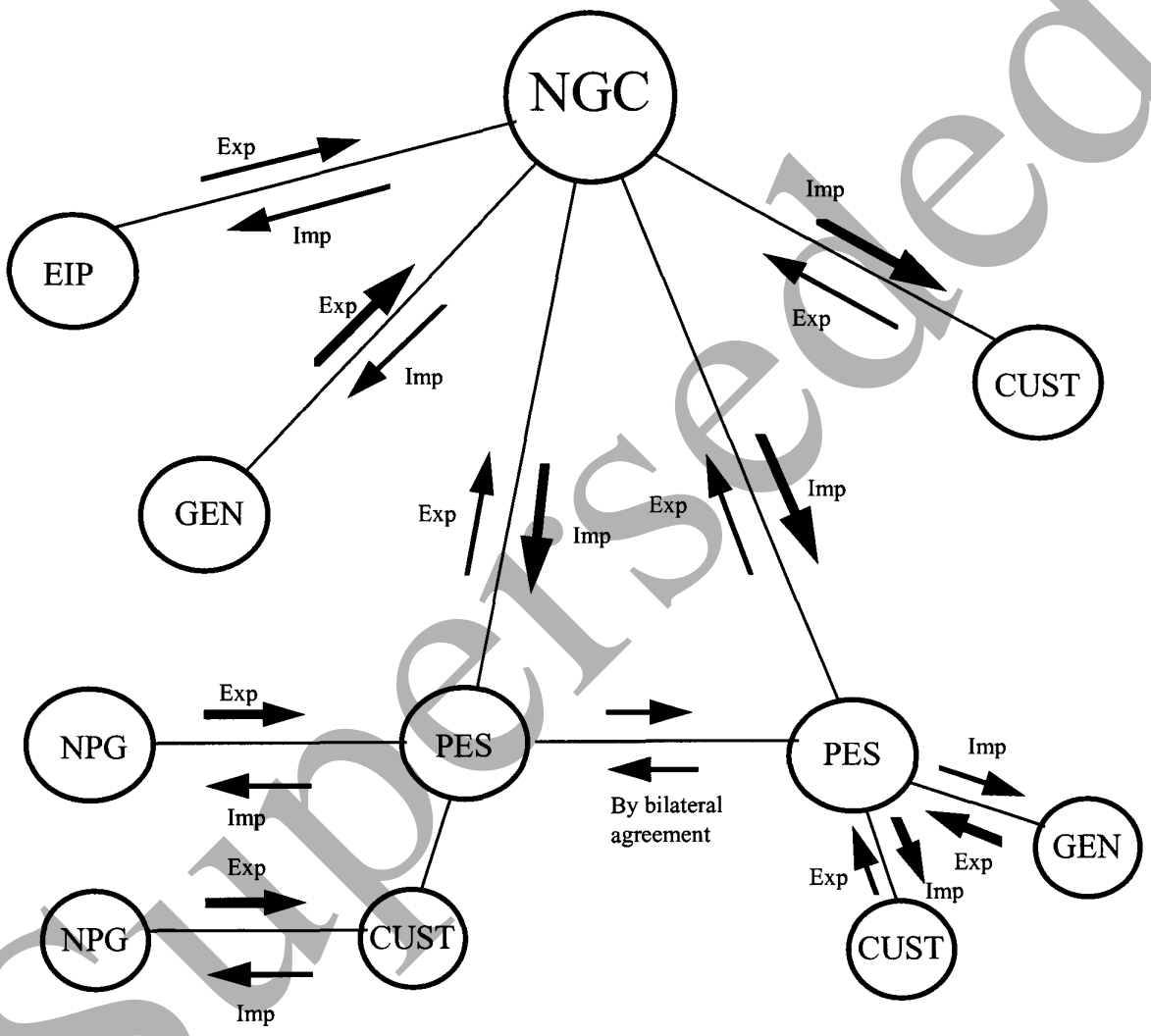

Figure 1

Key

NGC	-	NGC Transmission System (not including any Remote Transmission Asset).
EIP	-	Scottish Power plc and EdF.
GEN	-	Directly connected or Embedded Generator
NPG	-	Non-Pool Generator
PES	-	Public Electricity Supplier.
CUST	-	Customer whose metering is registered by a Supplier.

APPENDIX C

PASSWORDS

The Passwords specified in Section 5.6 shall be subject to the following additional requirements:-

1. The communications protocol employed shall ensure that the Password offered determines the level of access to the data within the Metering Equipment.

2. A counter logging the number of illegal attempts (i.e. Password comparison failures) to access Metering Equipment via the local and remote ports shall be incorporated into the log-on process. This counter shall reset to zero at every hour change (i.e. 0100, 0200, etc.).

3. If the counter reaches 7, then access is prohibited at all levels until the counter resets at the next hour change.

APPENDIX D

OPTIONS FOR ENSURING METERS AND DISPLAYS CAN BE READ AND REMOTELY INTERROGATED.

This Appendix sets out the options for complying with the requirements set out in clause 5 for certain types of supply where the voltage supply to the Metering Equipment would not normally be maintained for significant periods. e.g. those used for standby and those where the customer's restricted period load is controlled by the main incoming switchgear.

1. Connection of Metering Equipment to the Live Side of the Supply

   For new supplies the most practical solution would be to arrange for the Metering Equipment to be connected to the incoming side of the main switchgear so that it is normally energised even when the switchgear is open.

2. Install Separate Meters and Displays/Outstations

   Installation of separate Meters and Displays/Outstations would enable the latter to be connected to a normally energised supply. This would facilitate Local and Remote Interrogation andreading on a routine basis. The Meters would need to be provided with a permanent Meter Register to meet the requirements of clause 5.3.

3. Combined Meters, Displays and Outstations with Separate Auxiliary Supply Facilities

   Integrated products could be utilised which have separate input terminals to energise the data storage and display functions which could be connected to a normally energised supply, whilst the voltage supply to the Meter is from the relevant circuit.

4. Combined Meters, Displays and Outstations Supplied via a Voltage Relay Selection Scheme

   With this option the integrated equipment would be connected to the appropriate circuit via a voltage relay selection scheme such that when this circuit was energised it would receive it's voltage supply from this circuit. However, when this circuit was not energised it would obtain an appropriately rated single phase voltage from a normally energised supply. This arrangement is shown in Figure 2 overleaf.

APPENDIX D (cont'd)

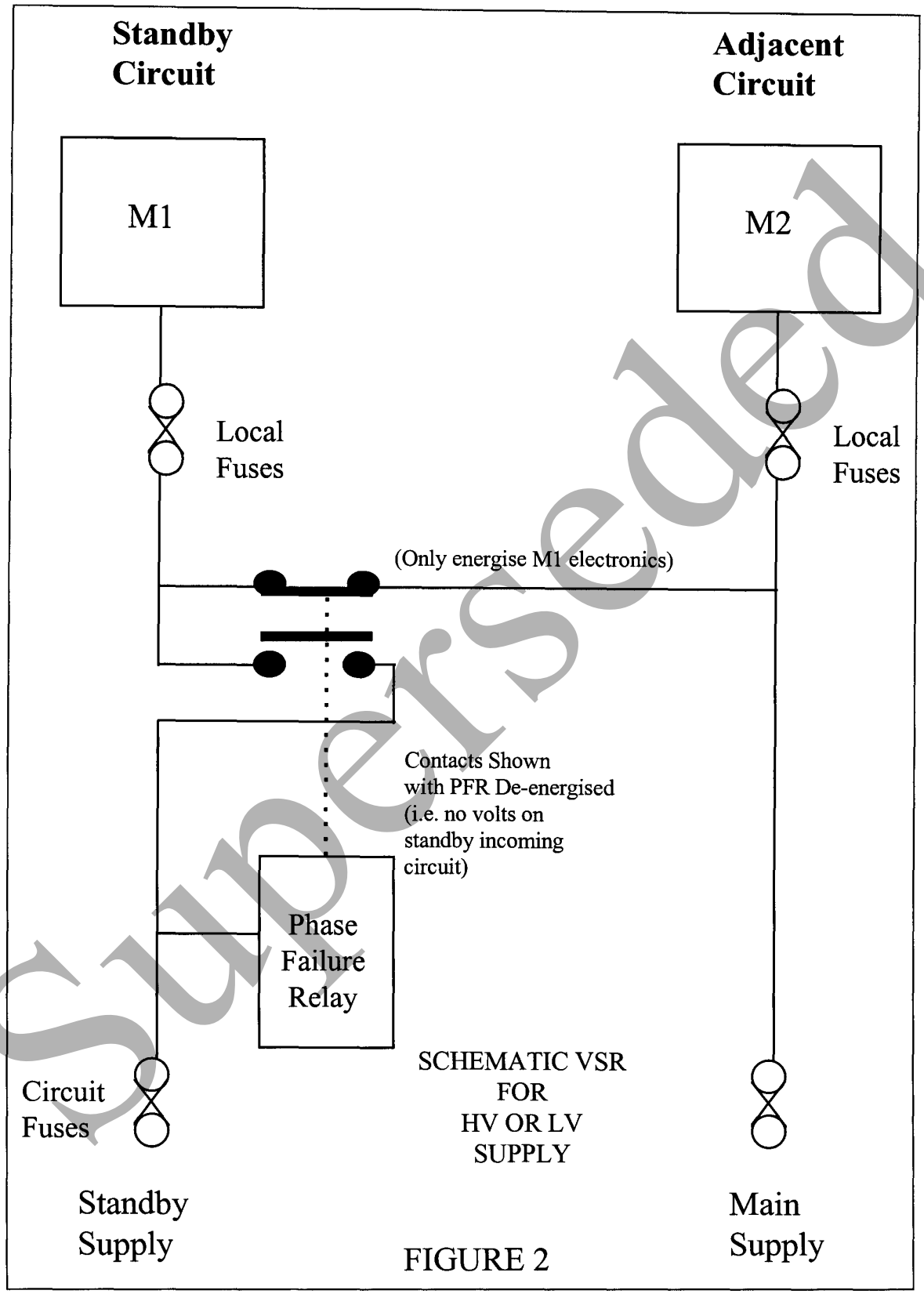

FIGURE 2