

**LIGHTING**  
UK LIGHTING BOARD

# **STREET LIGHTING ENERGY**

The lighting practitioners guide to Electricity Supply

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# STREET LIGHTING ENERGY

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# STREET LIGHTING ENERGY

## INTRODUCTION

Over recent years, UK lighting authorities have expended steadily increasing proportions of street lighting budgets on electricity bills. The introduction of Central Government targets for energy efficiency, by way of the Carbon Reduction Commitment Energy Efficiency Scheme together with local pressures to extract the last ounce of efficiency from their budgets, brings a need for better understanding and effective working relationships between Lighting Professionals and Procurement Specialists.

The UK Lighting Board's terms of reference include developing and promulgating best practice on technical, financial, administrative and operational matters relating to street lighting structures, taking into account the different circumstances that may arise in the four UK countries and in urban and rural areas. The Board is intended to be a source of advice to UKRLG, government departments, local authority associations and professional bodies across the UK on best practice and priorities for research, within the context of the wider transport picture.

It is timely and appropriate therefore for the UKLB to publish this document which brings together in one place an explanation of the various roles and responsibilities in the electricity supply industry, together with information intended to assist local decisions on the most appropriate energy procurement and management options. The input of numerous organisations and individuals who have devoted time to provide constructive comments and advice in its drafting is greatly appreciated.

The document is available as a free download from the UKLB website at:-

<http://www.ukroadsliaisongroup.org/lighting/index.htm>

Dave Johnson

UKLB

## REGULATION AND GOVERNANCE

From 1990 on the UK electricity market was progressively deregulated, allowing competition between suppliers. Prior to that time customer had no option but to purchase from the Regional Electricity Company (REC). In Northern Ireland, a Single Electricity Market (SEM) for the whole of the island of Ireland was established in November 2007.

Suppliers can attract customers by appealing to their green credentials or by offering high levels of customer service, but the main reason for change is generally as a result of keen pricing.

A significant proportion of customers have switched suppliers since deregulation. The potential savings available to larger customers are greater than those available to domestic customers, so it prudent for lighting authorities to regularly review their energy needs, and procure their energy accordingly.

The Legislative Framework within which the industry operates is principally contained within the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Act 2004. These and the relevant NI legislation can individually be located at <http://www.statutelaw.gov.uk/>

Ofgem Office of the Gas and Electricity Markets, is the statutory body established to protect consumers by regulating the monopoly firms in the gas and electricity networks. <http://www.ofgem.gov.uk> The Northern Ireland Authority for Utility Regulation (the Utility Regulator) is responsible for regulating the electricity, gas and water industries in Northern Ireland. <http://www.uregni.gov.uk>

Electrical Connections. Each electrical connection is subject to a Distribution Connection and Use of System Agreement (DCUSA) which is a multi-party contract between electricity Distributors and electricity Suppliers and others. It governs the main relationship between the people who sell electricity (Suppliers) and the owners of the networks that transport it (Distributors). The national terms of connection can be viewed at [Connection agreement](#). Its governance is managed by DCUSA Ltd. [www.dcuda.co.uk](http://www.dcuda.co.uk)

Guaranteed Standards of Performance (GSoP) for DNOs are now applicable to unmetered supplies and guidance on these can be viewed at:- [Ofgem Guidance](#)

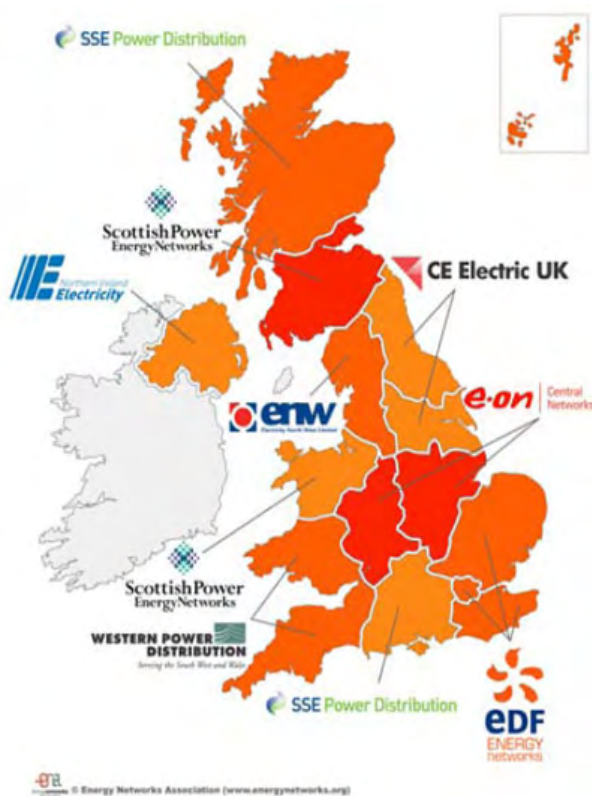
The 500w Rule determines whether or not any new supply will be metered or unmetered. To be unmetered the supply must be predictable, and unless there are extenuating circumstances should be less than 500w. The 'rule' is established by Statutory Instrument 2001 No 3263 the Electricity (Unmetered Supply) Regulations 2001. View at :- [The 500 watt 'rule'](#) The rule is inconsistently applied and has been the cause of many operational issues for lighting authorities and DNOs alike. Despite requests Ofgem have declined to issue guidance. Responsibility for application has recently passed to the national Measurement Office and the UKLB will continue to press for a review of the SI to produce a better solution.

## KEY PLAYERS IN THE ENERGY MARKETS

### Power Generation Companies

There are approximately 30 major producers of electricity in the UK and over 2,000 generating stations. The majority of generating capacity is fuelled by coal, gas and nuclear energy, while a larger number of smaller generating stations use renewable fuels such as hydro, wind, landfill gas, waste & biomass and combined heat and power stations. The association of energy producing companies can be located at <http://www.aepuk.com> and the Digest of United Kingdom energy statistics (DUKES) at :- [link to DUKES](#)

The National Grid owns and maintains the high-voltage electricity transmission system in England and Wales, and operates the system across Great Britain, balancing electricity supply with demand on a minute by minute basis. See [National Grid](#). The transmission systems in Scotland are owned by [Scottish Power Transmission](#) (central and southern Scotland) and [Scottish Hydro-Electric Transmission Ltd](#) (northern Scotland).



Distribution Network Operators (DNOs) maintain and upgrade the cables and other equipment used to transfer power from the national grid to customers property. DNOs are closely regulated by Ofgem. See [DNOs](#) (note former EDF areas are now operated by UK Power Networks).

Independent Distribution Network Operators (IDNOs) operate within DNO areas across GB. They are regulated by Ofgem and there are increasing numbers of their networks. DNO & IDNOs are collectively known as Distributors.

ENA - the Energy Networks Association - is the industry body for UK energy transmission and distribution license holders and operators, and acts in the interest of its members in the energy 'wires and pipes' sectors. See [ENA](#)

Electricity Suppliers are the firms licensed to supply power to customers in the UK market and include British Gas, EDF Energy, npower, E.ON, Scottish Power, and Scottish and Southern Energy. These six companies are members of the Energy Retail association. [www.energy-retail.org.uk](http://www.energy-retail.org.uk)

Customer In the context of this document is the lighting authority.

## KEY PLAYERS IN UNMETERED SUPPLY

ELEXON is the Balancing and Settlement Code Company (BSCCo) established under the provisions of the Balancing and Settlement Code (BSC). They procure, manage and operate the services and systems which enable the balancing and imbalance settlement of the wholesale electricity market and retail competition in electricity supply. [www.elexon.co.uk](http://www.elexon.co.uk) Of particular significance to the street lighting industry is the publication by ELEXON of Unmetered Supply Charge Codes and Switch Regimes. See [Charge Codes](#)

UMSUG (Unmetered Supplies User Group) has been set up by ELEXON to provide expert advice on the Unmetered Supplies (UMS) arrangements under the Balancing Settlement Code. UMSUG advises ELEXON on charge code submissions, reviews CMS applications and provides general UMS guidance. See [UMSUG](#)

UMSO (Unmetered Supplies Operator) a unit within the DNO responsible amongst other things for the issue of Unmetered Supply Certificates. The UMSO is the main point of contact for requesting unmetered supplies, submitting the inventory and is likely to be responsible for carrying out any audits.

Meter Administrator (MA) is registered with ELEXON and appointed by any customer trading in unmetered Half Hourly supply. The MA calculates the total energy consumption for each day, apportioning it into half hour 'slots'. The resulting data is periodically passed to the Half Hourly Data Collector, which will ultimately lead to a bill being raised by the Energy Supplier.

## KEY PLAYERS IN METERED SUPPLY

Supplier Hub is required for all metered supply and comprises the Electricity Supplier, a Meter Operator (MOP) and a Data Collector/Data Aggregator (DC/DA).

Meter Operator (MOP) has the role of providing, installing and maintaining electricity meters together with any associated communications equipment. The Association of Meter Operators maintains a list of members. [www.meteroperators.org.uk](http://www.meteroperators.org.uk)

Data Collector/Data Aggregator (DC/DA) reads meters and processes data to enable the Supplier to bill its customers. Normally the DC and the DA are the same organisation. The role of the Data Aggregator is to aggregate all the load details and provide them to Elexon to enable the supply system to be balanced and for the suppliers to settle their energy transportation and supply commitments with the Distributors.

For metered supply all communications between the various partners in supplying electricity is undertaken using standard industry Data Flows which are essentially preformatted emails. A numbered Data Flow exists for every situation and they are transmitted to the players via the Industry's Data Transfer Network. All processes are logical and robust and there are performance guidelines which must be followed to avoid situations where meters are installed without a supplier being in place etc.

## UNMETERED TERMS

A Charge code is used to identify the electricity consumed by a piece of unmetered equipment. It is a 13 digit number set against individual items in customers inventories. Guidance is contained in the Guidance Note issued by Elexon. It must be accompanied in the inventory with a Switch Regime. For guidance on the format of inventory submissions, see the ELEXON Operational Information Document

Switch Regime recorded in the inventory as a three digit code, it will identify the switching mechanism and for customers not trading in Half Hourly energy, the annual hours to be billed.

EAC Estimated Annual Consumption of unmetered equipment, derived from the inventory, the charge code and switch regime.

MPAN a Metering Point Administration Number, individual supply points must have an MPAN, as will aggregate loads contained in an Unmetered Supply Certificate. See guidance at:- MPAN Guidance

An Unmetered Supply Certificate is issued to the Customer by the UMSO to confirm agreement to dispense with the use of meters (Schedule 7 of the Electricity Act) and for Non Half Hourly customers to record the Estimated Annual Consumption (EAC) based on the inventory supplied by the customer. The certificate may be on paper, fax or electronic as agreed, for each inventory. A copy of the UMS Certificate is also provided to the Customers appointed Supplier. Customers may hold a number of UMS Certificates, each for a different Distribution area or to separate equipment types, street lighting from traffic signals for example.

PECU Array – An array of Photo Electric Control Units (PECUs), set up to be representative of and record the actual switch off / on times of lighting units within the Customers inventory.

### Equivalent Meters

Are systems which provide a pseudo metering arrangement and are of two main types,

1. Passive - which allocates the unmetered consumption across the half hourly periods by a mathematical relationship of annual burning hours to the daily time of sunrise and sunset;  
or
2. Dynamic - which allocate the unmetered consumption across the half hourly periods by reference to the operation of a number of PECUs, or by making use of actual switching times reported by a Central Management System.

Central Management Systems (CMS) dynamically manage individual lighting points having regard to ambient lighting levels, traffic conditions, prevailing weather, age of lamp and other user determined factors. In its simplest form CMS just allows for the remote switching of lights on/off.



More sophisticated systems can have two-way communication, allowing adjustment to appropriate degrees of brightness, remote fault detection and lamp failure prediction.

Ofgem have stated that it is necessary for Advanced CMS to be approved in accordance with the provisions of Schedule 7 of the Electricity Act for it to be used to meter supply. See guidance on CMS metering at :- [CMS Guidance](#)

## METERED ENERGY

Metered non half hourly – supply billed periodically, simply having regard to the difference between current and previous meter readings.

Metered half hourly – supply billed periodically having regard to the summation of the demand measured within half hourly time slots.

Meter Readings The Data Collectors obligation to read electricity meters is established in section 2.3 of Section S of the Balancing Settlement Code,

See:- [BS Code](#)

The performance standard set for the frequency of meter readings is established by S12.14 of the [Standard Conditions of Electricity Supply](#) requiring suppliers to read meters every two years, as long as they have been the Supplier for the whole of that period. If customers switch Suppliers frequently that seems to negate the obligation to ever inspect and take an actual reading, Ofgem have been asked to clarify.

Smart Metering - meters predominantly used in domestic installations having advanced functions and able to handle dual tariff and other functions. An often misused term for AMR meters.

Automatic Meter Reading (AMR) - has the capacity to record consumption in each half hour period, and a means of remote communication to report usage. Regulation requires all new meters for Profile 5-8 customers (non-domestic usage with demand above ~40kW) to have this capability, but does not require it to be activated. AMR would facilitate Half Hourly billing.

Consolidated Account - rolls up any number of individual electricity bills, greatly reducing the administration involved in settling consumption charges for multiple metered sites.

## **PURCHASING ENERGY**

### Purchasing Bodies

The Pan Government Energy Project identified that the best way to reduce cost in the complex energy markets is through adopting flexible, aggregated, risk managed energy procurement. One way to achieve this is by using the services of a central purchasing body with the knowledge, skill and experience to buy energy on your behalf, aggregating energy volumes from other public sector organisations.

Follow these links to Purchasing Bodies websites at:-

[OGC Buying Solutions](#)

[LASER \(L.A.S.E.R\)](#)

[Procurement Scotland](#)

TEC the energy consortium [www.energyconsortium](http://www.energyconsortium)

### Purchasing Options

#### Flexible

Purchasing electricity in volatile commodity markets carries inherent price risk. By buying in tranches in advance of the period of consumptions authorities can ensure effective management of risk and a level of budget certainty. Tranches of energy are purchased prior to consumption through multiple time to market transactions. The energy is usually procured in clips of either 1, 5 or 10 MW's from Day Ahead, Monthly, Quarterly, or Seasonal (Summer/Winter) wholesale electricity markets. This method of procurement is used in conjunction with a robust risk management strategy, which includes purchasing triggers and stop losses or upper limits. This procurement approach is consistent with recommended public sector best practice.

#### Fixed Price Fixed Term

Considered to be the 'old' approach to energy procurement FPFT contracts offer the procurement agent an opportunity to agree a price for a year or multiple year energy requirement on a price available on the day. In the past these types of contract have offered budget certainty, specifically in rising price conditions but have offered no flexibility in falling markets. Because the supplier is taking all of the risk these type of contracts have tended to include high risk premiums and as such are no longer considered to offer best value for money, as they do not allow a fully risk managed approach to energy procurement.

Different 'products' – By specifying the method of generation, Customers can select different electricity 'products', be they Nuclear, Hydro, Wind, Coal, Gas, CHP, Biomass etc and by selecting those products can then influence the development of generation capacity in that area. Different prices will apply to different products and a balance between Customers commitment to influencing climate change and price will need to be considered.

Different trading arrangements

Different prices will apply depending on whether the supply is metered or unmetered, and Half Hourly or Non Half Hourly.

Unmetered non half hourly energy charges will be calculated by the Supplier in accordance with EAC and billed monthly on a flat profile of 1/12th the annual charge.

Passive Half Hourly, charges will be periodically calculated by the appointed Meter Administrator based on the sunset/sunrise and billed accordingly. The rate per kWh can be expected to be more competitive than non half hourly supply.

Dynamic Half Hourly charges will be calculated by the appointed Meter Administrator having regard to data taken from a PECU Array and/or CMS and billed accordingly. The rate per kWh can be expected to be more competitive than non half hourly supply.

## **CARBON REDUCTION COMMITMENT ENERGY EFFICIENCY SCHEME (CRCEE)**

The Carbon Reduction Commitment (now renamed the CRC Energy Efficiency Scheme) is a mandatory carbon emissions trading scheme to cover all organisations using more than 6,000MWh per year of electricity (equivalent to an annual electricity bill of about £500,000).

The scheme requires organisations (including many lighting authorities) to purchase and submit sufficient CRC allowances to meet their annual liabilities for CO<sub>2</sub> emissions. The scheme started with a reporting year running from April 2010. As part of its Spending Review, the Government has announced that the scheme is to be simplified to reduce the burden on businesses, with the first allowance sales for 2011-12 emissions now taking place in 2012 rather than 2011, as previously announced. Revenues from allowance sales totalling £1 billion a year by 2014-15 will be used to support the public finances, including spending on the environment, rather than being recycled to participants. Further decisions on allowance sales are a matter for the Budget process.

At the time of writing, the Environment Agency could provide no further information on these changes. The previous arrangements were that during the introductory phase, all carbon emission allowances would be sold at a fixed price of £12 per tonne of carbon dioxide. From April 2013, allowances would be auctioned by the government, with fewer available each year.

It was clarified on 25<sup>th</sup> January 2010 that under CRC an unmetered electricity supply measured on a passive or non-half hourly basis is not classified as a CRC supply and therefore not reportable for the purposes of CRC qualification or footprint and annual reporting. See [DECC addendum](#)

It is possible that following industry representations we may eventually see rationalisation of the application of CRC so that metered energy, passive NHH, passive HH and dynamic HH are all treated on the same basis for CRC reporting purposes.

## ARRANGING FOR A METERED SUPPLY.

Making arrangements for a metered supply can be a daunting task, especially for the uninitiated. The customer will play a key role and it is important for them to understand the process, so that the parties can all perform to programme. There are 3 key steps to the process, as follows:-

### **Step 1: Agree an Available Capacity (kVA) with the Distributor**

You will need to contact your Distributor to organise the new supply and to sign an Available Capacity Agreement (for large connections). Once this has been done, the Distributor will issue you with a Meter Point Administration Number (MPAN) for your new supply.

### **Step 2: Sign a metering contract with your chosen Meter Operator**

The metering industry is a competitive market and you can contract with any accredited Meter Operator. See [Meter Operators](#) for more information. Once you have signed your metering contract, you must nominate them to the Energy Supplier (see p15) who will then be able to appoint them to install the meter. If you require an Automatic Meter Reader (AMR), it will require a communication system. That would normally be wireless and be provided by the Meter Operator as part of their contract, but other options are possible.

### **Step 3: Instruct the energy supplier**

Different energy suppliers will have their own processes to follow, but will all require details including the MPAN number and contact details for your accredited Meter Operator. Some suppliers such as EDF Energy have processes which can be completed online, link to their [New Connections form](#) or type the following into your browser :-

<http://www.edfenergy.com/products-services/large-business/PDF/MBC-WF-NC-005-0409.pdf>

On completion of the application they will:-

- Register the MPAN – this should take no more than 10 working days
- Contact the Meter Operator to arrange a date for installation of the meter.
- Provide Data flows to enable consumption data to be passed to the supplier for billing purposes.

## CONVERTING FROM CONVENTIONAL METERING TO AMRs

The following template can be used as a basis to invite accredited Meter Operators / Data Collectors to quote for the service. Procurement Organisations may also have established framework agreements which members may use.

### Authority Detail

<b>Subject: AMR installation and operation</b>	<b>Date issued:</b>
<b>Originating Department:</b>	
<b>Response required by 12 noon on :-</b>	<b>Date:</b>

FAO: Regional Account Manager Meter Operating companies
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From Lighting Authority contact details
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### **Purpose of Supplies / Services / Works**

- The installation and operation of a number of Automatic Meter Readers (AMR) to ensure that the energy supplier receives actual electricity consumption data enabling accurate billing and eliminating estimated charges. This will allow accurate data to be used as part of the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme.

### **Background and specification**

- The authority requires a 'one stop shop' organisation for the purchase and installation of AMR's at numerous sites across its area for electricity. The same organisation must then dial into the meter to obtain accurate data and on a monthly basis send this actual data to the energy supplier who will accept this as actual data rather than estimated. The authority also requires the data to review energy management processes.
- The sites where AMR's are to be installed are primarily unoccupied structures, including feeder pillars, pumping stations, tunnel control rooms, traffic signals, large VMS signs and the like.
- The supplier must provide flexibility for future site expansion of the number of AMR sites and development of CRC legislation, to this end the meters should be Code 5 and Code 10 accredited.

### **Timescales**

- The authority requires all meters installed and operational within xxx weeks of the date of its formal Purchase Order.

**Quotation**

- Please quote for the supply of the goods / services described above. Please provide your lowest fixed price(s) exclusive of Value Added Tax indicating any discounts that have been applied. Your quotation to include the full cost of carriage and installation at the sites listed in the schedule, be made in accordance with the authorities standard terms and conditions and be valid for 60 days from the response date.
- The types of meters necessary at individual sites are yet to be determined so please include alternative prices for single and three phased metering.
- On going costs should be included i.e. the cost for maintaining meters in serviceable condition and for ongoing data collection and associated charges.
- If there are savings pro rata for installing numerous meters then please indicate this in your quotation.

Description	Quantity	Fixed Price (£)		Delivery / Lead Time
		Each	Total	

**Other Information**

Please use this section to include any information that you think will help your bid or provide explanatory notes on your quotation:



## APPOINTMENT OF METER OPERATOR / DATA COLLECTOR TEMPLATE

Dear Sirs,

### **Installation and Operation of Automatic Meter Readers (AMRs)**

This authority are engaging (name the meter operator) to install and operate a number of AMRs at sites at which you are the energy supplier. Consequently this authority wishes to appoint that organisation as its Meter Operator and Data Collector for the supplies listed in the attached schedule.

I would be pleased if you will send the necessary data flows to them to enable the firm to perform their required functions. Once AMRs have been installed please arrange to appoint the firm as Data Collector.

The firm will be project managing the implementation of these AMRs and are authorised to act on behalf of this authority in that respect.

Yours faithfully

### **Schedule of sites requiring conversion to AMR**

Address Line 1	Address Line 2	District	Postcode	MPAN

## DOCUMENT CONTROL

Revision No	Date	Summary
V1.0	Dec 2010	Document issued