Load Profiles and their use in Electricity Settlement

Introduction

This document provides a broad overview of ‘Load Profiling’. It explains what a Load Profile is, how Load Profiles are created by the Profile Administrator (PrA), and how they are applied to the Balancing and Settlement Code (BSC). Data for ‘Load Profiling’ has been collected and analysed since the inception of the Electricity Council Load Research Programme in the 1950’s. However, the use of ‘Load Profiles’ for electricity settlement is relatively new, and was a product of the Electricity Pool ‘1998 Programme’ put in place to open up the electricity supply market to competition.

In order to avoid putting Half-Hourly metering into every supply market customer, it was decided that customers below 100 kW Maximum Demand would be settled using load profiles and readings from customers’ existing electricity meters. In 1994 the ‘Profiling Taskforce’ set about analysing electricity consumption patterns to define the number and type of profiles to be used in Settlement. It was decided that there would be eight basic types of profiles (Profile Classes), which would be manipulated in order to model the plethora of different metering configurations that exist in the electricity supply market. Following the implementation of Modification P272 ‘Mandatory Half Hourly Settlement for Profile Classes 5-8’ in April 2017, the number of Profile Classes that require profiling reduced to four.

SECTION A What is a Load Profile?

Load Profile is a broad term that can refer to a number of different forms of data. It can refer to demand and consumption data, or it can be a reference to derived data types (such as Regression and Profile Coefficients). However, all these data types have one thing in common; they represent the pattern of electricity usage for a customer segment of the electricity supply market. A load profile gives the Half-Hourly (Settlement Period) pattern or ‘shape’ of usage across a day (Settlement Day), and the pattern across the year (Settlement Year), for the average customer of each Profile Class. It is the proportion of demand in each Settlement Period that matters in the Settlement system. Figures 1 and 2 depict a typical daily and yearly pattern of demand for the average domestic unrestricted customer (Profile Class 1).

![Figure 1](image-url)
Figure 1 shows the daily pattern of demand in kW and Figure 2 shows the yearly pattern in kWh per day. The data provided to Settlement by the PrA is given in the form of Regression and Profile Coefficients, which can be manipulated to give the patterns of usage for each category. The format and usage of the coefficients are discussed later in this document.

The Profile Classes

The four generic Profile Classes represent large populations of similar customers, and are as follows:

- **Profile Class 1** Domestic Unrestricted Customers (Single Rate)
- **Profile Class 2** Domestic Economy 7 Customers (Two Rate)
- **Profile Class 3** Non-Domestic Unrestricted Customers (Single Rate)
- **Profile Class 4** Non-Domestic Economy 7 Customers (Two Rate)
SECTION B  Creating Load Profile Data

Load Profile data is created by recording and analysing Half-Hourly demand data from a representative sample of customers, for each of the four Profile Classes. This section discusses the sample selection and data collection processes involved in creating a load profile. Figure 2 is a simplified model of the basic processes involved, followed by a brief description of each stage.

Figure 3

Sample Design

In order to design a sample, the required sample size must be agreed. There are two main drivers of this decision:

Cost: The larger the sample size, the greater the expense at each stage

Accuracy: The larger the sample size, the greater the accuracy (precision) of the Load Profile(s)

There is a trade-off between cost and accuracy when deciding the required sample size. In order to assess this you must define a sampling variable. Since we are attempting to model the average load shape of sample members, the sampling variable for Load Profiling is annual consumption (kWh). Historically this information was readily available from Supplier billing systems.

Using a sampling fraction of 1 in n (e.g. 1 in 2000 for domestic customers) it was possible to draw a random primary sample from Supplier billing systems for each of the Profile Classes. Using the primary sample information it is possible to design a stratified sample. The strata referred to in the stratified sample are consumption bands. By setting the strata so that customers within each band are more homogenous (less variance) greater accuracy can be achieved with a smaller sample size, thus reducing costs. A typical stratification for domestic unrestricted customers is as follows:

Stratum 1  Customers who consume less than 3,000 kWh per year
Stratum 2  Customers who consume between 3,000 kWh and 7,500 kWh per year
Stratum 3  Customers who consume over 7,500 kWh per year
Sample Selection

It is desirable to have a sample that accurately represents the distribution of the national population for each of the Profile Classes. Therefore, customers are randomly selected within each stratum and each Grid Supply Point (GSP) Group (a collection of GSPs for a region) using the primary sample data. There are currently 14 GSP Groups; 12 in England and Wales and 2 in Scotland. The population within each of the strata, and within each region obtained from Suppliers billing systems, is used to weight the strata together in the correct proportions. Figure 4 shows a typical distribution of customers within 500 kWh consumption bands for a GSP Group.

![Figure 4](image)

Sample Recruitment

Historically, since you could not compel customers to take part in the Load Research samples, a small incentive payment has been made to domestic customers who agreed to join the sample and have a Secondary Meter installed. Suppliers are now required (following the implementation of Modification P223) to provide sample data gathered from customers within their own portfolios. Unsuccessful recruitment attempts can be replaced by a new selection from the same stratum and region from the Supplier portfolios. Similarly, sample customers who retire or move off-profile (e.g. a customer who has Half-Hourly metering installed) are replaced by a new selection from the Supplier portfolios.
Equipment Installation and Data Retrieval

Licensed Meter Operator Administrators (MOAs) have historically been used to install half-hourly metering equipment in successfully recruited customer premises. These metering systems record Half-Hourly and are fitted into customer premises as their Settlement meter.

The equipment has it Half-Hourly data collected once a month, which is then loaded into an application database (EPAS). The data can be collected by an Agent assigned by the Supplier, or by the Supplier directly (see Modification P223 for more information). The EPAS application allows the data to be check for validity, and provides the functionality required to analyse the data and calculate the load profiles (with input from the Data Agent who calculates the actual co-efficients).

Data Analysis

After retrieval, the Half-Hourly demand data is downloaded and validated. Historically, validation consisted of comparing aggregated recorded demand data to Meter advances, calculated using readings taken at the time of installation and data retrieved. Data which does not pass the validation tests are excluded from further analyses. A simplified model of the basic data analysis processes are given in Figure 5 below.

Figure 5

Grouping

After validation, demand data is grouped by Profile Class using the sample customer’s Metering Point Administration Number (MPAN). The first two digits of the full MPAN indicate the Profile Class. Where an MPAN does not tally with the Profile Class sample to which they were recruited, the associated site is omitted from the sample.
Weighting and Averaging

After grouping, it is possible to create a simple average demand for each Half-Hour period of the year for each stratum and GSP Group. These simple averages can be weighted together using the fractions of the population that are in each GSP Group. Figure 6 shows the weighting and averaging procedure for Profile Class 1, GSP Group _A, Half-Hour 1 on Settlement day 1.

Summating across each GSP Group gives a **Group Average Demand (GAD)** for that Settlement period and Settlement day. Repeating the procedure for each Half-Hour of the year gives a $365 \times 48$ matrix of GADs, which are used in the regression analysis.

Figure 6
Switched and Base Load for Economy 7 Customers

The two Economy 7 profile's GADs are split into switched load and base load, using sample customer information on their electric heating and their switching regimes (the times that the customer’s consumption is being recorded against the meter’s "low" register). Figure 7 depicts a typical switched load/ base load split.

Figure 7
Regression Analyses

A brief explanation of regression analysis, and how Regression Coefficients are created and evaluated, is given below.

What is linear regression?

The Regression Coefficients used in the Settlement System are multi-linear. This means that the regressions use more than one variable. In fact, they use up to seven variables including temperature, sunset and day of the week. More detail on the variables is given later, but for simplicity we will explain regression analysis using only 1 variable. This is called simple linear regression. The variable used in this simplistic explanation is noon temperature in °F. Figure 8 shows a plot of GADs against noon temperature with a linear trend line (the line of best fit).

![Figure 8](image)

Figure 8 shows that for every 1°F increase in temperature, the trend line falls by a fixed amount. It is this fixed amount is regarded as a coefficient.

The equation of a straight line can be expressed as:

\[ Y = BX + C \]

Where \( Y \) is the estimate of demand (kW), \( B \) is the coefficient, \( X \) is the noon temperature and \( C \) is a constant that gives the point at which the line will intersect with the \( Y \) axis when \( X = 0 \). In the above example, if we extended the trend line to where \( X = 0 \), it would intercept at 1.346.

Therefore in this example, \( B = -0.0115 \) and \( C = 1.346 \). This means that for every 1°F increase in temperature, demand falls by around 11.5 W. Using this information we can predict (evaluate) the likely demand at any temperature by using the equation. So at 50°F the estimate of demand will be:

\[ Y = (-0.0115 \times 50) + 1.346 = \text{approx. } 0.77 \text{ kW} \]
The evaluation is demonstrated in Figure 9. The dashed yellow line at 50ºF extends upwards until it hits the regression line. Reading this point off on the Y axis gives an estimate of 0.77 kW.

![Figure 9](image)

In reality there are multiple variables, so the calculations become more complicated, but the theory is the same.

**The Variables**

This section defines the variables that are used in the regression analysis, and give a brief explanation of why they are used. There are up to seven variables in each regression, depending on the day type of the regression. The variables are as follows:

**Noon Effective Temperature (NET)**

The above example of simple linear regression uses noon temperature in ºF. However, in reality the temperature variable used is Noon Effective Temperature (NET). A NET is designed to take account of the residual heat left behind in building fabric over a number of days. It is a weighted ºF value of the noon temperature on the day, the previous day, and the day before that. The weights are as follows:

\[
\text{NET} = 0.57 \times \text{Actual Noon Temperature on Day (ºF)} + 0.28 \times \text{Actual Noon Temperature on previous Day (ºF)} + 0.15 \times \text{Actual Noon Temperature on Day before that (ºF)}.
\]
Figure 10 shows the England and Wales NET values for a typical year (April to March).

Figure 10

The reason for having a temperature variable is obvious: heating load increases when temperatures fall, and load decreases when temperatures rise - until any cooling load (e.g. air conditioning) is applied.

The Sunset Variables

There are two sunset variables used in all the regressions. The sunset variable, which is expressed as minutes before or after 18:00 hours (GMT), is included as this affects illumination (e.g. lights are switched on at sunset).

The other sunset variable is sunset squared. Squaring the sunset variable gives positive values across the year, which can be used to predict seasonal effects. Figure 11 depicts sunset variables for a year (April to March).
Day of Week Variables

The weekday regressions also include dummy variables. These variables are expressed as 1s and 0s. Four sets of dummy variables are included in the weekday regressions as follows:

- Set 1: 1 if the day is a Monday else 0
- Set 2: 1 if the day is a Wednesday else 0
- Set 3: 1 if the day is a Thursday else 0
- Set 4: 1 if the day is a Friday else 0

Tuesday is taken to be the standard day and does not get a dummy variable. This means that when evaluating regressions for a Tuesday, the weekday coefficients are ignored.
Regression Equations and Evaluating Regression Coefficients

Using these variables creates a more complex equation than in the simple linear regression example. The equation for a weekday would be:

\[ Y = \text{Temperature Coefficient} \times \text{Temperature Variable} + \text{Sunset Coefficient} \times \text{Sunset Variable} + \text{Sunset Squared Coefficient} \times \text{Sunset Squared Variable} + \text{Monday Coefficient} \times \text{Monday Variable} + \text{Wednesday Coefficient} \times \text{Wednesday Variable} + \text{Thursday Coefficient} \times \text{Thursday Variable} + \text{Friday Coefficient} \times \text{Friday Variable} + \text{Constant} \]

When evaluating the regression coefficients the relevant variables are inserted into the equation above to get an estimate of Y for any Half-Hour.

The Regression Types

There are fifteen basic regression types representing five seasons and three day types. The GAD Matrices are divided into five seasons and three day-types. The definitions of the seasons are as follows:

- Winter (Season Id 1): defined as the period from the day of clock change from British Summer Time (BST) to Greenwich Mean Time (GMT) in October, up to and including the day preceding the clock change from GMT to BST in March;
- Spring (Season Id 2): defined as the period from the day of clock change from GMT to BST in March, up to and including the Friday preceding the start of the Summer period;
- Summer (Season Id 3): defined as the ten-week period, preceding High Summer, starting on the sixteenth Saturday before the August Bank Holiday;
- High Summer (Season Id 4): defined as the period of six weeks and two days from the sixth Saturday before August Bank Holiday up to and including the Sunday following the August Bank Holiday; and
- Autumn (Season Id 5): defined as the period from the Monday following the August Bank Holiday, up to and including the day preceding the clock change from BST to GMT in October.
Each season is divided into Week Days, Saturdays and Sundays. Figure 12 shows the relationship between the GADs and the Regression Coefficients.

**Figure 12**

**The Regressions and Special Days**

The regressions are performed on a Half-Hourly basis within each of the fifteen basic day-types, using the relevant GADs and variables. However, there are some days of the year such as Bank Holidays that are unlike other days. In order to create Regression Coefficients for these days, the Sunday Coefficients for the relevant season are copied and an adjustment is made to the constant term using information from the GADs for the relevant day. The regression output is Regression Coefficients for each Profile Class, Season, Day-type, Half-Hour, Coefficients and the Constant. An example is given in Table 1 below:

**Table 1**

<table>
<thead>
<tr>
<th>Profile_1</th>
<th>AUT</th>
<th>WD</th>
<th>Mon</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Const</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp.</td>
<td>-1.31E-03</td>
<td>4.66E-06</td>
<td>7.49E-03</td>
<td>-3.99E-05</td>
<td>-1.66E-03</td>
<td>1.04E-02</td>
<td>0.322</td>
</tr>
<tr>
<td>Sunset</td>
<td>-3.11E-05</td>
<td>4.66E-06</td>
<td>7.49E-03</td>
<td>-3.99E-05</td>
<td>-1.66E-03</td>
<td>1.04E-02</td>
<td>0.322</td>
</tr>
<tr>
<td>Sunset Sq.</td>
<td>4.66E-06</td>
<td>4.66E-06</td>
<td>7.49E-03</td>
<td>-3.99E-05</td>
<td>-1.66E-03</td>
<td>1.04E-02</td>
<td>0.322</td>
</tr>
</tbody>
</table>
**Evaluating the Coefficients**

Evaluation of the coefficients will usually occur at out-turn NETs and Sunset Variables for the day that is being estimated. Figure 13 shows how the coefficients evaluate to form a profile.
Figure 13 An example evaluation, using the above coefficients, for a Wednesday, with a NET of 52°F and a Sunset Variable of -13 is given in Table 2 below:

Table 2

<table>
<thead>
<tr>
<th>Temp.</th>
<th>Sunset</th>
<th>Sunset Sq.</th>
<th>Mon</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Const.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof_1</td>
<td>AUT</td>
<td>WD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>-1.33E-03</td>
<td>-3.11E-05</td>
<td>4.66E-06</td>
<td>7.49E-03</td>
<td>-3.99E-05</td>
<td>-1.66E-03</td>
<td>1.04E-02</td>
</tr>
</tbody>
</table>

Multiply

Evaluation Variables

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>TOTAL</th>
<th>TOTAL</th>
<th>TOTAL</th>
<th>TOTAL</th>
<th>TOTAL</th>
<th>TOTAL</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>-13</td>
<td>169</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

GRAND TOTAL 0.254 kW

Algorithmic Profiling

The Regression Coefficients for the Economy 7 switched load profiles undergo another step called algorithmic profiling. This process allows the coefficients to model switching regimes that are less than or greater than seven hours, or even switching regimes that are split across the day. Figure 14 shows evaluated Regression Coefficients for regimes of various lengths. The thicker brown line is the evaluation for the standard seven hour regime. The procedure ensures that the area under each curve remains the same.
Additional data provided by the PrA

Group Average Annual Consumption (GAAC)

Using ten-year average NETs and sunset variables for each GSP Group, the relevant Regression Coefficients are evaluated for every day in the Settlement year to which they are to be applied, for each Profile Class and GSP Group. Summing the evaluations (within each Profile Class and region) and dividing by 2 creates a Group Average Annual Consumption (GAAC) in kWh. The GAACs are used for calculation of Profile Coefficients in the Settlement System and are provided in MWh. An example of a GAAC is given below:

<table>
<thead>
<tr>
<th>&quot;GSP&quot;</th>
<th>&quot;Profile_Class&quot;</th>
<th>&quot;Type&quot;</th>
<th>&quot;GAAC&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;C&quot;</td>
<td>1</td>
<td>&quot;TOTAL&quot;</td>
<td>3.740 MWh</td>
</tr>
</tbody>
</table>

Profile Coefficients

A Profile Coefficient is an estimate of the fraction of yearly consumption within each Settlement period. It can refer to a fraction of the whole year or the fraction of consumption in a Settlement period relating to a single Meter register to the yearly consumption for that register. Profile Coefficients are calculated as follows

\[
\text{Evaluated Regression Equation} / (\text{GAAC} \times 2000)
\]

The GAAC is multiplied by 2000 to convert it from MWh to kW, so that:

\[
\text{kw per Half-Hour} / \text{kw per year}
\]

The use of Regression and Profile Coefficients are discussed in the next section, which describes how load profiles are used to estimate Half-Hourly consumption from a Meter advance.
SECTION C USING LOAD PROFILE DATA TO ESTIMATE HALF-HOURLY CONSUMPTION FROM A METER ADVANCE

The Settlement system uses load profiles to estimate Half-Hourly consumption for all supply market customers, with numerous metering configurations on a daily basis for each supplier. Operation of the NHH Settlement system is undertaken by the BSC and Party Agents. The role of these Agents is discussed later, but the theory of Load Profile application is described below.

To understand the theory it is easiest to consider how the load profiles can be used to estimate the Half-Hourly take for a single supply market customer, with a single meter register.

Example 1: A domestic unrestricted customer in London with a quarterly meter advance of 1,000kWh (for period 1 April 2004 – 30 June 2004)

Step 1: Using the methodology described in Section B, evaluate the Regression Coefficients using the NETs for the relevant period. Include London Sunset Variables and other variables as appropriate to give Estimated Regional Average Demands per Customer (ERADPCs). Figure 15 shows the evaluated Regression Coefficients for Profile Class 1 for 1 April 2004.
Figure 15  Step 2: Calculate Profile Coefficients for the Meter advance period, using the GAAC as described in Section B. Figure 16 shows the Profile Coefficients for 1 April 2004.

![Profile Class 1 - Profile Coefficients 1 April 2004](image)

Figure 16  

Step 3: Calculate an Annualised Advance (AA)

To calculate an Annualised Advance you simply divide the Meter advance by the sum of the Profile Coefficients over the period of the advance (1 April 2004-30 June 2004) in this case:

\[
\text{Annualised Advance} = \frac{1000 \text{ (Meter Advance)}}{0.221136 \text{ (Sum of Profile Coefficients)}}
\]

\[
= 4522 \text{ kWh (Estimation of customer’s annual consumption)}
\]

Step 4: Allocate the Calculated volume to each day

To allocate the calculated volume to each day, simply multiply the Profile Coefficients by the AA. Figure 17 shows the allocation of the AA to the Profile Coefficients for the 1 April.

![Profile Class 1 - Volumed Consumption 1 April 2004](image)

Figure 17
The customers Meter advance has now been split into Half-Hourly consumption without the need of Half-Hourly metering. The daily consumption estimate over the Meter reading period can be seen in Figure 18.

![Figure 18](image)

**Figure 18**

In practice, the true profile for an individual customer would not look like the profile shape, as this profile shape is of an “average customer” and all customers’ usage patterns differ. In reality, all domestic unrestricted customers in a GSP region have AAs calculated and aggregated before the volume is allocated.

If there is no Meter advance for a customer, an Estimated Annual Consumption (EAC) – calculated using historical Meter Reading information - is used in Settlements until the customers meter has been read. At this level, the profile should give a reasonable estimate of a Supplier’s take for each Half-Hour.

In reality, many supply market customers have metering configurations with more than one register. The configurations are referred to as Standard Settlement Configurations (SSC’s) and the registers as Time Period Registers (TPRs). For each SSC, the approximate fraction of consumption on each register is calculated; this is referred to as the Annual Fraction of Yearly Consumption (AFYC).
Example 2: A domestic Economy 7 customer in London on an 00:30–07:30 GMT switching regime (01:30–08:30 BST), who has a low register advance of 500 units and a normal register advance of 1000 units, for the period 1 April 2004 – 30 June 2004 (note this example also demonstrate how switched and base load coefficients are used).

Step 1: Evaluate the Regression Coefficients for switched and base load using the NETs for the relevant period, and London Sunset Variables. Figure 19 shows using a stacked bar chart of the evaluated Regression Coefficients for Profile Class 2 for the 1 April 2004.

![Figure 19](image)

Figure 19
Step 2: The Basic Period Profile Coefficients (BPPC) for switched and base load are calculated in the GAAC. However, the two sets of Profile Coefficients need to be combined in the correct proportions. Figure 20 shows Combined Period Profile Coefficients (CPPCs) for 1 April 2004.

![Figure 20](image)

Figure 20
Step 3: Next, divide the coefficients on the low register by the low register AFYC, and the coefficients on the normal register by the normal AFYC (0.4 low and 0.6 normal are used for this example). This is sometimes referred to as ‘chunking’ and creates Period Profile Class Coefficients (PPCCs). This step is also carried out in the first example but as there is only one register the AFYC is 1, this makes no difference. Figure 21 shows the ‘chunked’ coefficients for 1 April 2004.

![Profile Class 2: Chunked Profile Coefficients](image)

**Figure 21**

Step 4: Calculate AA for each register by dividing the annual advances by the sum of the ‘chunked’ coefficients for the register over the reading period. In this example:

Low AA = \( \frac{500}{0.174} = 2869 \)

Normal AA = \( \frac{1000}{0.232} = 4304 \)
**Step 5:** Multiply the ‘chunked’ coefficients (PPCC’s) by the relevant AA to give Half-Hourly consumption estimates for each register. **Figure 22** shows the volumes allocated to each TPR for 1 April.

![Figure 22](image)
As before, these calculations would in reality use aggregated AAs and EACs for all customers on the same SSC in each GSP Group for each Supplier. Figure 23 summarises the calculations. The SSCs, TPRs, switching times, AFYCs, and other information are contained in the Market Domain Data (MDD).

![Diagram](image-url)
The BSC Agents

All the calculations above are carried out by BSC Agents and BSC Party Agents. The following is a brief overview of the agents, and their roles in NHH Settlement as they relate to load profiles.

The Profile Administrator (PrA)

The PrA calculates the Regression Coefficients, GAACs and ‘default’ Profile Coefficients (coefficients to be used when a true coefficient cannot be calculated).

Non Half-Hourly Data Collectors (NHHDCs)

The NHHDCs read the NHH Meters and calculate AAs and EACs using the Daily Profile Coefficients (DPCs) (sum of PPCCs for the Settlement day and Settlement period) produced by the Supplier Volume Allocation Agent (SVAA). They provide the AAs together EACs to the Non Half-Hourly Data Aggregators (NHHDAs).

Non Half-Hourly Data Aggregators (NHHDAs)

The NHHDAs aggregate the AAs and EACs by Supplier, GSP Group, Profile Class (PC), Line Loss Factor (LLF), Standard Settlement Configuration (SSC), and Time Pattern Regime (TPR) to create a Supplier Purchase Matrix (SPM), which is used by the SVAA.

The Supplier Volume Allocation Agent (SVAA)

The SVAA uses the Regression Coefficients to calculate DPCs for each SSC and TPR combination in the MDD. The SVAA allocates the aggregated volumes given in the SPM to the applicable Settlement period using the Period Profile Class Coefficients (PPCCs). The SVAA also calculates the AFYCs and provides the MDD.

Supplier Metering Registration Agents (SMRAs)

The SMRA provides information to the other agents on Metering Systems and their Suppliers within each GSP Group.

Figure 24 shows in a simplified format the relationships between the Non Half-Hourly Agents.
Figure 24
Settlement Runs

The daily Settlement runs calculate the Profile Coefficients for the day. The Profile Coefficients for previous days are updated with AAs calculated using the latest Meter reading information.

After a 14 month period, Final Reconciliation (RF) for the settlement day occurs when hopefully most, if not all, supply customers’ meters have been read at least once.

Profiling Error

Sources of load profiling error occur at every stage; however, these errors fall into two main categories:

Profile Estimation Errors

The two main sources of Profile Estimation Error are:

Sampling Error: Sampling Errors are inherent in all samples, but tends to reduce as the sample size increases.

Regression Error: This is unavoidable, as shown in Figures 8 and 9 above. The vertical distance between the trend line and the data points can be described as the regression error. These are also sometimes referred to as residual demands.

Profiling Process Errors

The following are a few of the Profiling Process Errors:

- Application of national profiles to GSP Groups
- Incorrect assignment of customers to profile
- Incorrect AAs and EACs
GSP Group Correction Factors

When all Suppliers’ profiled Half-Hourly consumptions are summated across a GSP Group, the total can be compared to the actual metered take for the Group (after taking account of Half-Hourly metered data). Dividing the profiled take into the actual take creates a GSP Group Correction Factor (GSPGCF). This factor is applied to each Supplier’s individual profiled take in order to correct the profiled error.

Need more information?

BSC Audit Reports and other documentation including the Audit Scope and Approach are available on the BSC Website.

For more information on the BSC Audit process, including how to access the online tool, please contact your Operational Support Manager or email bscaudit@elexon.co.uk.

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