Redlined Service Description for Profile Administration changes for CP1365 'Shortening Profile Production Timescales'

The CP proposes changes to Service Description for Profile Administration sections: 2.2; 4.1.1, 5

We have redlined these changes against version 7.0 of the BSCP.

1 Introduction

1.1 Purpose

1.1.1 This is the Service Description for the Profile Administrator. The Profile Administrator is appointed by BSCCo for the purpose of providing a profile administration service in connection with the Balancing and Settlement Code ('the BSC').

1.1.2 The purpose of this Service Description is to describe the responsibilities and obligations of the Profile Administrator. The responsibilities and obligations of the Profile Administrator under this Service Description are collectively referred to as "the Profile Administrator Service".

1.1.3 This Service Description also describes the key interfaces between the Profile Administrator, BSCCo and other BSC Agents such as the Supplier Volume Allocation Agent (SVAA).

1.2 Structure of this Document

1.2.1 This document is structured as follows:

- Section 2 gives an overview of the Profile Administrator Service;
- Sections 3 and 4 describe the detailed requirements for the Data Collection and Data Analysis elements of the service respectively;
- Section 5 describes the deliverables;
- Section 6 specifies non-functional requirements;
- Appendix A contains the terms, acronyms and definitions used in this document;
- Appendix B specifies the profile transformation procedure used to convert 14-period switched load profiles into profiles of other durations;
- Appendix C provides background information on profiling under the BSC; and
- Appendix D describes Domestic Economy 7 Profile Classes.

1.3 The Balancing and Settlement Code Company

1.3.1 The BSC Panel is supported in the discharge of its duties and obligations under the BSC by the Balancing and Settlement Code Company (BSCCo). BSCCo is created by the BSC and procures, manages and operates services and systems that enable the Balancing Mechanism and Imbalance Settlement process to operate.

1.3.2 In accordance with Section E of the BSC, BSCCo shall enter into a contract with a person appointed as the Profile Administrator for the provision of the Profile Administrator Service as specified in this Service Description.

2 Overview

2.1 BSC Requirements for the Profile Administrator Service

2.1.1 Paragraphs 2.1.2 to 2.1.9 below summarise the requirements for the Profile Administrator Service. Note that these paragraphs 2.1.2 to 2.1.9 are a direct quote from Section S4.2 of the BSC (other than renumbering of paragraphs).

2.1.2 The principal functions of the Profile Administrator are, in accordance with the Supplier Volume Allocation Rules and relevant Code Subsidiary Documents:

(a) to create and maintain a load research sample using customer information provided to it by Suppliers and to carry out a programme of load research in order to collect or obtain half-hourly demand data relating to customers who form part of the load research sample;

(b) to analyse data collected through the load research programme and from other sources approved from time to time by the Panel;

(c) to derive sets of Regression Coefficients for each Profile Class;

(d) to deliver the Regression Coefficients and related data to Parties, the SVAA, Supplier Agents or BSCCo;

(e) to analyse data and to monitor the accuracy of Profiles derived from Regression Coefficients;

(f) to provide such consultancy services as the Panel may from time to time determine; and

(g) to, where agreed between the Profile Administrator and the relevant Supplier and in accordance with any requirements in BSCP510, install and maintain and/or procure the installation and maintenance of Profile Capable Metering Systems at the premises of the customers referred to in paragraph 2.7.5(e) of Balancing and Settlement Code who are identified to the Profile Administrator by the Supplier.

2.1.3 The Profile Administrator shall provide (unless and to the extent otherwise specified from time to time by BSCCo) to BSCCo or as otherwise directed by it a set of Regression Coefficients, Group Average Annual Consumption values and Profile Coefficients for each BSC Year on or before 30th November before the beginning of the relevant BSC Year, using data collected from the load research programme carried out by the Profile Administrator, augmented with data provided by Suppliers which is consistent with the overall sample design.

2.1.4 Unless and to the extent otherwise specified by BSCCo, the Profile Administrator shall deliver to BSCCo or as otherwise directed by it:

(a) on a quarterly basis, a breakdown by GSP Group of each Profile Class sample, together with a statement of the daily average number of Sample

Participants for which monitoring equipment has been successfully installed and commissioned for each Profile Class in respect of the previous quarter (a quarter being a period of 3 months commencing on 1st January, 1st April, 1st July and 1st October in any year); and

(b) an annual report and data analysis plan (in such form as may be specified by the Panel) setting out what load research data the Profile Administrator proposes to use, together with a load research plan (in such form as the Panel shall specify) setting out the proposed sample design and sample sizes in respect of the following BSC Year.

2.1.5 Unless and to the extent otherwise specified by the Panel, the Profile Administrator shall:

(a) make one or more representatives available, subject to reasonable notice, to attend meetings of the Panel or its representatives in order to provide advice on profiling matters; and

(b) provide advice to the Panel as to the implications of introducing new or modified Profile Classes and GSP Groups and as to the implications of changing sample sizes and profiling methodology.

2.1.6 Where:

(a) at the request of a Supplier, the Profile Administrator installs and maintains or procures the installation and maintenance of a Profile Capable Metering System on the Supplier's behalf at the premises of a customer who forms part of the load research sample, the Profile Administrator's associated costs shall be treated as BSC Costs under Section D of the Code; and

(b) a Supplier procures the installation and maintenance of a Profile Capable Metering System at the premises of a customer who forms part of the load research sample, the Supplier shall be entitled in respect of that customer to be paid the relevant Profile Sum (referred to in paragraph 4.2.7) by the Profile Administrator.

2.1.7 Without prejudice to any other provision in the Code, in the event that the Supplier requests the Profile Administrator to install and maintain or procure the installation and maintenance of a Profile Capable Metering System in relation to a customer who forms part of the load research sample, the Supplier shall also request the Profile Administrator to acquire or procure the acquisition of the Profile Capable Metering System and to perform or procure the performance of the relevant functions of a Meter Operator Agent, Data Collector and Data Aggregator in relation to that Metering System.

2.1.8 The relevant Profile Sum shall be the total of the average annual cost per member of the load research sample incurred by the Profile Administrator in each BSC Year in relation to the:

(a) acquisition and installation of a Profile Capable Metering System (provided that this cost shall only be included in the relevant Profile Sum where it has been necessary for the Supplier to procure the acquisition and installation of a Profile Capable Metering System in relation to the relevant customer for the purposes of the load research programme, and then only in relation to the first acquisition and installation thereof or in relation to the necessary replacement thereof);

(b) annual maintenance of a Profile Capable Metering System at a customer's premises and of performing the other functions of a Meter Operator Agent in relation to it (provided that only 50% of such cost shall be included in the relevant Profile Sum where the relevant customer has been part of the load research sample for part only of the relevant BSC Year or has been a customer of the relevant Supplier for part only of the relevant BSC Year); and

(c) annual cost of the collection of the half-hourly demand data from a Profile Capable Metering System (provided that only 50% of such cost shall be included in the relevant Profile Sum where the relevant customer has been part of the load research sample for part only of the relevant BSC Year or has been a customer of the relevant Supplier for part only of the relevant BSC Year).

2.1.9 The Profile Sum payable to each Supplier shall be paid annually in accordance with BSCP510 in respect of each BSC Year and, for the avoidance of doubt, shall be treated as BSC Costs under Section D of the Code.

2.2 Timetable for Profile Administrator Service

2.2.1 ~~Both the~~ The ~~p~~~~roduction~~Profile cycle will be determined from time to time by the BSC Panel. ~~and use of Profile data will take place on a BSC Year basis, where a BSC Year runs from 1 April to 31 March. The Technical Deliverables provided to BSCCo in a given BSC Year Y will be based on load research carried out in BSC Year (Y-1), and will be used to calculate Supplier energy volumes for Settlement Days in year (Y+1). A given set of Profile data therefore has a three year life-cycle,~~The Technical Product Deliverables will be produced to the defined ~~production~~Profile cycle on a yearly or seasonal basis such that the Market Domain Data and the SVA systems ~~is~~are populated with the latest Regression Coefficients, GAACs and Default Profile Coefficients and in a timely manner to allow for the Daily Profile Production ~~R~~runs. ~~as illustrated in Figure 2-1:~~

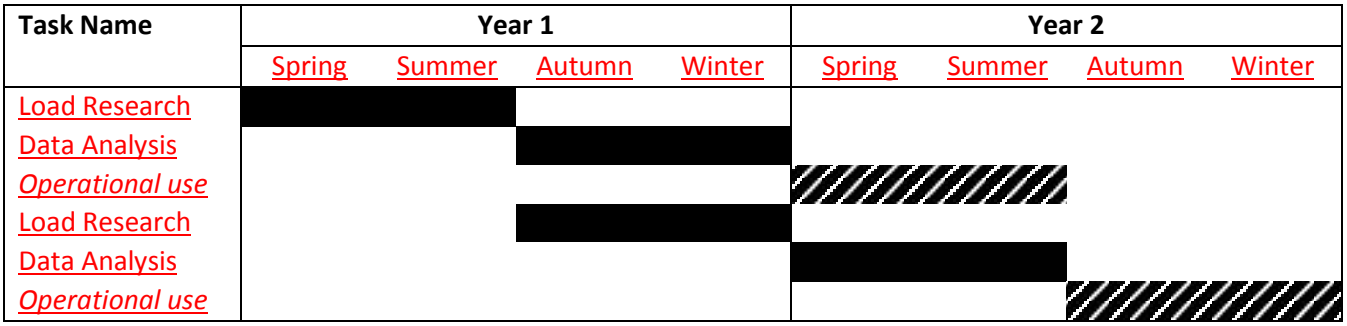

Figure 2-1: ~~A One year~~The ~~Production~~ Profile Cycle

2.2.2 In ~~the first year of this cycle –~~ the Load Research ~~Year~~ and Data Collection Sstage - the Profile Administrator conducts a programme of Load Research to monitor the patterns of electricity demand among various samples of Sample Participants in accordance with BSCP510 'Provision of Sampling Data to the Profile Administrator'. This is achieved by creating a Load Research sample based on the target sample size provided by BSCCo. Each year, the Load Research sample is maintained by obtaining the required number of Sample Participants from each Supplier, as specified by BSCCo. In order for BSCCo to determine the number of Sample Participants required from each Supplier, the Profile Administrator shall provide details of existing Sample Participants to BSCCo.

2.2.3 Metering equipment installed at each Sample Participant's premises must meet Settlement and half hourly data collection requirements. The Profile Administrator or the Supplier shall perform and procure the installation and maintenance of Profile Capable Metering Systems as agreed between the Profile Administrator and the Supplier in accordance with BSCP510.

2.2.4 Data for the Load Research sample is obtained following the installation of Profile Capable Metering Systems. Half hourly electricity consumption is collected from the installed Profile Capable Metering Systems for one year by the Profile Administrator or the Supplier as agreed in accordance with BSCP510. The data collected each half hour is for use in the Data Analysis stage of the programme.

2.2.5 In ~~the second year of the cycle~~[1] ~~–~~ the Data Analysis stage - the Profile Administrator uses the results of that Load Research ~~Year~~ and Data Collection Sstage to estimate the patterns of half-hourly average electricity demand for each Profile Class. Each pattern is a Profile, and is generated by the evaluation of regression equations to which temperatures and sunset data are applied for each type of Sample Participant and GSP Group.

2.2.6 In the ~~third year of the cycle – he~~ Operational Use stage - these Profiles are used by the SVA Agent and others to estimate the half-hourly average demands of Sample Participants based on meter readings taken over a longer period (such as a quarter). This stage is not the responsibility of the Profile Administrator and is included here only for completeness.

~~2.2.6~~2.2.7 ~~The SVA Agent will be provided with incremental sets of data following delivery of the data to BSCCo and approval by the Panel offor use of the data in Settlement and the completion of appropriate Market Domain Data change process.~~BSCCo will provide the SVA Agent with incremental sets of data. This will be done after the Panel has approved the data for Settlement and following completion of the appropriate Market Domain Data change process.

[1] ~~Note that the timetable described in this section 2.2 is somewhat simplified. In practice, depending upon the nature of the equipment installed, some or all of the data relating to the Load Research Year may not be retrieved until after the end of that~~

2.2.7 Figure 2-2 illustrates how the stages for successive Profile cycles run in parallel over a single Settlement Year:

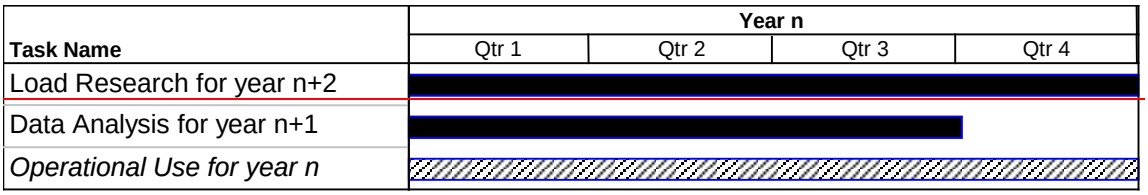

Figure 2-2: Profile activities in one Settlement Year

2.2.8 Within each BSC Year, the Regression Coefficients, GAAC values and Profile Coefficients shall be delivered on or before the last day of November.

3 Detailed Requirements for Data Collection

The Profile Administrator shall ensure that there exists a Load Research sample, shall ensure that this sample is of the requisite size as directed by BSCCo, and shall ensure that data recorded at these Sample Participant premises is collected not less than once each year. The Profile Administrator shall also be responsible for ensuring the development and planning of the sample.

BSCCo shall specify from time to time the requisite sample size in accordance with BSCP510.

3.1 Sampling Specification

3.1.1 The Profile Administrator shall design and operate the Load Research Programme so that the sample of Sample Participants is created and maintained which:

- includes Sample Participants from each of the GSP Group Areas, subject to there being a sufficient population of Sample Participants for sampling purposes;
- can be used, with regression analysis, to derive unbiased estimates of half -hourly average electricity demand per Sample Participant (measured in kilowatts) for each Profile Class;
- forms part of a stratified random sample, with the sample design specifying the required number of Sample Participants for each stratum;
- includes sufficient Sample Participants to allow the Profile Administrator to meet the installed sample target and data collection requirements for validated data described in sections 3.9 and 3.10 of this Service Description.

3.1.2 The load research undertaken for the Domestic Unrestricted and Non-domestic Unrestricted Profile Classes shall include only Sample Participants supplied on tariffs which incorporate no unit price differentiation at all, or in which the price differentials are not related to time-of-day, day-of-week, month or season. The samples for these Profile Classes shall therefore be restricted to Sample Participants supplied on tariffs with a single unit price or with prices which vary only according to the quantity of units used in a period.

3.1.3 The load research undertaken for the Domestic Economy 7 and Non-domestic Economy 7 Profile Classes shall be restricted to Sample Participants supplied on Economy 7 tariffs characterised by a continuous 7-hour night regime occurring between the times of 00:30 and 07:30 Greenwich Mean Time (or within an hour thereof to allow for a degree of timeswitch variation) when load is recorded on a Low Register and a continuous 17-hour period when load is recorded on a Normal Register. It should be noted that on the whole Sample Participants with clock-switched metering are favoured over tele-switched metering, and Sample Participants should where possible have metering of this type.

3.2 Sample Planning

3.2.1 Each year, prior to the commencement of the Load Research Year, the Profile Administrator shall develop a Load Research Plan setting out the recommended minimum sample requirements for the next full Load Research Year based on the defined installed Sample Participant requirements provided by BSCCo. The Profile Administrator shall calculate accuracy values and distributions which will be used by BSCCo for the purpose of estimating installed sample size requirements. In planning the Load Research Sample requirement the Profile Administrator shall account for attrition of the Sample as directed by BSCCo. For the avoidance of doubt, section 3.2.2 shall only apply to Sample Participants approved after 1st December 2009.

3.2.2 Where the Profile Administrator finds that a Sample Participant has changed Supplier, it shall retire the Sample Participant and obtain a replacement in the following BSC Year in accordance with BSCP510.

3.2.3 Annually, in accordance with BSCP510, the Profile Administrator shall produce a list of Sample Participants and provide to each Supplier a list of the Sample Participants that are customers of that Supplier. The Profile Administrator shall request confirmation of any change in Sample Participant details, and review the sample requirements for the following BSC Year.

3.3 Sample Participant Information provided by Suppliers

3.3.1 The Profile Administrator shall obtain the information necessary to meet the sampling requirements in accordance with BSCP510. The Profile Administrator shall request the required number of randomly selected Metering Systems and the following Sample Participant information for those selected Metering Systems from Suppliers:

- Profile Class;
- SSC;
- MSID;
- MPAN;
- Name of Sample Participant and, if appropriate, contact name for non domestic Sample Participants;
- Address of Sample Participant;
- Sample Participant contact details and alternate contact details for non domestic Sample Participants;
- Annual energy consumption;
- Where applicable, day/night split of annual energy consumption;
- Where applicable (e.g. for Profile Classes 5 to 8), the Customer Type (e.g. industrial, commercial);
- GSP Group;

- Super Stratum;
- Stratum;
- Annual consumption;
- Whether the Sample Participant already has a Profile Capable Metering System that meets the minimum requirements (the Profile Administrator requires this information to be able to provide the Supplier with a rebate, and to ascertain whether its agent can dial the Meter for half hourly data collection for profiling purposes); and
- Whether the Supplier will appoint agents, either as nominated by the Profile Administrator or other agents as chosen by the Supplier for that Sample Participant at MPID level.

3.3.2 The Profile Administrator shall carry out quality checks of the information which it receives to ensure that the Sample Participants selected fit the requirements of the sample in accordance with BSCP510.

3.4 Validation of Sample Participants

3.4.1 Where necessary to meet the requirements for validated data and in order to maintain a representative sample, the Profile Administrator shall ensure that sufficient Sample Participants in such numbers as are required to ensure that the number of Sample Participants in each Profile Class is equal to the Installed Participant Requirement for that Profile Class are obtained in accordance with the procedure set out in BSCP510.

3.4.2 Each Sample Participant must be documented in the Profile Administrator's systems, such that all relevant details pertaining to the Sample Participant are accurate and held in secure forms, and in accordance with the Data Protection Act.

3.4.3 The Profile Administrator shall provide to each Supplier of the Sample Participants included in the load research sample a list of the relevant sample MSIDs in accordance with the requirements of BSCP510.

3.4.4 At least annually, the Profile Administrator shall ensure that the sample remains statistically representative by checking, at minimum, whether:

(a) there has been a change to measurement class;

(b) there has been a change in Profile Class or tariff;

(c) there has been a change to the time pattern regime for the metering system;

(d) a Sample Participant has not retired on request or through the Change of Supplier process;

(e) unrestricted Sample Participants have changed to an evening/weekend tariff;

(f) economy 7 Sample Participants have changed from a standard 7-hour night regime; and

(g) any other change has occurred whereby a Sample Participant no longer meets the sampling requirements.

3.4.5 The Profile Administrator shall review the status of each Metering System subject to these checks and replace Sample Participants in accordance with the procedure set out in BSCP510, and inform BSCCo of the outcome of these checks.

3.4.6 From time to time, the Profile Administrator shall recalculate the stratum populations using frequency distribution information provided by BSCCo (obtained from Non-Half Hourly Data Aggregator (NHHDA) systems).

3.5 Stratification of Samples

3.5.1 In order to ensure representative samples, the Profile Administrator shall classify the metering systems in the sample for each Profile Class into strata, according to the sample design, and assign an appropriate weight to each stratum, as follows. Note that this Service Description uses the subscript 'h' to refer to a particular stratum of a particular Profile Class, and the acronym W_h to refer to the weight assigned to a given stratum:

(a) each metering system shall be classified to one of a number of pre-defined strata using billed annual consumption information; and

(b) where specified by the sample design each metering system shall be classified to its GSP Group Area.

3.5.2 The total number of metering systems in each stratum at the time that the samples were drawn shall be determined using frequency distribution information to be provided to the Profile Administrator. These populations shall be denoted by $N_h(PS_p)$, where p is the Profile Class represented by the relevant sample. The Profile Administrator shall calculate W_h the Stratum Weight of stratum h in Profile Class p as follows:

$$W_h = N_h(PS_p) / N_p$$

where:

Np = The total number of non half-hourly metering systems in Profile Class p.

3.6 Nomination and appointment of agents

3.6.1 In order to ensure that Metering Eequipment meets Settlement and half hourly data collection requirements for the Sample, the Supplier will either install and maintain Profile Capable Metering Systems (as Settlement Meters that also collect half hourly data) for approved Sample Participants, or request the Profile Administrator to do so.

3.6.2 Where the Supplier has requested the Profile Administrator to install and maintain Profile Capable Metering Systems, it shall also request the Profile Administrator to nominate NHH agents for Settlement purposes in relation to that Metering System. The Profile Administrator shall nominate the following agents (it may choose to nominate itself): a Meter Operator Agent (MOA), a Non Half Hourly Data Collector (NHHDC) and Non Half Hourly Data Aggregator (NHHDA).

3.6.3 Additionally, where the Profile Administrator installs and maintains the Profile Capable Metering System, it shall be responsible for undertaking half hourly data collection for the Sample with respect to that Metering System. The Profile Administrator can fulfil this requirement either through itself, its NHHDC or a third party. The Supplier will appoint the Profile Administrator's nominated NHH agents (or different NHH agents of its choice) in accordance with existing industry processes. For a given Metering System, the Supplier will not appoint a mix of Profile Administrator nominated and Supplier chosen NHH agents, it must appoint all three NHH agents nominated by the Profile Administrator or all three NHH agents of its choice.

3.6.4 Where the Supplier has chosen to appoint NHH agents of its choice for the purposes of Settlement, the Supplier shall be responsible for collecting and providing half hourly data for the profiling Sample, e.g. via its appointed NHHDC, a third party or itself.

3.6.5 Once the Supplier has appointed agents (NHHDC, NHHDA, MOA), either of its own choice or those nominated by the Profile Administrator, the relevant agents shall carry out the NHH processes for Settlement and collect and provide actual half hourly data to the Profile Administrator.

3.7 Replacement and Use of Equipment

3.7.1 Where the Supplier has opted to appoint the Profile Administrator's (or its nominated agents), sections 3.7.2 to 3.7.7 shall apply. Note that sections 3.7.4 to 3.7.8 shall also apply to Sample Participants recruited prior to 1st December 2009.

3.7.2 The Profile Administrator or its MOA shall replace existing Settlement metering equipment with Profile Capable Metering Systems and maintain these at each Sample Participants' premises for the purpose of recording half-hourly demand values and automatically communicating these to the Profile Administrator's data centre for processing.

3.7.3 The Profile Administrator or its MOA shall install such metering equipment in accordance with the requirements of BSCP510. For the avoidance of doubt, the Supplier shall be responsible for the installed metering equipment.

3.7.4 The Profile Administrator may procure further Fieldwork Agents (as necessary) to install all necessary metering equipment in order to deliver the Profile Administrator Service.

3.7.5 The Profile Administrator shall ensure that:

(a) connection, disconnection and maintenance of the metering equipment at Sample Participants' premises shall be carried out only by qualified staff employed by the Profile Administrator or its MOA that are approved by BSCCo;

(b) all installation staff are familiar with the safety, installation, testing and maintenance procedures of the Profile Administrator; and

(c) where necessary, appropriate training is given to staff of its nominated agents or sub-contractors .

3.7.6 The Profile Administrator shall ensure that the appropriate mobile telephony or other communication systems are installed and tested to facilitate data collection from the Sample Participant's premises.

3.7.7 The Profile Administrator shall:

(a) ensure that all relevant information relating to the metering equipment installed and location of the metering equipment within the Sample Participants premises is recorded by the person(s) performing the installation.

(b) maintain systems for tracking the location of each piece of metering equipment such that at any given time the Profile Administrator shall know the location of each piece of metering equipment.

(c) maintain systems for communicating with the metering equipment installed such that at any given time the Profile Administrator can assess the operational status of the installed metering equipment.

(d) maintain systems for communicating with the metering equipment installed such that any third party contract data (e.g. Airtime Contracts and SIM Card Information) is accurately recorded.

(e) ensure that the installation and communication data within the systems maintained by the Profile Administrator shall be both auditable and transferable.

3.7.8 The Profile Administrator shall ensure that any disturbance and inconvenience experienced by the Sample Participant taking part in the sample is reduced to a practical minimum.

3.8 Non Half Hourly Settlement activities

3.8.1 Where the Profile Administrator is responsible for the installation and maintenance of Profile Capable Metering Systems, the Profile Administrator shall also undertake NHH Settlement activities (Meter Operation, Data Collection and Data Aggregation) in accordance with the relevant BSCP (BSCP504, BSCP505 or BSCP514) as described in section 3.6.

3.9 Collection of half hourly Data

3.9.1 The following section applies to all Sample Participants whether recruited prior to 1st December 2009 or after.

3.9.2 Where requested by the Supplier:

(a) The Profile Administrator shall collect half-hourly demand and meter reading data periodically (and at least annually) from each Sample Participant included in the sample by way of a remote "dial up" link with the metering equipment; and

(b) The Profile Administrator shall undertake an initial validation of the data (such as High/Low analysis, Consecutive Zero's and Meter Advances (Mini MAR)), in accordance with the requirements of BSCP510 and section 3.10 of this Service Description.

3.9.3 The Profile Administrator shall:

(a) have the ability to collect one year's worth of data from the sample within agreed timescales; and

(b) maintain a record of data collection activities relating to all metering equipment in each Sample Participant's Premises.

3.9.4 The Profile Administrator shall ensure that upon communication with the installed equipment an assessment of the operational capability of the installed equipment to provide valid data is undertaken and where necessary undertake additional actions to resolve any communications or metering issues.

3.9.5 If the Profile Administrator is unable to collect data from any metering equipment the Profile Administrator shall carry out all practicable "remote" diagnostics to determine the cause of the failure to collect data. Where the failure cannot be rectified remotely, the Profile Administrator shall take appropriate action to resolve the issue.

3.10 Validation of Data

3.10.1 Following collection, either by the Profile Administrator or the Supplier as described in section 3.6, the half hourly data shall be converted to a standard format and uploaded to project databases held on the Profile Administrator's central systems (either via the Supplier or the relevant agent). The Profile Administrator shall provide the upload facility for Suppliers and relevant agents to submit the collected data.

3.10.2 The Profile Administrator shall receive validated data in one file for all MSIDs from the relevant agent in accordance with the timescales requirements set out in BSCP510.

3.10.3 The Profile Administrator shall carry out quality checks of the demand data recorded for each Sample Participant. Examples of such checks include checking whether the data has any days of missing or uncharacteristic consumption, and whether the data has any demand "spikes". Any data failing these checks shall be rejected and not used for the purposes of data analysis.

3.10.4 The Profile Administrator shall detail the data validation procedure in the Profile Administrator's Operating Manual. These procedures shall include tests and checks to be applied to the retrieved half-hourly data values and shall be designed to ensure that invalid or erroneous data are not included in the datasets used for regression analysis.

3.10.5 Data accepted as valid for data analysis shall be retained in the Profile Administrator's systems for later processing and extract purposes for at least one year. After this period the data shall be archived and retained in accordance with the data retention requirements in section 6.3 of this Service Description.

3.10.6 In meeting the validated data requirements the Profile Administrator may use validated data from appropriate sources external to the Profile Administrator in addition to or instead of the validated data collected from the sample.

3.11 Calculation of Supplier Rebates

3.11.1 The Profile Administrator shall pay the Profile Sum incurred by Suppliers as approved by BSCCo for providing data to the sample where the Supplier has opted to use its own agents, on an annual basis, in accordance with paragraphs 2.1.8 and 2.1.9. The Profile Administrator shall submit this calculation for approval in accordance with BSCP510.

4 Detailed Requirements for Data Analysis

This section describes the requirements for the Data Analysis stage of the Load Research Cycle. This Data Analysis takes as its input the validated half hourly demand values from the Data Collection stage of the load research cycle (see section 3).

4.1 Outputs from Data Analysis

4.1.1 The purpose of the data analysis programme is to derive sets of Regression Coefficients that can be used to estimate half hourly demands for Non Half Hourly Sample Participants. ~~during the following Settlement Year.~~ The Regression Coefficients will also be used to calculate GSP Group Average Annual Consumption (GAAC) values for each Profile Class and GSP Group and to calculate a set of 'nationally-representative' Profile Coefficients for each Profile Class. These deliverables are then used for purposes of volume allocation under the BSC, as follows:

(a) The Regression Coefficients and GAAC values are to be used by the Supplier Volume Allocation Agent (SVAA) for the purpose of Daily Profile Production and estimation of Suppliers' half-hourly energy purchases (the outputs of the daily profile production process are sets of half-hourly profile coefficients for each Standard Settlement Configuration within a GSP Group).

(b) The Profile Coefficients are to be used by Half-Hourly Data Collectors for the purpose of estimating half-hourly demands for half-hourly metered Sample Participants when actual metered consumption data is not available.

(c) The half-hourly profile coefficients for each Standard Settlement Configuration (produced in Daily Profile Production) are summed by SVAA to derive sets of daily profile coefficients and these are provided to Non Half-Hourly Data Collectors for the purpose of calculating Annualised Advances from meter readings.

4.2 Overview of Data Analysis Process

4.2.1 Figure 3-3 overleaf provides a high-level overview of the calculations required to produce these deliverables. Note that the number in the top left corner of each box is a cross-reference to the sub-section of this document which describes the process in more detail:

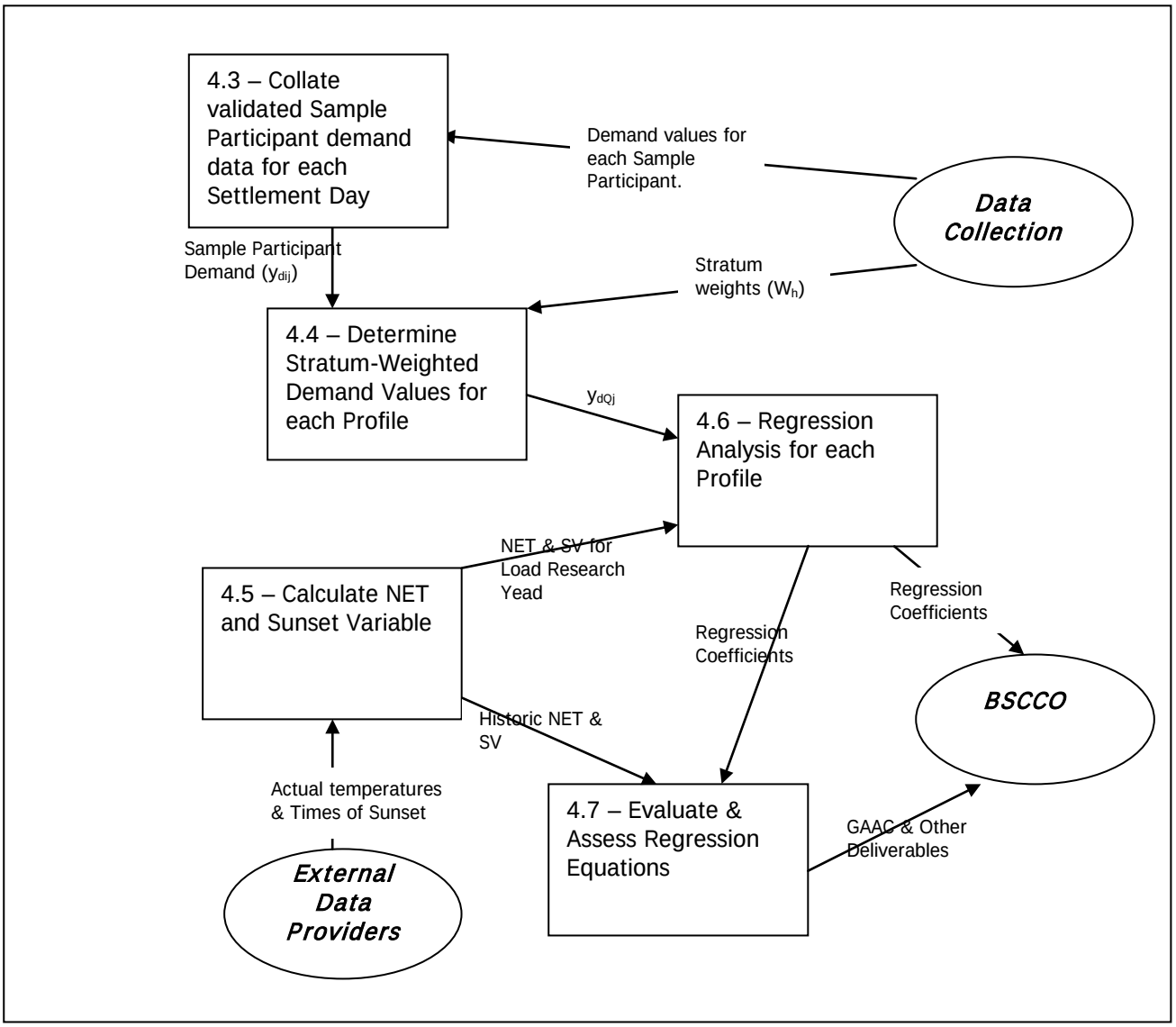

Figure 3-3: Diagrammatic Representation of Data Analysis Requirements

4.2.2 It can be seen from the above diagram that the inputs to the Data Analysis stage are as follows:

- Validated half hourly demand data from the Data Collection program. For each Sample Participant i in the load research sample, this data will take the form of demand values for some or all of the Settlement Periods in the Load Research Year.
- Details of the Profile Class P and Stratum h to which each Sample Participant belongs.
- For Domestic E7 Sample Participants (i.e. those in the sample for Profile Class 2), details of whether they have storage heating and/or immersion heating installed.
- Details of the Stratum Weight W_h for each Profile Class p and Stratum h.

- Actual Noon Temperature data.
- Time of Sunset.

4.3 Collate Validated Sample Participant Demand Data for each Settlement Day

4.3.1 In order to allow Regression Coefficients to be calculated, the demand values for each Sample Participant must first be divided up into individual Settlement Days. For each Sample Participant i in the load research sample, and each Settlement Day T in the Load Research Year, the process is as follows:

- Check that the Sample Participant has validated demand data for each Settlement Period j in the day. Note that a Settlement Day runs from 00:00 to 00:00 clock time (i.e. not GMT), and has 48 periods, labelled 1 to 48 (except for the clock change days, which have 46 or 50 periods, as explained in Appendix C).
- If any data is missing for that Sample Participant and Settlement Day, the whole day's data will be excluded from the calculation. However, that Sample Participant's data can still be used for other Settlement Days.
- If the data is complete for that Sample Participant and Settlement Day, it can then be used in the remainder of the calculation. This Service Description uses the term y_{Tij} to refer to the validated demand data for Sample Participant i in period j of Settlement Day T.

4.3.2 The output of this process is therefore validated Sample Participant demand data y_{Tij} for each Settlement Day of the year. However, the set of Sample Participants for whom such data has been successfully calculated will potentially vary from one Settlement Day to the next (depending on which Sample Participants had complete data for a given day).

4.4 Determine Stratum-Weighted Demand Values for each Profile

4.4.1 Having derived demand values y_{Tij} (as described in section 4.3), the individual Sample Participants' demand values are used to calculate a weighted average y_{TQj} of demand for a given Settlement Day T, Profile Q and Settlement Period j. The details of this process differ depending on the Profile Class:

- For the non-Economy 7 Profile Classes, demand data y_{TQj} is required only for the single 48-period Profile.
- For the Economy 7 Profile Classes, demand data y_{TQj} is required for both the 48-period baseload Profile, and the 14-period switched load Profile. A process is therefore required to split the demand data between base and switched load, as described below. Note that demand data is not required for switched load Profiles with durations other than 14 periods, because these are derived through manipulation of the Regression Coefficients, as described in section 4.6.10.

Non-Economy 7 Profile Classes

4.4.2 For Non-Economy 7 Profile Classes, the stratum-weighted demand value for each Profile is calculated as:

$$y_{TQj} = \Sigma_h (W_h \, y_{Thj})$$

where:

- W_h is the fraction of the total Profile Class population belonging to stratum h; and
- y_{Thj} is the average demand for Settlement Day T, stratum h and Settlement Period j (i.e. the simple arithmetic mean of the y_{Tij} values for all Sample Participants i in stratum h).

Domestic Economy 7 Profile Class

4.4.3 See Appendix D for a full description of Domestic Economy 7 Profile Classes.

4.5 Calculation of Noon Effective Temperature and Sunset Variable

4.5.1 As explained in Appendix C, two of the key variables used in the regression equations are the Sunset Variable (SV), and the Noon Effective Temperature (NET). The Sunset Variable is defined as the number of minutes after 18:00 GMT at which sunset occurs. The Noon Effective Temperature on a day T is defined as a weighted average of the Actual Temperatures (in degrees Fahrenheit) at noon on days T, T-1 and T-2:

$$NET_T = 0.57 \, AT_T + 0.28 \, AT_{T-1} + 0.15 \, AT_{T-2}$$

4.5.2 The Profile Administrator shall obtain the required temperature and sunset time measurements from the Authorised Temperature Provider and Sunset Time Provider for the 1998 Market. The means by which the data are obtained and the payments made for such data shall be subject to the contract's audit requirements.

4.5.3 In the case of the Sunset variables, these are the same for each GSP Group and the values at Birmingham are used. The weather stations to be used for recording temperature, shall be specified by BSCCo, and will be different for each GSP Group. Note however that the use made of this GSP Group-specific temperature data varies depending on the usage to which the data is being put:

- When evaluating regression coefficients to derive GSP Group Average Annual Consumption (GAAC) values, as described in section 4.7, the relevant temperature for each GSP Group is used, resulting in different GAAC values for each GSP Group.
- When constructing regression coefficients (as described in section 4.6), and evaluating regression coefficients to derive Profile Coefficients (as described in section 4.7), national rather than GSP-Group specific temperature values are required and an arithmetic average of the value for each GSP Group is used.

4.6 Regression Analysis for each Profile

4.6.1 Having derived stratum-weighted average demand values (y_{TQj}) for each Profile Q, Settlement Day T and Settlement Period j, a regression analysis is then performed to derive the Matrix of Regression Coefficients $MRC_{Q(aa)(nn)j}$.

4.6.2 The Profile Administrator shall first partition the data into different Analysis Classes, depending upon the Day Types and Season to which each Settlement Day belongs. See Appendix C for a more detailed description of Analysis Classes.

4.6.3 The regression variables Mon_T, Wed_T, Thu_T, Fri_T, NET, SV and SV must then be determined for each Settlement Day:

- The day of the week variables (Mon_T, Wed_T, Thu_T, Fri_T) depend solely on the day of the week.
- The Noon Effective Temperature (NET) is derived from the actual noon temperatures at weather stations in each of the GSP Groups, as described in section 4.5 above.
- The Sunset Variable (SV) and the square of the Sunset Variable (SV^2) are derived from the calculated sunset times at Birmingham, as described in section 4.5 above.

4.6.4 Having calculated the seven regression variables for each Settlement Day, the Profile Administrator shall then perform a regression analysis for each separate combination of Profile, Analysis Class and Settlement Period. The result is the Matrix of Regression Coefficients $MRC_{Q(aa)(nn)j}$ for the 48-period and 14-period profiles. (Regression Coefficients for other durations of switched load profile are then derived algorithmically as described in section 4.6.10 below.)

4.6.5 Note that for all Day Types other than Weekday ('WE'), the day of the week variables are all zero, and the corresponding Regression Coefficients are set to zero.

4.6.6 Note also that in some cases, it may be necessary to augment the load research data (y_{TQj}) collected in respect of each Load Research Year with data collected during prior years in order to ensure that:

- the validated data requirements set out in section 3.7 of this Service Description are achieved in respect of each Profile Class; and
- the data in respect of each Analysis Class have been collected for a set of days that provides a reasonable range of temperature variation.

Special Processing for Temperature Coefficient in Winter

4.6.7 For the Winter season only, any positive values of the Regression Coefficient for Noon Effective Temperature should be removed as follows:

- Set the temperature coefficient (i.e. coefficient five) to zero; and
- Adjust the regression constant (i.e. coefficient zero) by adding 42 times the original temperature coefficient.

The effect of this adjustment is to make the evaluated demand the same for all temperatures i.e. equal to the original evaluated demand at 42 degrees Fahrenheit.

Special Processing for Bank Holidays and Shoulder Days

4.6.8 For all the 'special' Day Types i.e. those that are not Weekday ('WE'), Saturday ('SA') or Sunday ('SU'), there is insufficient data to perform a regression analysis. The following method is therefore used instead.

4.6.9 All the Regression Coefficients except the regression constant (i.e. the coefficients for NET, SV and SV^2) are set to equal to those for Sundays (Day Type 'SU') in the same Season. The regression constant (i.e. Regression Coefficient zero) is then set as follows:

- Average the demand values y_{TQj} for all Settlement Days in the Analysis Class to obtain a single demand shape y_{Qj}. Note that some Analysis Classes will have only a single Settlement Day anyway (e.g. Christmas Day), but others will have several (e.g. Winter Shoulder Days).
- Subtract from this the non-constant part of the Sunday Regression Equation for that Season, using the national average temperature and Birmingham sunset time for the particular day in question:

$$RC_{Q0j} = y_{Qj} - RC_{Q5j} * NET - RC_{Q6j} * SV - RC_{Q7j} * SV^2$$

where $RC_{Q(nn)j}$ is the Regression Coefficient for Profile Q, Settlement Period j and Regression Coefficient Type (nn).

In the case of an Analysis Class containing more than one day (e.g. Shoulder Days), the average sunset time and temperature for those days is used.

The effect of this is that:

- For a sunset time and temperature matching that on the day in question, the regression equations will evaluate to a demand equal to the measured demand for the day.
- For other temperatures and times of sunset, the evaluated demand will vary as it would do for a Sunday in the same Season.

Algorithmic Stretching and Contracting of Switched Load Profiles

4.6.10 The Profile Administrator will derive the algorithmic procedure described in Appendix B to transform each set of 14 Regression Coefficient values derived for the Switched-load Profiles of the two Economy 7 Profile Classes such that the normal duration of the Economy 7 switching period (seven hours) is made shorter or longer. The Regression Coefficients derived from the load research data will thereby be transformed into separate sets of Regression Coefficients, each representing a different daily duration of switching regime. The Profile Administrator shall apply the procedure to create a set of Regression Coefficients representing all possible duration of regime from two to forty-seven half hour periods: that is 46 regime

durations beginning with the shortest duration (two half-hours) and increasing in half-hourly increments up to and including the longest duration (47 half-hours).

4.7 Evaluation and Assessment of Regression Equations

4.7.1 Having produced the Regression Coefficients (as described in section 4.6 above), additional analysis is required to produce the Technical Product Deliverables, as described in this section 4.7.

Regression Coefficients

4.7.2 The Matrix of Regression Coefficients $MRC_{Q(aa)(nn)j}$ will be formatted as described in section 5 (Deliverables) for delivery to BSCCo.

Profile Coefficients

4.7.3 The Profile Administrator shall calculate a set of 'nationally-representative' Profile Coefficients for each of the non Economy 7 Profile Classes for the Settlement Year in which the Regression Coefficients are to be used for settlement purposes. The calculations shall be carried out for each non Economy 7 Profile Class as follows:

(a) A set of half-hourly average electricity demand estimates for the Settlement Year are calculated by evaluating the relevant Regression Coefficients using historic, 10-year national-average daily temperatures, and times of sunset recorded at Birmingham for the Load Research Year, ensuring by calendar matching that the Regression Coefficients used for each date correspond to the correct Season and Day-Type for the Settlement Year concerned.

(b) Calculate the sum of the evaluated demand estimates calculated at step a);

(c) Each of the demand values calculated at step a) is divided by the sum calculated at step b).

4.7.4 The Profile Administrator shall then format the profile coefficients as described in section 5 (Deliverables) for delivery to BSCCo.

GSP Group Average Annual Consumptions

4.7.5 The Profile Administrator shall calculate GAAC values for each Profile Class and GSP Group. In the case of the Economy 7 Profile Classes, separate GAAC values shall be calculated for the Baseload Profile and for the Switched-load Profile. The values shall be calculated by forming the sum of a complete year's half-hourly average electricity demands (measured in kW), derived by evaluating the Regression Coefficients for the relevant Profile Class, and dividing this number by 2000 (a factor to convert the half-hourly kW values to MWh). The half-hourly average demands shall be calculated for each GSP Group Area by evaluating the relevant Regression Coefficients using historic 10-year averages of daily temperatures (recorded at the relevant weather station for the GSP Group) and sunset times (relating to the relevant location for the GSP Group) for the most recent Load Research Year.

4.7.6 The Profile Administrator shall then format GAAC values as described in section 5 (Deliverables) for delivery to BSCCo.

Analysis of Profile Accuracy

4.7.7 The Profile Administrator shall analyse the statistical precision of the half-hourly demand estimates for each Profile Class, as follows:

- Estimate the precision (i.e. the precision ±x% at one or more confidence levels P% agreed with BSCCo) for each of the 17,520 (or 17,568) half-hourly demand estimates for each Profile Class; and
- For each Profile Class, determine the demand-weighted average across all Settlement Periods of the precision level x% (giving a single measure of profile accuracy for each Profile Class).

4.7.8 The Profile Administrator shall provide summary details of these analyses in the Annual Report.

Clock Change Days

4.7.9 Whenever Regression Coefficients (other than those for switched load) are evaluated for an entire year (as for example in paragraphs 4.7.3 and 4.7.5 above), special rules are required for clock change days. In each case, the 48 half hourly values obtained by evaluating the regression equations are manipulated to obtain 46 or 50 values as required, in accordance with the following rules:

- In the case of the short day (when the clocks go forward from 1:00 to 2:00 at 1:00 GMT), the values for the third and fourth periods are discarded (and subsequent periods renumbered as 3 to 46);
- In the case of a long day (when the clocks go back from 2:00 to 1:00 at 1:00 GMT), the values of the third and fourth periods are repeated as periods five and six respectively (and subsequent periods renumbered as 7 to 50).

5 Deliverables

For each Settlement Year subsequent to that ending on 31 March 2004, the Profile Administrator shall deliver the following Technical Product Deliverables on the ~~d~~Delivery Date(s) ~~on or before the last day of November~~as defined in the Data Analysis Plan~~. (the Delivery Date)~~:

(a) a set of Regression Coefficients, GAAC values and Profile Coefficients;

(b) a set of "friendly format" Technical Product Deliverables, in which the Regression Coefficients are provided in comma separated ASCII text for each Settlement Day; and

(c) a report presenting comparative results of the Profile Administrator's sample data demonstrating that the Technical Product Deliverables will provide reliable profile estimates for use in energy settlement. The comparisons should include a comparison of average weekday group demands recorded in the Load Research Year with the calculated Regression Coefficients and a comparison of calculated weekday Regression Coefficients with weekday regression coefficients for the previous year evaluated at noon effective temperatures and Birmingham sunset times.

In addition, the Profile Administrator shall deliver the following Documentation Deliverables:

Documentation Deliverables			
Deliverable	**Description**	**Delivery Date**	**Acceptance Period**
Data Analysis Plan	A plan proposing the quantity, source and period of collection of the Sample Participant demand data to be used in regression analysis for each Profile Class. The report will discuss and justify any decisions made by the Profile Administrator to use data collected from sources outside the load research sample and to use data from prior years.	15 June each year	10 Days
Load Research Plan	A plan for the next full year of load research proposing the sample design and sample recruitment needed to meet the Installed Participant ~~Requirement for~~Requirement for each Profile Class, drawing on the estimated relationship between sample sizes and accuracy and other suitable measures.	15 November each year	10 Days

Documentation Deliverables			
Deliverable	**Description**	**Delivery Date**	**Acceptance Period**
Annual Report	A report comparing the results achieved during the last twelve months against the objectives and targets set out in the previous plan, summarising the key objectives for the next twelve months, and discussing any outstanding issues, constraints and risks.	15 November each year	10 Days

The Profile Administrator shall also deliver the Stratum-Weighted Average Demands for each Settlement Year ~~on or before the 15th October~~on or before the Delivery Date as defined in the Data Analysis Plan in the following Settlement Year.

This remainder of this section 5 describes in detail the derivation and format of the Technical Product Deliverables.

5.1 Regression Coefficients

Purpose

To be used to calculate Profile Coefficients for each Profile Class and each Settlement Period.

Derivation

By application of the procedures set out in Section 4 (Data Analysis Programme) and applied to load research data collected in the Load Research Year.

Quality Criteria

The Regression Coefficients shall satisfy the quality criteria detailed below:

Format and Completeness

The electronic version of the data is in the required format and the expected number of data values is present.

Acceptance Tests

Evidence is provided to BSCCo that the acceptance tests set out in the Acceptance Procedures Documentation Deliverable have been successfully carried out.

Format and Presentation

The Profile Administrator shall provide copies of the Regression Coefficients in electronic form. The Regression Coefficients shall be provided in a single physical file (together with the GAAC values referred to in 5.3). The physical file format

shall be specified by BSCCo, and the data delivered annually on CD-ROM. The logical format should be as defined in the SVA Data Catalogue Volume 1: Data Interfaces flow P0014: Regression Data File, as detailed in the SVA Data Catalogue Volume 1: Data Interfaces (Reference 1).

The data shall be grouped by Profile Class and the following logical data items shall be provided in order to identify each set of Regression Coefficients within a Profile Class:

(a) the date of the first day of the Settlement Year for which the data are to be used;

(b) a code to be specified by BSCCo identifying the Profile Class;

(c) a code to be specified by BSCCo identifying the type of Profile (i.e. Baseload Profile or Switched-load Profile) and the Profile daily duration in half-hours.

For each Profile within each Profile Class, the following logical data items shall be provided in order to identify each Regression Coefficient:

(a) a code to be specified by BSCCo identifying the Season;

(b) a code to be specified by BSCCo identifying the Day-Type;

(c) a number identifying the Settlement Period to which the Regression Coefficient relates;

(d) a code to be specified by BSCCo identifying the Regression Coefficient (eight Regression Coefficients are required for each Settlement Period: zero values must be provided in the case of Day-Types for which values are not calculated for all eight such Regression Coefficients);

(e) the numeric value of the Regression Coefficient itself.

The physical file format may specify additional data items (e.g. checksums, control totals) for audit and security purposes.

5.2 Profile Coefficients

Purpose

To be used to estimate demand values for half-hourly metering systems for which actual metered values are not available.

Derivation

From the Regression Coefficients, in accordance with the procedures specified in Section 4 (Data Analysis Programme).

Quality Criteria

The Profile Coefficients shall satisfy the quality criteria detailed below:

Format and Completeness

The electronic version of the data is in the required format and the expected number of data values is present.

Accuracy

Evidence is provided to BSCCo that the Profile Coefficient values have been derived from the Regression Coefficients and GAAC values.

Format and Presentation

The Profile Administrator shall provide copies of the Profile Coefficients in electronic form and they shall be provided in a single physical file. The physical file format shall be specified by BSCCo. The logical format shall be as follows.

The data shall be grouped by Profile Class and the following logical data items shall be provided in order to identify the set of Profile Coefficients for each Profile Class:

(a) the date of the first day of the Settlement Year for which the data are to be used;

(b) a code to be specified by BSCCo identifying the Profile Class.

For each day of the Settlement Year in which the Profile Coefficients are to be used, the following logical data items shall be provided in order to identify each Profile Coefficient:

(a) the date of the day to which the data refers;

(b) the number of Settlement Periods within that day;

(c) a number identifying the Settlement Period to which the Profile Coefficient relates;

(d) the numeric value of the Profile Coefficient itself.

The physical file format may specify additional data items (e.g. checksums, control totals) for audit and security purposes.

5.3 GAAC Values

Purpose

To be used to convert half-hourly demand estimates, derived from evaluating the Regression Coefficients, into Profile Coefficients.

Derivation

From the Regression Coefficients, in accordance with the procedures specified in Section 4 (Data Analysis Programme).

Quality Criteria

The GAAC Values shall satisfy the quality criteria detailed below:

Format and Completeness

The electronic version of the data is in the required format and the expected number of data values is present.

Accuracy

Evidence is provided to BSCCo that the GAAC values have been derived from the Regression Coefficients.

Format and Presentation

The Profile Administrator shall provide copies of the GAAC values in electronic form.

Electronic Form

The GAAC values shall be provided in a single physical file (together with the Regression Coefficients referred to in 5.1). The physical file format shall be specified by BSCCo. The logical format shall be as follows.

The data shall be grouped by GSP Group and Profile Class and the following logical data items shall be provided in order to identify each GAAC Value:

(a) the date of the first day of the Settlement Year for which the data are to be used;

(b) a code to be specified by BSCCo identifying the GSP Group;

(c) a code to be specified by BSCCo identifying the Profile Class;

(d) a code to be specified by BSCCo identifying the type of Profile (i.e. Baseload Profile or Switched-load Profile) and the Profile daily duration in half-hours;

(e) the numeric value of the GAAC in MWh.

The physical file format may specify additional data items (e.g. checksums, control totals) for audit and security purposes.

5.4 Friendly Format Technical Product Deliverables

Purpose

To be used to calculate Profile Coefficients for each Profile Class and each Settlement Period. The friendly format TPDs document the same information as the Regression Coefficients and GAAC values, but are produced in a comma separated text format from which it is simple to obtain the Regression Coefficients for a particular day. They are generally used in the acceptance process.

Derivation

By application of the procedures set out in Section 4 (Data Analysis Programme) and applied to load research data collected in the Load Research Year.

Quality Criteria

The Regression Coefficients shall satisfy the quality criteria detailed below:

Format and Completeness:

The electronic version of the data is in the required format and the expected number of data values is present.

Format and Presentation

The Profile Administrator shall provide copies of the friendly format Technical Product Deliverables in electronic form. Each Profile Class shall be delivered in its own individual text file, as shall Profile Class 2 and 4 Switched Load Regression Coefficients, with data in comma separated format and shall contain the following information:

1. Profile Class,
2. (Total, base or switched load),
3. Season, Day Type,
4. Half-Hour,
5. Temperature Coefficient,
6. Sunset Coefficient,
7. Sunset Square Coefficient,
8. Monday Coefficient,
9. Wednesday Coefficient,
10. Thursday Coefficient,
11. Friday Coefficient,
12. Constant.

Each file should contain 1152 lines of data (48 Settlement Periods x 24 day types (see below)), and the seasons and day type should be in the following order:

1. Autumn Saturdays

2. Autumn Sundays
3. Autumn Weekdays
4. High Summer Saturdays
5. High Summer Sundays
6. High Summer Weekdays
7. Summer Saturdays
8. Summer Sundays
9. Summer Weekdays
10. Spring Saturdays
11. Spring Sundays
12. Spring Weekdays
13. Winter Saturdays
14. Winter Sundays
15. Winter Weekdays
16. Good Friday (GFBH)
17. Easter Monday (EMBH)
18. May Bank Holiday (MAYBH)
19. Spring Bank Holiday (SPRBH)
20. Summer Bank Holiday (SMRBH)
21. Christmas Day (CD)
22. Boxing Day (BD)
23. New Year Bank Holiday (NYBH)
24. Christmas Shoulder Days (SD)

Note that:

- The Summer Bank Holiday (SMRBH) data is used for both the early August Bank Holiday (in Scottish GSP Groups) and the late August Bank Holiday (in E&W GSP Groups); and
- The Boxing Day (BD) data is also used for the 2nd January Bank Holiday (in Scottish GSP Groups only).

The information below is an example of this file:

Profile_1_Final_Yr6,Total,AUT,SAT,0.30,0.0012182341,-0.0001160324,0.000003669, 0,0,0,0,0.211244698

Profile_1_Final_Yr6,Total,AUT,SAT,1.00,0.0003049405,-0.0000052294,0.0000041406, 0,0,0,0,0.2345546052

Profile_1_Final_Yr6,Total,AUT,SAT,1.30,-0.0018490848,-0.0000142034,0.0000010316, 0,0,0,0,0.3418389599

Profile_1_Final_Yr6,Total,AUT,SAT,2.00,-0.0003801295,-0.0001261095,0.0000003721, 0,0,0,0,0.243004026

Profile_1_Final_Yr6,Total,AUT,SAT,2.30,-0.0001321875,-0.0000318315,0.0000007931, 0,0,0,0,0.2211213139

A separate file should also be produced for GAAC values, documenting the GAAC values for each GSP Group and Profile class. The file should include the following information:

1. GSP Group
2. Profile Class
3. Type
4. GAAC

The information below is an example of this file:

"GSP"	"Profile Class"	"Type"	"GAAC"
"C"	1	"TOTAL"	3943
"J"	1	"TOTAL"	3971
"H"	1	"TOTAL"	3933
"L"	1	"TOTAL"	3922
"A"	1	"TOTAL"	4012
"B"	1	"TOTAL"	4010
"E"	1	"TOTAL"	3990
"K"	1	"TOTAL"	3926
"D"	1	"TOTAL"	3976
"M"	1	"TOTAL"	3980
"F"	1	"TOTAL"	3997
"G"	1	"TOTAL"	3984
"N"	1	"TOTAL"	3962
"P"	1	"TOTAL"	3977
"C"	2	"SWITCHED"	2143
"J"	2	"SWITCHED"	2207
"H"	2	"SWITCHED"	2124

5.5 Comparison Report

Purpose

The Comparison Report shall present the comparative results of the Profile Administrator's sample data for the Load Research Year. Comparisons shall be drawn with data from the previous Load Research Year and with the current Load Research Year. The object of the report is to give some confidence that sample data for the Load Research Year will provide reliable profile estimates for use in energy settlement in the Settlement Year.

The comparisons should be given in two sections:

1. a comparison of average weekday group demands in the Load Research Year with the evaluated Regression Coefficients for the same Load Research Year;

2. a comparison of the current Load Research Year weekday Regression Coefficients with the previous Load Research Years' weekday Regression Coefficients evaluated at noon effective temperatures and Birmingham sunset times.

Tabulations of annual consumptions should also be given along with sample sizes used in the Load Research Year.

Format and Presentation

The Profile Administrator shall provide copies of the friendly format Comparison Report in electronic form. The comparisons should be made for all Profile Classes, as well as the Switched Load components of Profile Classes 2 and 4. The report should compare for both 1 and 2 above, the average working day demand estimates for every season as well as monthly consumption estimates. Any anomalies in the comparisons should be highlighted by the Profile Administrator and explanations provided.

6 Non-Functional Requirements

6.1 Audit Requirements

6.1.1 The determinations and calculations made by the Profile Administrator in connection with the Profile Administrator Service, and the extent to which such determinations and calculation comply with the BSC and Code Subsidiary Documents, shall be subject to regular audit by the BSC Auditor, in accordance with the BSC Audit.

6.1.2 The Profile Administrator shall, as a condition precedent to its appointment, execute a confidentiality undertaking with the BSC Auditor.

6.1.3 The Profile Administrator shall be able to re-perform calculations in accordance with the data retention requirements in 6.3.1, producing the same results from the same input data.

6.1.4 All processes operated by the Profile Administrator in respect of the Profile Administrator Service must be verifiable. This means that:

(a) processes must be documented such that they can be verified by the BSC Auditor;

(b) all processing must be recorded and these records must contain such cross-references as are necessary to allow verification by tracing data through processing, both forwards and backwards.

6.1.5 The Profile Administrator must make available at all reasonable times input data and other related documentation (including procedures and evidence of operation of controls) used in the provision of the Profile Administrator Service for inspection and copying (including electronically) by the BSC Auditor, in accordance with the data retention requirements in 6.3.1.

6.1.6 The Profile Administrator must also make its staff available at all reasonable times to provide explanations and answer any questions arising from the audit that the BSC Auditor may require.

6.1.7 BSCCo shall instruct the Profile Administrator to carry out such corrective action at its own cost as may be required by BSCCo consequent on receipt of the BSC Auditor's Report. The Profile Administrator shall take such corrective action as may be necessary.

6.2 Helpdesk Service

6.2.1 The Profile Administrator is required to appoint a single point of contact as a helpdesk service, which shall be available between the hours of 9h00 to 17h00 on Business Days only.

6.2.2 The single point of contact shall receive incoming calls from BSCCo on matters that affect the service described in this service requirement.

6.2.3 The single point of contact shall include:

(a) logging of all incidents notified including;

(i) allocation of a unique call reference number;

(ii) a description of the problem;

(ii) details of the source of the problem, how widespread the problem is; and

(iv) the likely duration of the problem.

A call back and progress reporting mechanism.

6.2.4 The Profile Administrator shall respond to all incoming calls as detailed below:

Type of Incident	Severity Level	1st Call Back to caller	Follow-up Calls to caller
Any operational incident that will prevent timely delivery of the Technical Product Deliverables in accordance with the time-scales set out in 2.2	1	Within 15 minutes	Within time-scale agreed with caller
All Other Enquiries	All	Within 4 Business Hours	Within time-scale agreed with caller

6.2.5 The Profile Administrator shall contact BSCCo via their single point of contact for the purposes of the services set out in this Service Description and the table above.

The Profile Administrator shall tell BSCCo immediately of any issue impacting the delivery of the Profile Administrator Service.

6.3 Data Retention and Transfer

6.3.1 In respect of Audit requirements and disputes, the Profile Administrator is required to retain data for at least 40 months from the last Settlement Day the data was used in the Settlement calculations. The data shall be kept for 28 months in a format that may be rapidly retrieved; thereafter it shall be kept in a format from which the data can be retrieved if requested within 10 Business Days.

6.3.2 The Profile Administrator is required to retain all the following datasets:

(i) all data inputs used in the production of the Technical Product Deliverables; and

(ii) Technical Product Deliverables sent to BSCCo.

6.3.3 The Profile Administrator shall be required to transfer the datasets in section 6.3.2 on the appointment of a new Profile Administrator, and this obligation endures the termination of the Profile Administrator BSC Contract.

6.4 Change Management

6.4.1 The Profile Administrator Service Description is a Code Subsidiary Document and therefore BSC Parties (and other industry participants) can raise Change Proposals (BSCP40) and Modification Proposals (BSC Section F, BSCP76) that may have an impact on this document.

6.4.2 The Profile Administrator shall provide a Change Management service in accordance with BSC Procedure BSCP40 "Change Management" as amended from time to time. The latest version of BSCP40 will be made available to the Profile Administrator by BSCCo.

6.4.3 The Profile Administrator shall conduct impact assessments of the costs, timescales and other relevant considerations on any proposed changes to the service as notified by BSCCo. The Profile Administrator shall respond with their impact assessment within 5 Business Days of receiving the request from BSCCo or a longer period by prior agreement with BSCCo.

6.5 Consultancy Service

6.5.1 The Profile Administrator shall make available a consultancy service providing business and technical consultancy relating to the provision of profiles or other subject matter as may be directed by BSCCo.

6.5.2 The consultancy service shall have the capability to analyse existing business needs and business processes relating to the provision of profiles, or other subject matter as directed by BSCCo. The consultancy service shall produce proposals, specify

requirements, produce business case justifications and deliver additional, new or changed business processes as may be required.

6.6 Security and Controls

6.6.1 The Profile Administrator shall use reasonable endeavours to maintain the physical and logical security of all hardware and software used by it, and all data and other information acquired or held by it as the Profile Administrator in order to prevent data loss or corruption.

6.6.2 The Profile Administrator shall provide evidence of adequate controls processes to include such areas as:

(i) access to operations area:

(ii) access to application (e.g. passwords, audit log, spot checks);

(iii) prevention of unauthorised changes to the software;

(iv) authorisation process for software changes; and

(v) defect correction process, which shall include processes to ensure that the Profile Administrator shall not deploy changes without notifying BSCCo of the defect and its severity level so that the Profile Administrator can agree the timing of the resolution with BSCCo.

6.7 Service Levels

6.7.1 The minimum levels of performance required of the Profile Administrator shall be specified in the Profile Administrator BSC Contract, and include, but are not limited to:

1. Timely delivery of Technical Product Deliverables;

2. The use of sufficient validated Sample Participant data in the creation of the Technical Product Deliverables; and

3. Timely provision of a snapshot of Installed Participants on the 1st of April each year.

Appendix A – Terms, Acronyms and Definitions

Appendix A describes Terms, Acronyms and Definitions used in this document. The following table defines terms used in this document:

Term	Definition
BSC	Balancing and Settlement Code.
BSC Year	each successive period of 12 months beginning on 1st April in each year.
Business Hours	the hours from 9h00 to 17h00 on any Business Day.
Business Day	means a day (other than a Saturday or a Sunday) on which banks are open in London for general interbank business in Sterling and, in relation to payment in Euro, any such day when in addition the Trans European Automated Real-time Gross Settlement Express Transfer System is operated.
Code	The Balancing and Settlement Code.
Code Subsidiary Documents	means any document referred to in Section H1.2.4 of the Code as modified from time to time in accordance with Section F of the Code.
Customer Type	This indicates the usage type of the premises e.g. an industrial customer or a commercial customer.
Delivery Dates	Agreed dates for delivery of profiling deliverables defined in the Data Analysis Plan.
Documentation Deliverables	Deliverables of the Profile Administrator Service, other than Technical Product Deliverables.
Fieldwork Agent	An agent appointed by the Profile Administrator to install and maintain equipment at Sample Participants' premises. A Fieldwork Agent must be appropriately qualified to perform such work (which may in some cases require the breaking of meter seals) i.e. must be a Meter Operator approved by OFGEM or have Approved Contractor status with the National Inspection Council for Electrical Installation Contracting.
Installed Participant Requirement	Shall mean the Installed Participant Requirement by Profile Class as set out in the Profile Administrator BSC Contract.
Load Research and Data Collection Stage	The period in which data is collected from the Load Research sample.
Metering Equipment	Shall mean the meter, communications and ancillary equipment installed at the Sample Participant's Premises for the purpose of collecting (and communicating to the Profile Administrator) such data as is required to be collected by virtue of this Service description and the BSC Agent Contract between the Profile Administrator and BSCCo.
Profile Capable Metering System	Means Settlement Metering Systems with Half-Hourly data collection capability in accordance with the requirements set out in BSCP510.

Term	Definition
Profile Class	A classification of profiles which represents an exclusive category of Sample Participants whose Consumption can be reasonably approximated to a common profile for Settlement purposes.
Profile Coefficients	The Profile Coefficients delivered to BSCCo by the Profile Administrator (in the format described in section 5.2 of this Service Description). *For the avoidance of doubt, these Profile Coefficients are calculated in advance using historical temperature and sunset data, and are intended for use in estimation of missing data by Half Hourly Data Collectors in accordance with BSCP502. They correspond to the Default Period Profile Class Coefficients (DPPCC) referred to in BSCP502. They are not the same as the Profile Coefficients calculated by the SVAA (using actual temperature data) in accordance with Section 6 of Annex S-2 of the BSC.*
Regression Coefficients	The Regression Coefficients delivered to BSCCo by the Profile Administrator (in the format described in section 5.1 of this Service Description). *For the avoidance of doubt, these Regression Coefficients correspond to the Matrix of Regression Coefficients* $MRC_{Q(aa)(nn)j}$ *as defined in the BSC.*
Sample Participant(s)	Shall mean a consumer of electricity (referred to as "customer(s)" in section 2.1 of this Service Description) whose consumption of electricity is being measured by the Profile Administrator.
Standard Settlement Configuration	A standard Non Half Hourly Metering System configuration recognised for settlement purposes under the BSC.
Stratum	A sub-division of the sample included in the sample design that is defined by criteria such as annual consumption, GSP Group or Customer Type.
Stratum-Weighted Average Demands	Shall mean the demand matrices in kW derived from averaging the Sample Participant data. This data is also known as the Group Average Demand data (GADs).
Supplier Volume Allocation Agent (SVAA)	The BSC Agent responsible for Supplier Volume Allocation.
Supplier Volume Allocation Rules	The rules contained in Annex S-2 of the BSC (including any BSC Procedures and Party Service Lines referred to in that Annex).
Technical Product Deliverables	Those deliverables of the Profile Administrator Service that are defined as Technical Product Deliverables in section 5 of this Service Description (i.e. the Regression Coefficients, Profile Coefficients, GAAC Values, Friendly Format Technical Product Deliverables and Comparison Report).

The following table lists acronyms used in section 4 of this document ('Detailed Requirements for Data Analysis'):

Acronym	Data Item
$MRC_{Q(aa)(nn)j}$	Matrix of Regression Coefficients for Profile Q, Analysis Class (aa), Regression Coefficient Type (nn) and Settlement Period j.
$RC_{Q(nn)j}$	Regression Coefficient for Profile Q, Regression Coefficient Type (nn) and Settlement Period j.
W_h	The stratum weight assigned to a given stratum of the sample for a Profile Class. These weights are used to calculate the stratum-weighted demand values, as described in section 4.4.
y_{TQj}	Stratum-weighted demand data (in kW) for Profile Q in Settlement Period j of Settlement Day T.
y_{Thj}	Stratum-weighted demand data (in kW) for stratum h in Settlement Period j of Settlement Day T.
y^{A}_{Tj}	Stratum-weighted demand data (in kW) for Domestic E7 consumers who are Sample Participants in 'Group A' (i.e. both Storage and Immersion Heating) in Settlement Period j of Settlement Day T.
Y^{B}_{Tj}	Stratum-weighted demand data (in kW) for Domestic E7 consumers who are Sample Participants in 'Group B' (i.e. Immersion Heating without Storage Heating) in Settlement Period j of Settlement Day T.
Y^{C}_{Tj}	Stratum-weighted demand data (in kW) for Domestic E7 consumers who are Sample Participants in 'Group C' (i.e. no Storage or Immersion Heating) in Settlement Period j of Settlement Day T.
y_{Tij}	Validated half-hourly demand data (in kW) for a consumer who is Sample Participant i in Settlement Period j of Settlement Day T. These values are derived in accordance with section 4.3, and then used to calculate the stratum-weighted demand values in accordance with section 4.4.

Appendix B – Profile Transformation Procedure

The purpose of the procedure is to 'stretch' or 'contract' the standard 7-hour Switched-load Profile, derived from load research, so as to represent switching regimes of different duration. The algorithm is designed to preserve the daily shape of the demand profile and so the total daily demand estimated by the Switched-load Profiles will be the same for each duration.

Background

The algorithm must be applied separately to the set of 14 values for each Switched-load Profile Regression Coefficient derived for each Day-Type (i.e. combination of Season and Day-Type or a specific Bank Holiday). For example, if the regression model used derives three Regression Coefficients for a given Day-Type (such as Winter Sundays), there will be 3x14 coefficient values for each of the Economy 7 Switched-load Profiles for this Day-Type:

Half hour of switch regime	Regression Coefficient values		
	β_1	β_2	β_3
1	$b_{1,1}$	$b_{1,2}$	$b_{1,3}$
2	$b_{2,1}$	$b_{2,2}$	$b_{2,3}$
14	$b_{14,1}$	$b_{14,2}$	$b_{14,3}$

Procedure

The procedure consists of four steps as follows:

Step 1: Form the cumulative version of the daily coefficient values.

Index	Regression Coefficient values (cumulated)		
	β_1	β_2	β_3
0	$C_{0,1}= 0$	$C_{0,2}= 0$	$C_{0,3}= 0$
1	$C_{1,1}=b_{1,1}$	$C_{1,2}=b_{1,2}$	$C_{1,3} =b_{1,3}$
2	$C_{2,1}=b_{1,1}+b_{2,1}$	$C_{2,2}=b_{1,2} + b_{2,2}$	$C_{2,3}=b_{1,3} + b_{2,3}$
14	$C_{14,1}= \sum_{i=1}^{14} b_{i,1}$	$C_{14,2}= \sum_{i=1}^{14} b_{i,2}$	$C_{14,3}= \sum_{i=1}^{14} b_{i,3}$

Step 2: Calculate the ratio R= old_length/new_length

where: old_length = duration of standard regime in half hours (14)
new_length = duration of transformed regime in half hours

For example, if the transformed regime is to be 12 half hours long, then R would be calculated as 14/12.

Step 3: Calculate a new set of cumulative values for each Regression Coefficient using the following procedure:

Calculate new cumulative values for each index value of h = 1.....new_length, as follows:

$$D_{h,i} = C_{k,i} + f \times (C_{k+1,i} - C_{k,i})$$

where: k = Min (47, Int[hxR]), the *integer* part of the product of h and R
and f = hxR - Int[hxR], the *fractional* part of the product of h and R.

In the example, the cumulated values for the i^{th} Regression Coefficient of the 12-hour switch regime Profile would be calculated as follows:

h	**k**	**f**	**new values $D_{h,i}$**
0	0	0	$D_{0,i}=C_{0,i} + 0 \times (C_{1,i} - C_{0,i}) = 0$
1	1	2/12	$D_{1,i}=C_{1,i} + 1/6 \times (C_{2,i} - C_{1,i})$
2	2	4/12	$D_{2,i}=C_{2,i} + 1/3 \times (C_{3,i} - C_{2,i})$
3	3	6/12	$D_{3,i}=C_{3,i} + 1/2 \times (C_{4,i} - C_{3,i})$
....	.....	.....	.....
11	12	10/12	$D_{11,i}=C_{12,i} + 5/6 \times (C_{13,i} - C_{12,i})$
12	14	0	$D_{12,i}=C_{14,i} + 0 \times (C_{15,i} - C_{14,i}) = C_{14,i}$

Step 4: Calculate the Regression Coefficients for the transformed switch regime from the new cumulative values as follows:

	Regression Coefficients values for transformed Profile		
Index	β_1	β_2	β_3
1	$b_{1,1} = D_{1,1} - D_{0,1}$	$b_{1,2} = D_{1,2} - D_{0,2}$	$b_{1,3} = D_{1,3} - D_{0,3}$
2	$b_{2,1} = D_{2,1} - D_{1,1}$	$b_{2,2} = D_{2,2} - D_{1,2}$	$b_{2,3} = D_{2,3} - D_{1,3}$
.....	.....	.....	.....
n=new_length	$b_{n,1} = D_{n,1} - D_{n-1,1}$	$b_{n,2} = D_{n,2} - D_{n-1,2}$	$b_{n,3} = D_{n,3} - D_{n-1,3}$

Appendix C – Profiling Under the BSC

Appendix C is provided for information only, and provides background information on certain concepts relevant to profiling under the BSC e.g. Profile Classes, Analysis Classes, GSP Groups and Settlement Periods.

Profile Class and Profiles

For purposes of profiling, all Non Half Hourly metering systems are allocated to one of eight Profile Classes:

Profile Class	Description
1	Domestic Unrestricted
2	Domestic Economy 7
3	Non-domestic Unrestricted
4	Non-domestic Economy 7
5	Non-domestic, MD, load factor 0-20%
6	Non-domestic, MD, load factor 20-30%
7	Non-domestic, MD, load factor 30-40%
8	Non-domestic, MD, load factor 40%+

Within each Profile Class, the Profile Administrator is required to produce Regression Coefficients for one or more Profiles:

- The six non-Economy 7 Profile Classes (i.e. Profile Classes 1, 3, 5, 6, 7 and 8) have a single Profile associated with them (used for estimating the total demand on a metering system).
- The two Economy 7 Profile Classes (i.e. Profile Classes 2 and 4) each have a number of different Profiles:
    1. A baseload Profile, used for estimating demand that is not associated with switched load; and
    2. A number of switched load Profiles, used for estimating demand from switched load. 46 different switched load Profiles are required for each E7 Profile Class, corresponding to different durations of switched load from 2 to 47 Settlement Periods.

Although each Economy 7 Profile Class has 46 different switched load Profiles, only one of these (i.e. the one with a duration of 7 hours or 14 Settlement Periods) is derived directly from load research. All the others are derived from the seven-hour Profile using a simple algorithmic transformation, as described in section 4.6 of this Service Description.

Settlement Days and Settlement Periods

The term ‘Settlement Day’ refers to a day on which electricity is traded. It should be noted that these days are defined in clock time rather than GMT, so during British Summer Time a Settlement Day runs from 23:00 GMT to 23:00 GMT.

It follows from this that each year contains two 'clock change' days that are not twenty-four hours long: a 'short day' in March, and a 'long day' in October. These should be treated as follows:

- When constructing the Regression Coefficients, the short and long days are entirely excluded from the regression analysis.
- When evaluating the Regression Coefficients, simple rules are used to convert 48 values into 46 (for the short day) or 50 (for the long day), as described in paragraph 4.7.9 of this Service Description.

Each Settlement Day is then subdivided into 48 half-hour Settlement Periods (except for the short and long day, which contain 46 and 50 Settlement Periods respectively as noted above). These are labelled from 1 to 48:

- Period 1 – 00:00 to 00:30
- Period 2 – 00:30 to 01:00

… … …

- Period 48 – 23:30 to 00:00

Seasons, Day Types and Analysis Classes

For the purpose of modelling Sample Participant demand, the year is divided into five Seasons, defined 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.

In addition, each Settlement Day is assigned a 'Day Type' i.e. a 2-character alphanumeric code that identifies what sort of day it is. The details of these Day Types will potentially vary from year to year, as required by BSCCO and the BSC Panel, but for purposes of guidance it's expected that they will be allocated as follows:

- Normal weekdays (i.e. excluding Bank Holidays, Shoulder Days and other special cases) will be assigned the Day Type 'WE' (for Weekday).

- Saturdays will be assigned the Day Type 'SA'.
- Sundays will be assigned the Day Type 'SU'.
- Bank Holidays (and any other day that needs to be treated as a special case for profiling purposes) will be assigned a specific code. This may be specific to a single day (e.g. 'CD' for Christmas Day); or it may cover more than one day. An example of the latter is the code 'SD' used for so-called 'Shoulder Days' i.e. days like Christmas Eve that are not public holidays, but on which electricity demand is significantly affected by proximity to the holiday period.

The significance of these Seasons and Day Types is that separate sets of Regression Coefficients are calculated for each combination of Profile, Season and Day Type. Each combination of Season and Day Type is referred to as an 'Analysis Class'.

The number of Analysis Classes may vary slightly from year to year, as new Day Types are agreed. However, the set of Analysis Classes for BSC Year 2003/04 (i.e. the profile deliverables based on Load Research Year 2001/02) was as follows:

Analysis Classes for the Current BSC Year (2003/04)		
Day Type	**Season**	**No. of Days**
Weekday (WE)	Winter (1)	100
	Spring (2)	29
	Summer (3)	49
	High Summer (4)	29
	Autumn (5)	40
Saturday (SA)	Winter (1)	22
	Spring (2)	5
	Summer (3)	10
	High Summer (4)	7
	Autumn (5)	8
Sunday (SU)	Winter (1)	22
	Spring (2)	6
	Summer (3)	10
	High Summer (4)	7
	Autumn (5)	7
Shoulder Day (SD)	Winter (1)	7
Late August Bank Holiday (A2)	High Summer (4)	1
Boxing Day (BD)	Winter (1)	1
Christmas Day (CD)	Winter (1)	1
Easter Monday (EM)	Spring (2)	1
Good Friday (GF)	Spring (2)	1
New Years Day (J1)	Winter (1)	1
1st May Bank Holiday (M1)	Spring (2)	1
2nd May Bank Holiday (M2)	Summer (3)	1

Form of Regression Equations

The form of the regression equations that the Profile Administrator is required to calculate is specified in Section 6.5.3(e) of Annex S-2 of the BSC:

$$y_{HQj} = RC_{HQ0j} + (RC_{HQ1j} * Mon_T) + (RC_{HQ2j} * Wed_T) + (RC_{HQ3j} * Thu_T) +$$

$$(RC_{HQ4j} * Fri_T) + (RC_{HQ5j} * NET_H) + (RC_{HQ6j} * S) + (RC_{HQ7j} * (S)^2);$$

where $RC_{HQ(nn)j}$ is the Regression Coefficient for Profile Q, Settlement Period j and Regression Coefficient Type (nn). There are eight Regression Coefficient types, as follows:

- Regression Coefficient 0 is the constant term.
- Regression Coefficients 1 to 4 are applied to the Day of the Week variables Mon_T, Wed_T, Thu_T and Fri_T. Mon_T is defined as being one (1) on Mondays and zero (0) on other days; Wed_T is one (1) on Wednesdays and zero (0) on other days; and so on. The inclusion of these variables in the regression equation therefore allows different days of the week to have different profile shapes, even though they are all assigned to the 'WE' Day Type.
- Regression Coefficient 5 is applied to the Noon Effective Temperature. The inclusion of this variable in the regression equation allows the demand estimates to take into account the effect of temperature on demand.
- Regression Coefficients 6 and 7 are applied to the Sunset Variable, and the square of the Sunset Variable. (See paragraph 4.5.1 of this Service Description for the definition of the Sunset Variable). The inclusion of these variables in the regression equation allows the demand estimates to take into account the effects of changing demand within a Season (including but not limited to the effect of sunset and sunrise times on lighting demand).

The Profile Administrator provides a different set of Regression Coefficients for each Analysis Class. The BSC refers to the complete set as a Matrix of Regression Coefficients $MRC_{Q(aa)(nn)j}$. So, for a given Profile and Analysis Class, the number of Regression Coefficients required is equal to eight times the number of Settlement Periods in the Profile (eight being the number of Regression Coefficient types).[2]

GSP Groups

The BSC divides the country into a number of 'GSP Groups', where each GSP Group represents one or more Distribution Systems. Currently there are fourteen GSP Groups under the BSC, although this can potentially change as required by the BSC Panel.

The Regression Coefficients required from the Profile Administrator are national i.e. they do not vary by GSP Group. The concept of GSP Group is therefore not central to the data analysis performed by the Profile Administrator. However, GSP Groups are relevant to the analysis for the following reasons:

- The stratum weights used to calculate average demand values are different for Sample Participants in different GSP Groups.
- GSP Group Average Annual Consumption (GAAC) data is required for each GSP Group.

[2] Note however that Regression Coefficient Types 1 to 4 will have zero Regression Coefficients for all Analysis Classes other than Weekday ('WE').

Appendix D – Domestic Economy 7 Profile Classes

Appendix D describes the procedures for splitting and aligning the Economy 7 demand profiles into switched and base load for use in the regression analyses. For Profile Class 2 (Domestic Economy 7), this process has three main steps:

1. Compare the demand profile for Sample Participants with storage heating and/or immersion heating to that for Sample Participants without either, and hence estimate the fraction of total demand (for each Settlement Period within the standard E7 window of 00:30 to 07:30 GMT) that represents switched load.

2. Use the fractions from step (1) to split the demand profile for each switching regime into base and switched load.

3. Calculate a weighted average of the demand profiles for each switching regime to construct base and switched load demand profiles for the Domestic Economy 7 Profile Class as a whole.

The switched load fractions from step (1) are also used to split the Non-Domestic Economy 7 demand profile into base and switched load. Note that the Non-Domestic sample does not include Sample Participants on regimes other than the standard 00:30-07:30, so there is no need to combine data for different switching regimes.

The remainder of this Appendix describes each of these steps in detail.

For the purposes of this Appendix, the year is divided into GMT days (running from 00:00 GMT to 00:00 GMT), each of which contains 48 Settlement Periods. Note that this is different to the approach taken in the regression analysis, where the year is divided into Settlement Days (running from 00:00 clock time to 00:00 clock time). This Appendix therefore uses a different notation to the remainder of the Service Description:

- For the purposes of this Appendix only, subscript ‘T’ denotes a GMT day (running from 00:00 GMT to 00:00 GMT); and Settlement Period 1 in a given day always starts at 00:00 GMT;

- In the remainder of the Service Description, subscript ‘T’ denotes a Settlement Day (running from 00:00 local time to 00:00 local time); and Settlement Period 1 in a given day starts at 23:00 GMT during British Summer Time.

Domestic E7 (Step 1) – Estimation of Switched Load Fraction

For the Domestic Economy 7 Profile Class (i.e. Profile Class 2), the equation for the stratum-weighted demand value (see paragraph 4.4.2 of this Service Description) is applied to give a stratum-weighted average demand for the Profile Class as a whole (referred to in this Appendix by the acronym yPC2Tj):

$$yPC2Tj = \Sigma h\ (Wh\ yThj)$$

where:

T = GMT Day

j = Settlement Period (labelled from 00:00 GMT as explained above)

h = Stratum

i = All Sample Participants i in stratum h

Wh = Stratum weight for stratum h

yThj = the average demand for GMT Day T, stratum h and Settlement Period j

(i.e. the simple arithmetic mean of the yTij values for all Sample Participants i in stratum h)

The equation is also applied separately to three sub-groups of Sample Participants within Profile Class 2, deriving a separate stratum-weighted average demand for each:

- Group A – Sample Participants with Storage and Immersion Heating. This section uses the acronym y^{A}_{Tj} for the stratum-weighted average demand of this group of Sample Participants in Settlement Period j of GMT Day T.
- Group B – Sample Participants with Immersion Heating but no Storage Heating. This section uses the acronym y^{B}_{Tj} for the stratum-weighted average demand of this group of Sample Participants in Settlement Period j of GMT Day T.
- Group C – Sample Participants without Storage or Immersion Heating. This section uses the acronym y^{C}_{Tj} for the stratum-weighted average demand of this group of Sample Participants in Settlement Period j of GMT Day T.

Note that Sample Participants with Storage Heating but no Immersion Heating are not included in any of the groups (A, B or C). However, their data is still used in the calculation of the overall Profile Class demand yPC2Tj. There are very few such Sample Participants, typically less than 5 in the sample.

For the avoidance of doubt, it should be noted that the three Sample Participant groups (A, B or C) include E7 Sample Participants from all switching regimes, not just the standard 00:30 – 07:30 regime.

For each of the fourteen Settlement Periods in the standard 00:30 – 07:30 GMT regime period, the average demand shapes (yATj, yBTj and yCTj) are used to calculate average demand values for Storage Heating and Immersion Heating:

$$y^{Immersion}_{Tj} = \max(0, y^{B}_{Tj} - y^{C}_{Tj})$$

$$y^{Storage}_{Tj} = \max(0, y^{A}_{Tj} - y^{B}_{Tj})$$

which are then combined to create a composite switched load profile:

$$y^{PC2\_Switched}_{Tj} = y^{Immersion}_{Tj} * F_{Immersion} + Y^{Storage}_{Tj} * F_{Storage}$$

where $F_{Immersion}$ and $F_{Storage}$ are the fractions of the total Domestic E7 sample that have storage heating and immersion heating respectively.

Note: in each case demand values outside the standard 00:30-07:30 regime period should be set to 0.

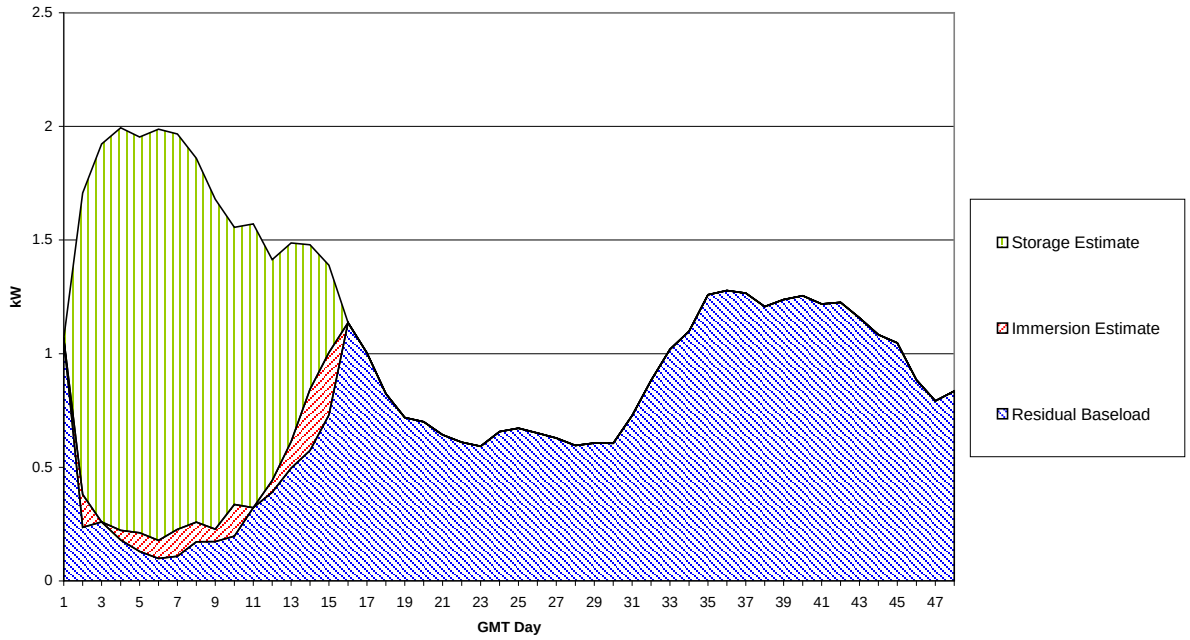

Figure 1 Storage and Immersion Heater Sample Participant Demand Estimates

The switched fractions for each half-hour of the standard 00:30–7:30 regime period (i.e. each value of j from 2 to 15) are then calculated as follows:

$$Y^{FRACTION}_{Tj} = \max(1, Y^{PC2\_Switched}_{Tj} / Y^{PC2}_{Tj})$$

Domestic E7 (Step 2) – Split Demand into Base and Switched for Each Regime

The next step of the process is to split the demand values for each separate switching regime in the sample into base and switched load, using the fraction determined in step 1.

In order to do this, stratum weighted average demands must be calculated for all allowable regime sub-groups. Regimes must be seven hour continuous and not more than 1 hour outside the standard 00:30-07:30 regime. There are therefore five regimes

potentially eligible for inclusion: 00:30-07:30, 00:00-07:00, 01:00-08:00, 01:30-08:30 and 23:30-06:30. However, a given regime will only be included in the calculation where the sample size is sufficient to create a viable grouping.

This Appendix uses the subscript 'C' to denote a regime included in the calculation, and the acronym y_{TCj} for the stratum-weighted average demand of regime 'C' in Settlement Period j of GMT Day T. The switched load fractions calculated in step 1 are then applied to the y_{TCj} values for each regime to calculate the switched load $y^{PC2\_Switched}_{TCj}$ for each regime as follows:

$$Y^{PC2\_Switched}_{TCj} = Y^{FRACTION}_{T(j-n)} * Y_{TCj}$$

where:

- For a given regime 'C', the calculation is performed for those Settlement Periods which fall within the switched load period for that regime. In the case of the 01:30 – 08:30 regime, for example, the calculation would be performed for Settlement Periods 4 to 17. For all other Settlement Periods, the value of $y^{PC2\_Switched}_{TCj}$ is zero.
- For a given regime 'C', the offset 'n' in the term $y^{FRACTION}_{T(j-n)}$ is the number of Settlement Periods time difference between regime 'C' and the standard 00:30-07:30 regime. In the case of the 01:30 – 08:30 regime, for example, n would take the value +2. The function of this offset value n is to ensure that the $y^{FRACTION}_{Tj}$ values used are always those for periods 2 to 15, not those for the periods relevant to regime 'C'.
- In the case of the 23:30-06:30 regime (for which n takes the value -2), applying the above equation to period 48 will produce a value of j larger than 48 i.e. $y^{FRACTION}_{T(50)}$. In this context, period 50 of day T has to be interpreted as period 2 of day (T+1). To put this more formally:

$$y^{PC2\_Switched}_{TCj} = y^{FRACTION}_{(T+1)(j-n-48)} * y_{TCj} \quad (\text{if } j-n>48)$$

The base load demand y^{BASE}_{TCj} is then calculated for each GMT Day D, Settlement Period j and regime C by subtracting the switched load from the total:

$$y^{BASE}_{TCj} = y_{TCj} - y^{PC2\_Switched}_{TCj}$$

Domestic E7 (Step 3) – Calculate Weighted Average of Demand for Each Regime

Calculation of the final switched load demand profile is made by offsetting the load for each individual regime into Settlement Periods 1-14 (as required for the regression analysis), and weighting by sample population estimates.

The following diagram illustrates this process of aligning different regimes on the standard Settlement Periods 1-14:

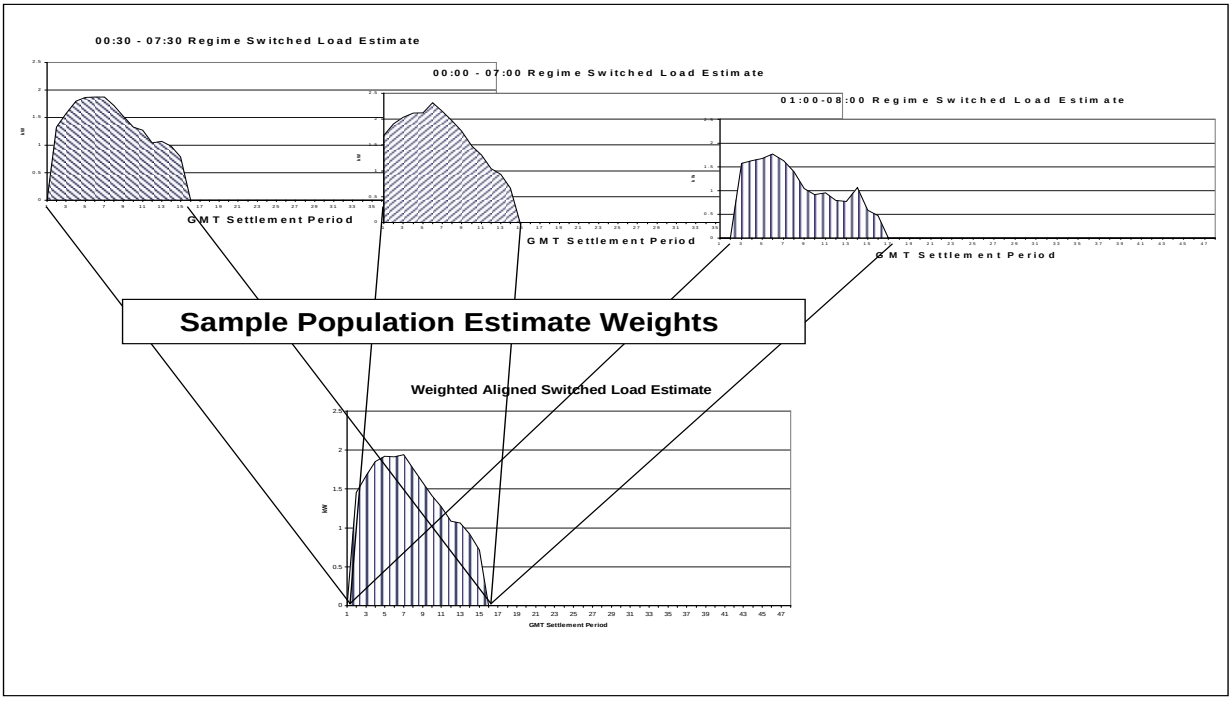

Figure 2 Switched Load Alignment Procedure

Mathematically, this process of alignment and weighting is achieved by calculating the final switched load demand values y_{TQj} for the 14-period switched load profile (for each GMT Day T and each Settlement Period j in the range 1 to 14) in accordance with the following formula:

$$y_{TQj} = \Sigma_C \left(y^{PC2\_Switched}_{TC(j+n+1)} * PE_C\right) / \Sigma_C \left(PE_C\right)$$

where:

- PE_C is the sample population estimate for regime 'C'
- Σ_C denotes summation over all regimes
- For a given regime 'C', the offset 'n' is the number of Settlement Periods time difference between regime 'C' and the standard 00:30-07:30 regime (as defined in step 2 above). In this case the (j+n+1) subscript in the equation is being used to 'move' the switched load periods from the Settlement Periods relating to that particular regime into periods 1-14.

- In the case of the 23:30-06:30 regime (for which n takes the value -2), applying the above equation to period 1 will produce a value of j less than 1 i.e. $y^{PC2\_Switched}_{T(0)}$. In this context, period 0 of day T has to be interpreted as equivalent to period 48 of day (T-1).

The final base load demand estimate is calculated by a similar process of weighting together the regime base loads using sample population estimates, but without the issue of aligning the different regimes. For each Settlement Period j of each GMT Day d, the y_{TQj} values for the base load profile are calculated as follows:

$$y_{TQj} = \Sigma_C \left(y^{BASE}_{TCj} * PE_C\right) / \Sigma_C \left(PE_C\right)$$

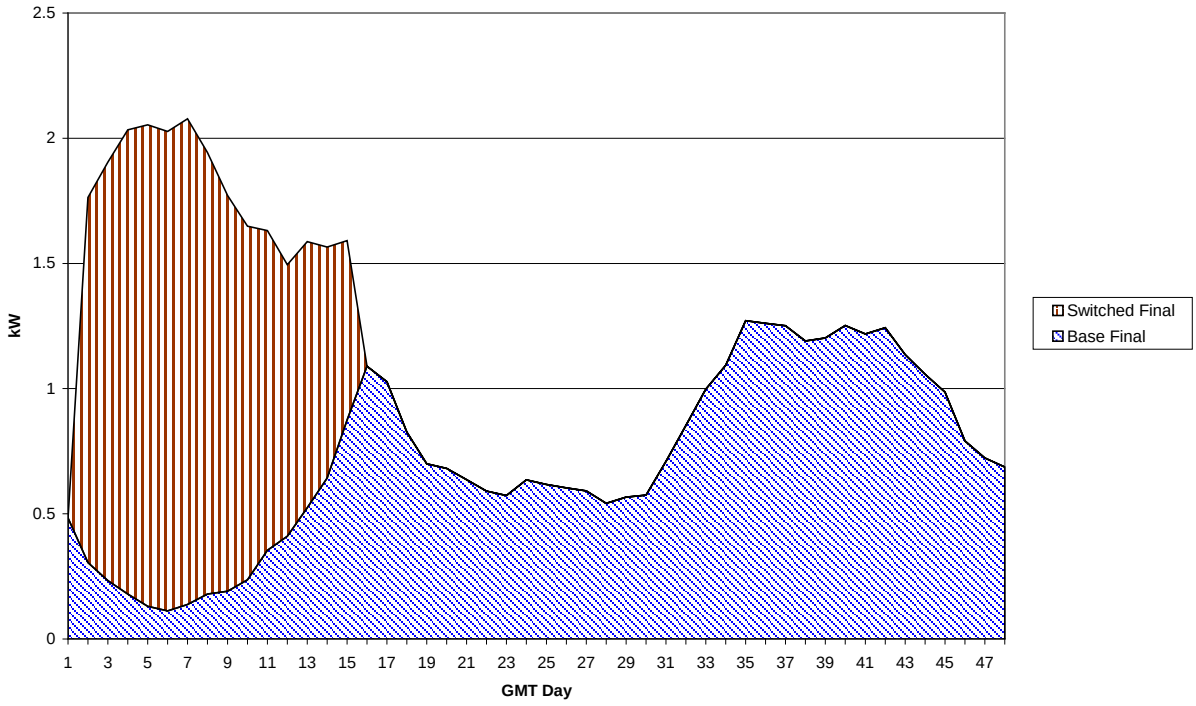

Figure 3 Final Switched and Base Load Estimates

Non-Domestic E7

The base load and switched load demand values for the Non-Domestic Economy 7 Profile Class are constructed by splitting the overall demand in the same ratio as the base and switched load for Profile Class 2:

Create stratum-weighted average demand values for the Profile Class as a whole (referred to in this section by the acronym y^{PC4}_{Tj}):

$$y^{PC4}_{Tj} = \Sigma_h \left(W_h \, y_{Thj}\right)$$

These total values are then split into base and switched load by applying the fraction calculated previously for Profile Class 2:

$$Y^{FRACTION}_{Tj} = \max(1, Y^{PC2\_Switched}_{Tj} / Y^{PC2}_{Tj})$$

to the overall demand for Profile Class 4. For the switched load profile, values of yPC4_Switched_FinalTj are calculated (for each GMT Day T and each Settlement Period j in the range 2 to 15) as follows:

$$Y^{PC4\_Switched\_Final}_{Tj} = Y^{FRACTION}_{Tj} * y^{PC4}_{Tj}$$

However, because the regression analysis requires switched load demand values y_{TQj} for periods 1-14 rather than periods 2-15, these values are 'shifted' by one period as follows:

$$Y_{TQj} = Y^{PC4\_Switched\_Final}_{T(j-1)}$$

Finally, the base load demand values are calculated (for each GMT Day T and Settlement Period j) by deducting the switched load profile from the total load:

$$Y_{TQj} = y^{PC4}_{Tj} - Y^{PC4\_SWITCHED\_FINAL}_{Tj}$$

The switched and base load estimates can now be entered into the regression process.

