Profiling: a new suggestion

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Introduction

The Balancing Mechanism and the Settlement system deal with divergences between the actual and the contracted deliveries and outputs of suppliers and generators, half hour by half hour. This necessarily requires a half hourly volume allocation between suppliers of the total metered intake into distribution systems. I describe the way this is currently done, then show that, besides being complex and inaccurate, it has the defect of preventing the introduction of innovatory tariffs for small consumers. I then make a proposal for avoiding these defects, stressing that no innovatory type of tariff for such consumers will be introduced unless OFGEM and/or the DTI takes the initiative.

Description

An initial step is to sum the metered consumptions of each supplier’s half-hourly-metered* customers and the estimated consumptions of their non-half-hourly-metered customers, all scaled up by Line Loss Factors. When this half-hourly sum totalled for all suppliers does not equal the metered half-hourly total take at a Grid Supply Point Group, the total for each supplier is scaled up or down so as to achieve equality and the resulting allocated supplier volumes are used in settlement.

The sources of inequality between the two totals are several, including:

* Known as "Interval metered" in North America
1. Errors in the estimated consumptions of non-half-hourly metered consumers;
2. Problems of estimating unmetered loads;
3. Differences between the imputed default values and the actual values of missing data;
4. Inappropriate Line Loss Factors;
5. Metering inaccuracies.

The consumptions of non-half-hourly metered consumers in each half-hour are estimated by applying profiles to their Estimated Annual Consumptions. These profiles provide coefficients which express consumption in each of the 17,520 half-hours in the year as a fraction of annual consumption. There are eight separate profiles for different groups of non-half-hourly metered consumers: for Standard and Economy Seven domestic consumers, for Standard and Economy Seven commercial consumers, and for industrial and commercial consumers on maximum demand tariffs, classified by load factor. The coefficients for any half-hour are modified by the application of regression co-efficients for daily noon effective temperature, sunset time, season and day of week to allow for the effects of weather and daylight upon consumption served by each Grid Supply Point Group.

The profiles are estimated annually by the Electricity Association, continuing a tradition of load research established by the Electricity Council. Half-hourly consumption data are recorded for a stratified sample of 1,200 domestic consumers on Standard and Economy Seven tariffs and for a sample of 1,300 Industrial and Commercial consumers, almost all with maximum demands of less than 100KW. Consumption-weighted means are computed to produce each profile. The data are collected for each financial year, and in the following November the eight profiles applied during the next financial year are promulgated.
Thus the profiles applied from April 2003 to the end of 2004 embody load data for the financial year April 2001—March 2002.

Defects

Leaving aside issues of sample size and selection, a matter for professional sampling experts, it is evident that this method of supplier volume allocation can create errors in the estimated consumptions of non-half-hourly metered consumers for the following reasons:

- During a period extending to 36 months, several reconciliation calculations are made, resulting in adjustments to the initial supplier volume allocations. They reflect any revisions and adjustments in meter registration data, meter technical details, aggregation rules, line loss factors, metered data and the use of subsequent meter readings for non-half-hourly metered consumers to update their Estimated Annual consumptions as new meter readings become available.
- The coefficients for some Economy Seven consumers have to be adjusted somewhat arbitrarily to allow for differences in switching times.
- The profiles and the weather correction co-efficients are two years out of date.

Demand response

There is a case for time-of-day tariffs to the extent that there are regular and predictable variations in half-hourly prices. But eliciting some demand response among small consumers to day-ahead or real-time variations in wholesale prices would be more valuable. What is wanted is a response to occasional large price spikes which are largely unpredictable except in the very short run. These spikes occur when demand presses upon capacity because of a conjunction of bad weather
and generation or transmission outages, not being confined to regular peak hours nor occurring during most of them. Hence there would be considerable benefits from tariffs which reflected such variations, incentivising adjustments in consumer consumption patterns. Tariffs of this kind would result in reductions in consumption at high-price times, with some shift to consumption at lower-price times. The resultant saving in generation costs, being shared between suppliers and their customers, would make these tariffs mutually worthwhile for them and should be weighed against the costs of introducing the tariffs in question.

EdF’s optional TEMPO tariff† provides a good example of such a tariff. Consumers are provided with information from 8 pm in the evening about the prices which are to be applied in peak and off-peak hours during the following day. They can react accordingly and can choose to have their water and space heating circuits automatically switched on and off appropriately. There are six different KWh rates and meter registers — for peak and off-peak hours, for days denominated as blue, white and red, with the red-day peak rate (whose advent can be signalled by a buzzer) over ten times as high as the off-peak blue-day rate.

The essential feature of such a tariff is that it reflects conditions anticipated from day to day and elicits consumer responses to them. Hence with supplier competition it would require a half-hourly volume allocation to each supplier reflecting the actual demand responses of its consumers. *But the present profiling system completely precludes this,* since the profiles which are used to estimate the volume allocations relate to average consumer behaviour in a previous year.

† See www.tempo.tm.fr/menus/
Indeed the system even precludes the introduction of any new tariff with a different type of meter from the standard and Economy Seven meters for non-half-hourly-metered consumers

1. Establishing such a tariff would require a profile which could only be estimated on the basis of load research relating to consumers who already came under such a tariff two years previously — an insoluble chicken and egg problem!

2. Introduction, whether general or selective, of a new type of meter cannot be done alone by an innovative supplier but would require a nationwide decision which would specify the meter and hence the structure of a new tariff, though, as with existing tariffs, not its component prices.

To reinforce the second point, consider the impossibility of doing in Britain what Enel is doing in Italy without OFGEM and/or the DTI taking the initiative (as they did with NETA). Telegestore is an innovative system for metering, data transmission and data management for gas and electricity. It can read, acquire and aggregate customer data remotely, allowing two-way communication with customer appliances. 345,000 concentrators located at MV/LV substations will obtain data from 30 million solid state meters. Each concentrator will have GSM communication with a central system for data aggregation and the management of the whole process.

My proposals

1. Profiling

The recorded half-hourly data for the samples of non-half-hourly-metered consumers would be obtained daily instead of annually. The
half-hourly volume allocations would be made by grossing up the recorded half-hourly consumptions of the consumers in each sample to obtain total estimates.

Sample estimates of the actual behaviour of consumers on each tariff would thus replace the out-of-date average coefficients amended by an average weather-correction which are applied to Estimated Annual Consumptions. These estimates would continue to be required for establishing the sampling fractions used to scale up the sample data in order to estimate the totals.

Remote reading of the recorders installed in the premises of consumers in the samples would obviously be necessary to implement this proposal. At present, remote reading is practised for about a quarter of sampled consumers (and, of course, for all half-hourly-metered consumers).

New and innovatory tariffs could be introduced if, initially, all consumers choosing them had half-hourly recorders installed in addition to the special meters appropriate for those tariffs. However, once the number of such consumers reached a sufficient level, the half-hourly recording could be confined to a sample.

2. Taking the initiative

Cost benefit analysis of possible innovatory new tariffs on a national scale and a national decision sharing the costs of introducing any chosen possibility are required. (This is how what is now called Economy Seven was introduced, thanks to the co-ordination between Area Boards provided by the Electricity Council.) OFGEM or the DTI or some joint industry body should investigate and organise any new system which is proposed as a result of the investigation.