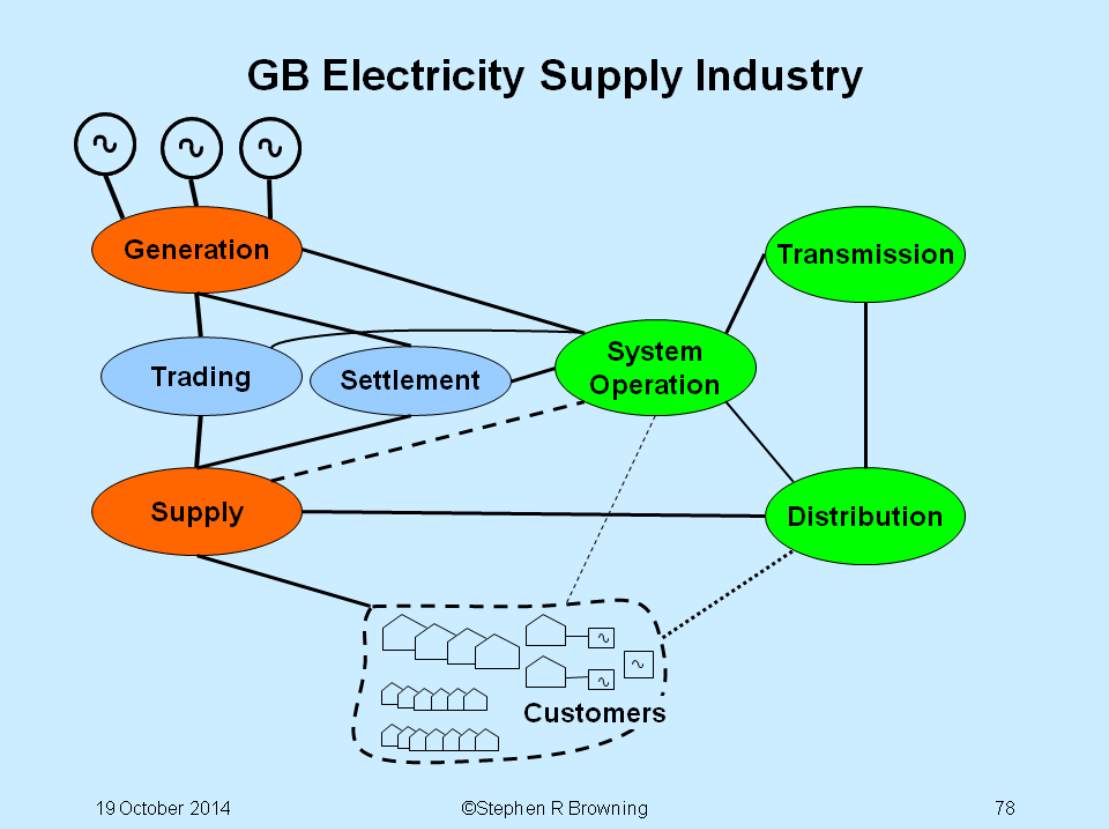
Future Power Systems 10 - The customer and the industry

The current relationship between the customer and the electricity supply business looks as follows. This diagram is based on the unbundled electricity supply structure in Great Britain (GB). With the exception of balance trading and settlement, all the business elements will be present in any electricity supply structure. This is the case even in countries with full or partial vertical integration.



In Great Britain, each supplier party is responsible for trading by the half hour to ensure that a viable profile of generation is purchased to meet forecast demand. The resultant power profiles (by generating unit and supplier-demand grouping) are submitted to the system operator so that the overall match can be checked and adjusted and transmission security maintained. At 1.5 hours ahead, the operator takes over, making specific instruction to individual generation units.

Each customer deals with their supplier, who has to charge for both energy and use of system. Normally, this is on a per unit consumed basis by period billing, even though the system charges relate to capacity and maximum demand. Distribution security is maintained on the 'passive' model; the customer only contacts the distributor in cases of supply failure.

Demand falls into one of three types:-

Time Critical

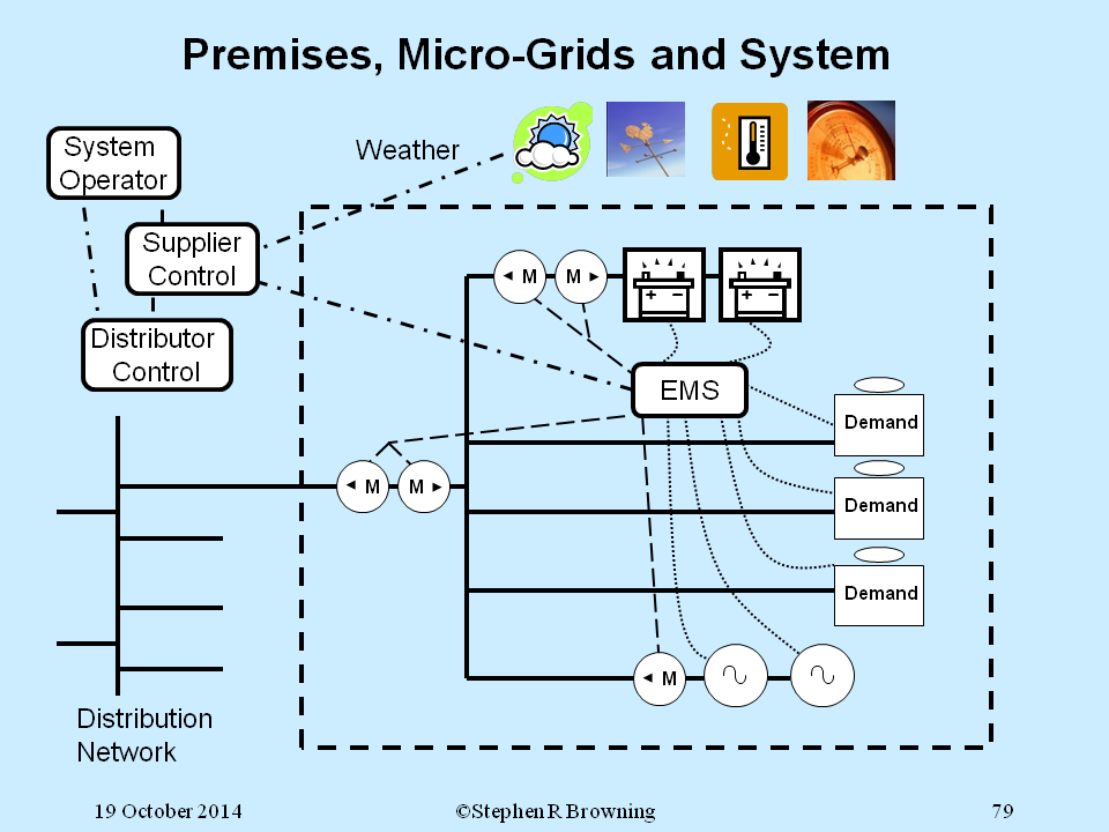
Non Time Critical

Unnecessary!!!

The latter of these three is obviously being tackled vigorously as public awareness of energy costs rises. Use of power efficient light bulbs and recognition of the fact that empty rooms and inanimate objects are not frightened of the dark is being recognised; a change from the acceptance of 'passive energy waste' we have grown up with. However, more automatic systems may be necessary as 'manual' operation can be tedious and the requirement tends to be forgotten over time.

Tackling the non-time critical element is important to improve the operating profile of residual fossill fired plant. However, this has to be done in a predictable manner.

Under a new model, some customers are active participants in a short-term market system.



The classic commercial interface between the customer and the system has always been limited by the capability of the metering and logistics of obtaining meter readings. Historically, a simple electro-mechanical integrating energy meter was the only practical option. This was read at set intervals and the energy consumed charged at a pre-set tariff. A separate standing charge was levied to cover connection and use of system charges. Where electrical storage heating was appropriate, a second register and a simple clock switch was added to allow this load to be energised overnight at a lower tariff rate. Larger premises could justify some more sophisticated metering with such facilities as maximum power demand tariffs and alarms.

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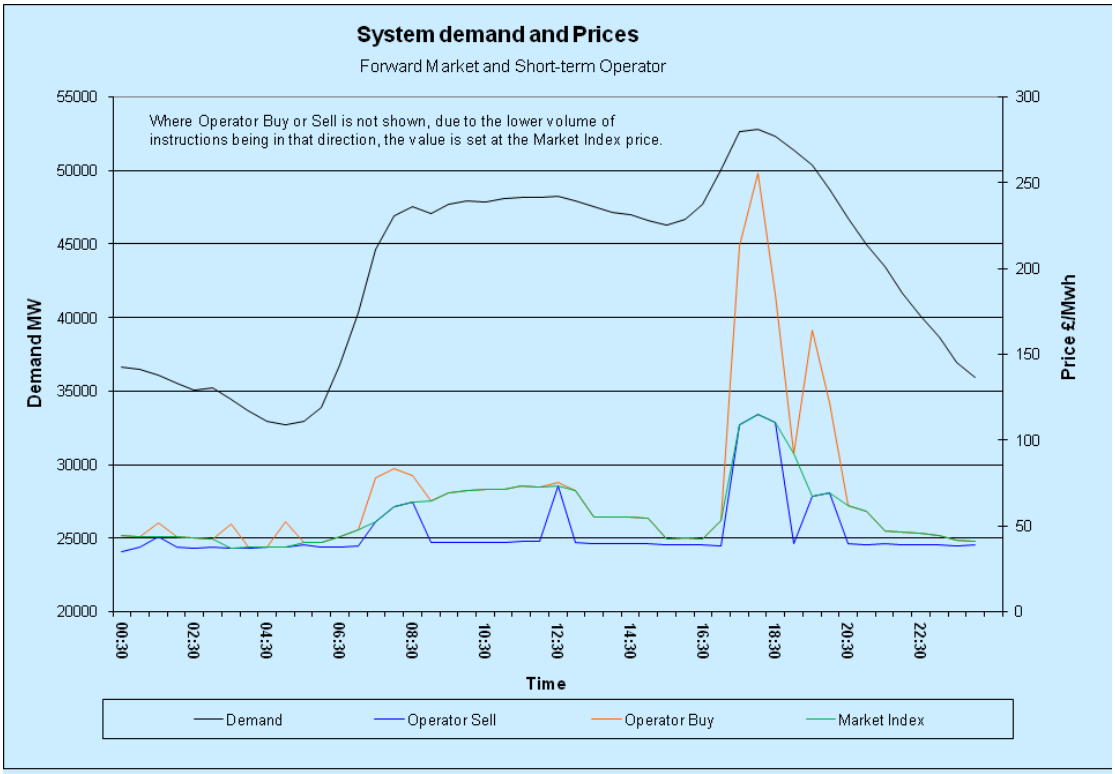
Modern data acquisition and storage technology, together with cheap communications, can make the customer to utility interface more dynamic. This has the potential to allow a wider range of premises to have demand and energy use monitored more frequently and to enable DER to have a more active role in generation to demand matching. However, suitable commercial mechanisms need to be developed to enable this effectively.

A variable tariff model that reacts to real time and short term predicted system conditions is one possibility, with price signals generated from the operator and the market respectively. However, this subjects the customer to uncertainty as regards future energy costs and makes budgeting difficult. Premises with generation will have justified the installation against a forward analysis of energy rates. For a large installation, the owner (industrial or commercial) will have secured a power purchase agreement to fix the value of the energy in their project plan.

Setting the price signals correctly is a tricky business. The objective here is to correct generation-demand mismatch and remove expensive and inefficient operation by main plant; smoothing and peak reduction. Marginal pricing mechanisms can show large swings and the application of raw data could give excessive inappropriate changes to power profile. Average prices will give the wrong message and may cause adverse behavior to that required. The prices need to be set so that the customers deliver the level of power change required. Time staggering the application of price changes by customer groups (generic) can also give more precise results. Geographic control is also of course required to maintain transmission and distribution security under this model. The issue of differential treatment of customers, especially as regards charging due to transmission/distribution congestion has to be carefully managed.



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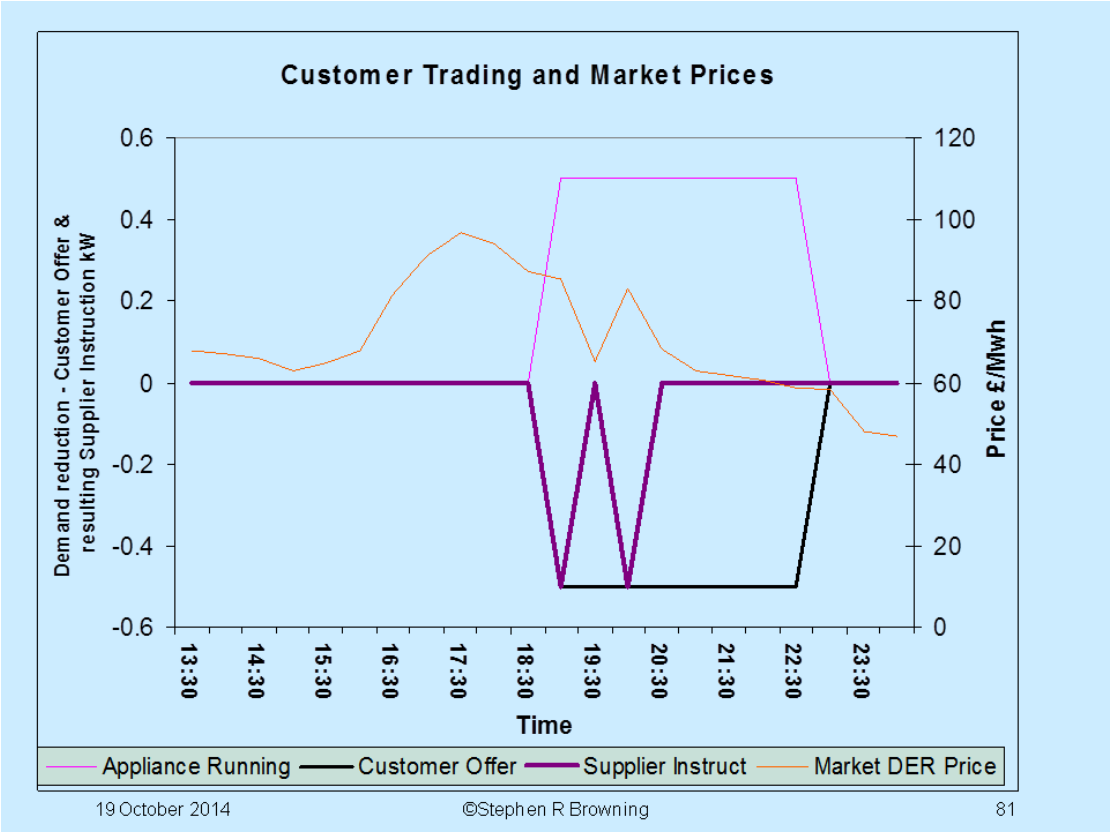
The second method is to enable trades in 'variations' from the expected power profile using incremental and decremental offers; this is similar to the way in which the Great Britain operator matching mechanism works. It should be a more accurate way of adjusting the generation-demand match. However, variation trading requires a pre-declaration of expected power profile with prices for increasing or reducing import-export. If changes to profile are instructed, the final premises metering needs to be compared with the declared profile. This facilitates calculation of energy charging/payment for the instructed difference and any penalties for non-delivery. Again, to be effective this process needs to be carried out in market and operator timescales; with small premises it is difficult to predict the power profile.

It is possible to consider other variants, such as capped/collared tariff pricing to reduce the level of price variations the customer sees. Also, as was made clear earlier, the process needs to be automatic; the customer does not want to be actively involved in power management on a continuous basis, unless there is a potential financial consequence, (say a short-term high price,) which could be avoided by simple manual action.



Customer Use of System charging (Wires and services)

Under FPS 5 we outlined the existing logistics of the GB UoS charges for demand, being an annual levy on Suppliers at wholesale level based on their Peak Power take.

However, at retail level it is difficult for the UoS annual charge to be correctly apportioned on the retail side; the problems are metering to determine customer Peak Power usage and the capability of the Suppliers' back office systems. In the future, some customers may have more large demands (such as Electric Vehicles) and fair apportionment of the charges will be more important. If retail customers were to be correctly charged UoS based on their maximum Power demand that will also influence them to control their appliances more efficiently and thus smooth the Distribution and Transmission system loadings.