Future Supply Market Arrangements

A submission by David Tolley, DLT Consulting, and Prof. Furong Li, Department of Electronic & Electrical Engineering, University of Bath

Introduction

Ofgem's call for evidence on the future of the supplier hub is timely. Technological advances and the scale and pace of change over the past two decades in the energy landscape have overtaken the suitability of the supplier hub model as a market design that can offer the best opportunities and choices to energy customers.

The electricity supply industry has invested very substantial sums to create a wholesale market and balancing mechanism that can trace the short-term supply/demand imbalances. Supply businesses have then spent very substantial sums in order to average the wholesale energy and network costs back to a simple price that bears no relation to the short term market fundamental of energy surplus or deficit. Instead it has wholly obscured the market short-term price signals leaving customers facing only a price for an total amount of energy.

The arrangements are so complicated that few parties can understand and participate effectively in the supply of energy. Consequently community based energy strategies tend to focus on energy efficiency and conservation such as loft insulation, efficient lighting and home appliances. Little consideration is given to a roadmap for a smart, flexible energy system that would reduce both the unit cost of the energy supplied as well as its quantum.

The substantial increase in renewable generating capacity, much of which is intermittent, and the closure of almost all of the legacy drum boiler plant that provided significant inertia to the system has enhanced the need for, and the value of, flexibility in the supply/demand balance. Casting the supplier as a hub in the supply arrangements compromises the efficiency of the supply system. It also poses a major hurdle in making use of extant assets, and to the uptake of new technologies and the adoption of disruptive business models. Collectively these can provide a route to reducing carbon emissions at a fraction of today's cost.

Although Ofgem's consultation invites comments for both gas and electricity supply our focus in this note is mainly on electricity. The frequency of electricity settlement (17,520 times a year) compared to that for gas (365 times a year) makes the electricity supplier hub model much more vulnerable to technological development, especially in an increasingly digital era.

Weaknesses in the supplier hub model

Many of the weaknesses of the electricity supplier hub model can be traced to shortcomings elsewhere in the electricity supply arrangements. If the position of consumers is to be improved then it will be necessary to address these shortcomings as part of the overall evolution of the supply model. We would identify the principal shortcomings as:

- Consumers insulated from wholesale price movements by settlement profiling
- Use of ex-post wholesale prices making it difficult for consumers to exercise rational choice

- Lack of transparency in the composition of final customer prices
- No economic drivers for optimising between distribution network investment and energy costs
- The use of a multitude of relatively inefficient ancillary services by the system operator to achieve an energy balance.

These market shortcomings are explored further below.

Use of profiles: The use of profiles in settlement was an essential step to facilitating the allocation of wholesale costs to each supplier's account for non-half hourly metered customers; in essence the SME and residential consumer groups. Whilst a pragmatic step in enabling competition in supply, profiles render useless the wholesale cost as a driver for customer economic efficiency. Worse, settlement profiling creates a positive discouragement for suppliers to offer prices to their customers that would bring efficiency and lower emissions for the overall supply system.

Ex-post wholesale prices: Under the electricity Pool wholesale prices were posted day-ahead for the subsequent 24 hours. The transition to NETA/BETTA and the capability for generators to self-despatch their plant was accompanied by a move to wholesale pricing where prices would not be known until after the event. This has meant that generators, and customers who have the ability to manage their demand (and have access to half-hour prices) must individually forecast wholesale energy prices so as to make economic choices, with the attendant risks for economic efficiency of those forecasts being wrong. The mechanics of the present settlement arrangements do not preclude the use of an ex-ante price derived from a short term (say 4-hour) forecast being used in place of the calculated ex-post price. Moving to this arrangement would allow wholesale prices to be known in advance by customers who could then make rational choices.

Price transparency: Around half of the final residential bill can be attributed to charges that are invariant with the supplier. These are predominantly network charges (for use of the transmission and distribution networks) but also imposts in respect of wider government policies; in particular support for low carbon generation technologies. It should be incumbent on all suppliers, irrespective of any future reforms, to make transparent to their customers those costs that could be avoided by self-generation. Unless the cost of energy production and the connection to the system are clearly delineated then the apparent economics of local generation will be perverted.

Network versus energy costs: Many aspects of the efficient functioning of the electricity supply system depend upon a trade-off between network reinforcement and energy costs. Unfortunately the separation of the energy market from the regulated network businesses often makes these optimisations impossible. This problem manifests itself in many areas. Aligning incentives for reducing BSUOS costs and network investment have long been bedevilled by the difficulty of the necessary mismatch in regulatory horizons. At a local level, where the costs of network reinforcement tend to be by way of a single capital payment or capital contribution, the economic optimisation of incurring network investment or higher energy costs is totally obscured.

***System balancing inefficiencies*:** The commercial inertia in the supplier hub model has led to the onus for balancing the system falling on the system operator (National Grid) through the use of the Balancing Mechanism and a multitude of bilaterally contracted ancillary services. Since distributed generation connects at the edge of the system, the system operator will find it increasingly difficult

to predict changes in the system imbalances and trace their cause. This in turn leads National Grid acting as system operator to contract for more extensive and complicated arrangements, adding to the costs of the system.

Technological change and electricity supply

A number of technological developments at the boundary between the consumer's premises and the electricity supply system that are either manifest or latent indicate that the supplier hub model is now no longer sufficient to ensure the economic delivery of energy to the customer. Most obvious amongst these developments are:

- The roll-out of smart meters that will reduce meter reading costs, but which also has the capability to bring the wholesale price to the customer's door-step
- A growing prevalence in the ownership of local generation in the form of photovoltaic cells and micro CHP
- A growth in electric vehicle ownership where vehicle batteries could also be used to regulate the distribution and diurnal use of energy
- Digital technologies fed by a wholesale price that can control the use of domestic appliances with little or no human intervention

The challenge is to find a supply model that can ensure these developments will be marshalled so as to bring the benefits of lower costs and increased utility to the consumer, albeit in a manner that retains the security and safety of the electricity supply system.

A way forward

Our proposal is based on a number of assumptions. These are:

- The establishment of a new commercial boundary in the distribution network at the 11kV to LV transformation points where the half-hourly wholesale market price (suitably loss adjusted) would be publicised
- The owner of the distribution assets (DNO) and the licensee responsible for operation of the distribution system (DSO) would be combined for Networks at 11 kV and higher voltages.
- DNO/DSOs may continue to own the LV networks but there would be no monopoly rights in this respect. LV networks could be owned or leased by community based organisations or other commercial enterprises who might also take responsibility for their operation. This would create the opportunity for optimising local generation, demand and network investment at this voltage.
- Wholesale prices would be determined periodically on an ex-ante basis (perhaps every four hours) within a 24 hour period, suitably loss adjusted and published for each half-hour at this new commercial boundary. They would thus become the avoided cost of any generation connected to the system at or below this point.

A new supply model

The essence of our proposal is that the supply function should be joined once more with that of the network operator. Thus for supplies given at 11 kV and higher voltages the end users of energy would be contracted directly with a monopoly provider for both the use of the networks and the

provision of energy at the wholesale price. This arrangement would not preclude the activities of risk managing companies, akin to the existing supply businesses. These would offer to swap the half-hourly price for a fixed term pricing arrangement, or hedge other price uncertainties of the supply if the consumer so wished.

Customers connected to the LV network, which constitute the vast majority by number, could be supplied by the DNO/DSO entity as a default arrangement, but may also be supplied by an independent community based supplier (CSO) who would lease the extant LV system from the DNO, or in time, construct its own LV network if this was more economic. The commercial arrangement between the consumer and the CSO would be against a backcloth of a half-hourly wholesale price being available at the LV to 11kV commercial boundary, which would be the CSO's avoided cost.

This approach is only an outline and will require further evolution, but should be able to be built on most of the established codes and agreements that govern the electricity supply industry. Such an arrangement with assets owned and supply in the first instance in the hands of the system operators would provide a framework for accommodating the technological changes that have overtaken the supplier hub principal in the past two decades. By creating an environment where investment in networks and energy production could be optimised it would provide an enduring foundation for incipient technological developments over the next two decades.

The opportunity for community system operators (CSO) to emerge, who have a locus over the LV network and its connected parties can create a competitive market (by comparison). Such organisations would also facilitate the trading of energy within the LV network at prices linked to the avoided costs of local generation.