£/MWh –

low carbon technologies is likely to be unsustainable, given the nature of the new technologies and the way in which markets operate.

The preference for market mechanisms, whilst understandable, has obscured the fact that centrally coordinated purchases of power under long term contracts would provide a better service. This new entity could encourage competitive forces where they can have a real and beneficial effect.

Anthony White

28th September 2023

This Appendix describes how electricity is traded in Great Britain. The trading system has changed since first introduced in 1990. Initially all generators were obliged to be party to a pooling and settlement agreement. Such coercion ran counter to the liberal philosophy of the time and it was always intended that the trading arrangements would evolve. Nevertheless, it is worth considering how it operated in order to understand the challenges facing the current trading arrangements.

The "Pooling& Settlement Agreement" of 1990 provided central coordination of all power stations connected to the Transmission network and arranged that all power generated at a particular time (half hour) was priced at the same level. In this way, the inability to store electricity and differentiate between difference sources of power was accommodated. In simple terms, each day every generator unit would inform National Grid how much power it could generate on the following day and the price at which it was willing to operate. National Grid then listed all generating units in order of these declared prices. It then estimated demand in each half hour and selected only those generating units required to meet this demand. The "System Marginal Price" was set for each half hour as the bid price of the last (most expensive) generator required to meet that half hour's demand. The actual price for each half hour was then found by adding an amount that was intended to encourage generators to offer capacity, based on an assessment of the necessary amount

This was quite an operation but it did the trick. The power stations' operations were co-ordinated

each of the half hours made the previous day and the underlying costs of generation, such as oil, coal and gas prices. It followed that the pool prices, and contract prices, were closely related to fuel prices when the market was competitive.

The contracts could be “one-way”, whereby a Generator would recompense the Supplier if the pool price was greater than the agreed “strike” price. Or they could be two-way, whereby the Supplier would compensate the Generator of the pool price were lower. The duration of these contracts tends to be for one year or shorter and may only relate to weekdays or weekends, day time or off-peak. The most frequently traded contracts were “day ahead”, i.e. an agreement on price for the following 24 hours.

Under the New Electricity Trading Arrangements (NETA) introduced in 1998, and subsequently British Electricity Trading and Transmission Arrangements (BETTA) in 2000, Generators inform the “System Operator” (SO), how much generation they are going to produce an hour ahead (“gate closure”), they have sold for the next half hour. Similarly, Suppliers submit the likely and how much of this consumption is covered by contracts. Thus the market’s participants, rather than National Grid, determine the demand forecast adopted. Both also tell the SO the price they would charge if later asked to alter their behaviour because, for example, demand turned out to be higher or lower, or if a generating unit suffered an unexpected failure.

The SO then ensures that the power stations meet demand using a “balancing mechanism” in which it calls on the offers to change behaviour in the light of actual circumstances. The SO charges those

The consequence of these new trading arrangements is that the imbalance prices, unlike the “pool price”, bears no relationship to the underlying balance of demand and supply, nor to underlying fuel prices. They solely relate to the balance of supply and demand between the differences between participants contractual and physical positions in every half hour.

Suppliers and Generators tend to be fully contacted at “gate closure” and most trading between parties is conducted through Day Ahead trading, as well as contracts of longer duration, around one or two years. When the Pool was in existence, i.e. until 1998, Suppliers and Generators could have some confidence that, if their contract position differed from their actual generation or consumption, the difference could be made up at pool prices which bore some relation to the underlying fuel prices. That confidence was weakened after the introduction of NETA, though, in time, it was re-established as gas stations tended to be at the margin and so set prices.

The CFDs by which the LCCC secures new capacity are struck with relation to the strike price and a “reference” price, which is meant to reflect the national average price mentioned in the main text. For offshore wind prices, for example, this reference is the average day ahead price. A problem may arise were a generator’s revenues from the contracts it holds with Suppliers to differ from this reference price. If the generator had, somehow, been able to secure a higher average revenue, it would enjoy superior returns. On the other hand, if its revenues were lower, then it would face lower returns and may even be loss making. This uncertainty is known as “basis risk”.

At present, investors regard this basis risk as low, since day ahead prices are driven by marginal costs which, currently, are determined by gas generators – and Generators are able to stabilise their positions, should they so choose, by trading in the underlying gas market. However, as gas generation dwindles as the contribution from non-fossil generation increases, there will be periods when all the plant operating, i.e. wind and nuclear, will have zero marginal cost and so prices will be far more volatile. It will be more difficult for a Generator to be confident that its revenues from its contracts with Suppliers will match the reference price. This “basis risk” will grow. Developers wishing to secure long-term finance in order to construct a new lant will have difficulty convincing financiers that this basis risk is manageable at a reasonable cost. It seems to me, that the current trading system cannot last in its current form for many more years.

AALW

28th September 2023

Anthony White started his career working for the CEGB in 1977 where he led the geothermal energy team at Marchwood Engineering Laboratories. He then spent two years as a Harkness Fellow at the Los Alamos Laboratory, New Mexico, the Electricity Power Research Institute in Palo Alto and Brown University. He returned to the CEGB and worked in the Health & Safety, Corporate Strategy and Finance Departments and he left in 1989 to join James Capel, the Government’s broking Advisor for the Restructuring and Privatisation of the Electricity Supply Industry in England & Wales. He joined the National Grid Company in 1992 and inty iL 0 Š d ent 1 & n ŏ d , l Ṛ tuct a new la

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