Securing supplies in European power markets

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Securing energy supplies is a strategic and politically sensitive issue. Stefan Judisch, Managing Director of RWE Trading, argues that in order for the market to generate a socially-desirable level of security of supply efficiently, system operator responsibilities with regards to reserve capacity must be widened in line with market principles.

Setting the scene

This paper focuses on discussing fundamental security of supply issues and not on 'blackouts' caused by human error and/or technical grid failures. The cost of disruption can be significant. The August 2003 blackouts in the northern US cost the US economy between $7 and $10 billion.[1] We all know that security of supply is crucial, but the question is: how much of it do we need?

Consumers have different thresholds of tolerance for supply disruptions depending on their individual needs. However, today's electricity networks and metering techniques do not allow systems to cater for individual threshold levels for the broad mass of residential and small business consumers. As a consequence, security of supply takes the nature of a 'public good', which requires some form of central coordination in order to be supplied at a socially-desirable level. system operators are in a privileged position to provide the coordination required and may actually do so in a number of ways, which differ in their reliance on market principles.

Pricing security of supply

It is difficult to determine a uniform value of security of supply for power for different consumer groups. For other commodities the levels of security of supply can be determined by consumers through holding different levels of inventory. Because power itself cannot be stored, there is no way to adjust inventory levels other than buying on-site (redundant) generation and storing the primary fuel. However, investing in auto-generation capability would incur prohibitive transactions costs for the broad mass of residential and small business consumers, as would any model to let the system operator manage interruptible contracts for all the individuals.

As a consequence, power markets may not generate the socially-desirable level of security of supply on the basis of decentralised transactions between individual market participants. Therefore, there is a need for coordination by central institutions. We believe that the general level of security of supply should be determined by all major stakeholders through a 'security of supply commission' (SSC). This level may then be implemented by the system operator through auction processes with regards to reserve capacity.

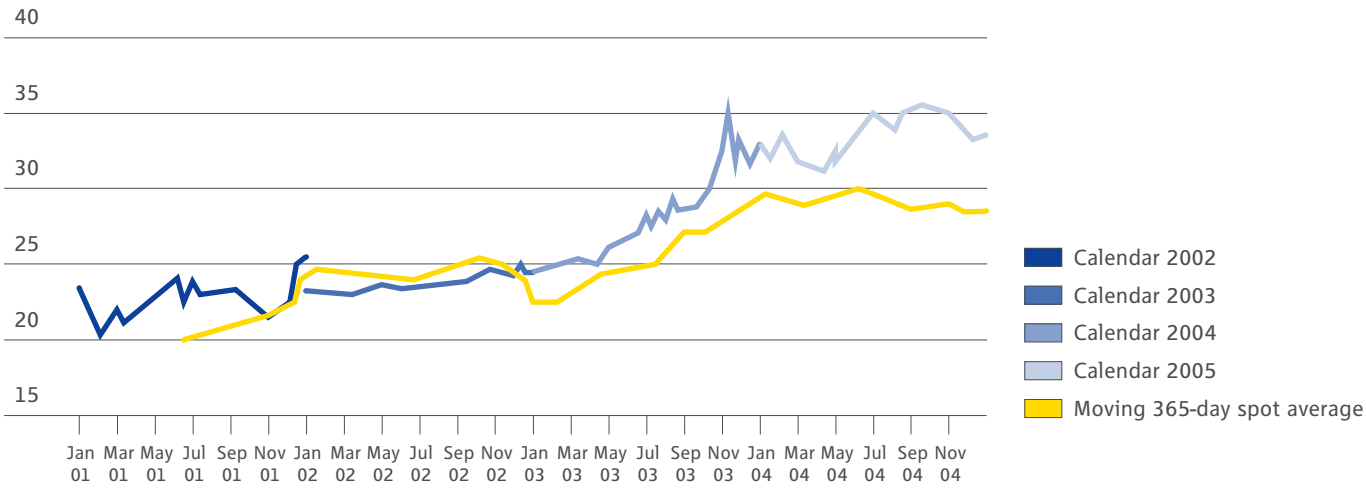
In contrast to power, the security of supply in the European gas sector is not a significant risk. We see that the price signals in the UK do exactly what they are supposed to do: stimulate investment and attract additional supply and dampen demand. A new pipeline – the Balgzand Bacton Pipeline (BBL) which will link the Netherlands and the UK – will start operations in January 2007. A number of LNG projects are in various stages of planning/completion. Expanding the availability of LNG will increase reliability of supply as it broadens the choice of supplying regions, countries and companies. In this way, greater supply diversity increases security of supply.

Price signals are also reliable in the oil market. They have prompted new upstream investments, and for the third year in a row worldwide refining capacity is at a record level.[2] The year 2004 saw accelerating investment which is forecast to continue at a rate of 10—12% per annum.[3] The same developments can be observed in many other commodity sectors: coal, steel, copper, DRAMs etc. One can conclude that generally markets do provide supply security in a very efficient way. This does not mean there is no pain (or gain) for market participants in that process.

[1] Source: ICF Consulting, 'The Economic Cost of the Blackout', an Issue paper on the Northeastern Blackout, August 14, 2003
[2] Source: Oil & Gas Journal, 20 Dec 2004; Vol.10247; David N. Nakamura, p.46
[3] Source: Merrill Lynch, 21 December 2004

Figure 1 – Recent power price trends

Rolling forward calendar year baseload vs. rolling average of EEX Phelix Base spot price



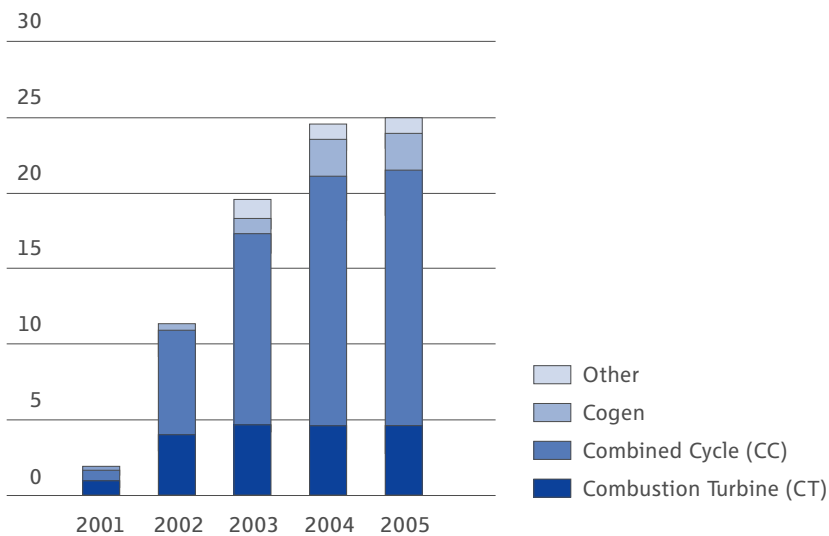
Demand and supply factors do operate in power markets and we have seen a rising curve (see Figure 1) in recent years which, other things being equal, should signal new capacity investment.

However, while European power markets are in the process of developing signals to participants, those may not be perceived to be strong enough to incentivise a sufficient level of long-term investment on time. This raises the question of how existing market designs could be amended in order to preserve what might be considered the socially-desirable level of security of supply.

One effective solution is demonstrated by the PJM[4] model being operated within the US power market. It is the leading example of successful wholesale electricity deregulation and restructuring in North America. Here spot market or bilateral OTC trading is taking place within a framework of operating rules, including open access to transmission, reserve requirements and penalties for failing to meet them. The capacity is auctioned and current efforts are aimed at extending the time horizon of the auctions to 3–4 years forward. The amount of investment which has flown in proves that this model is working: since 1997, PJM has added an average of 800MW of new generation each year[5] (see Figure 2). The capacity growth of 4.2% between 1997–2000 has exceeded the peak demand growth of 2% over the same period.[6] Following PJM, a number of similar concepts have been discussed or implemented, for example in Brazil, New Zealand and Ontario where the TSO's auction capacity into the markets with relatively long lead-times (up to 5 years) has provided stable conditions for investment and help to ensure security of supply.

Figure 2 – Capacity in the PJM System

Cumulative PJM Generation Addition 2001–2005



[4] Pennsylvania-New Jersey-Maryland

[5] Source: 'PJM – Electric Power Competition that works', PA Consulting industry case study (2 July 2001)

[6] Compared to California where peak demand between 1997–2000 also grew roughly 2% but generation capacity declined by 3.4%.

Regulatory uncertainty in the EU

Most European power markets have not been as effective as the PJM in developing models to provide signals for new investment. In Europe, market players are still looking at legislation, policies and schemes to provide a basis for their investment decisions. However, regulatory uncertainty has been, and continues to be, too high – especially in connection with environmental policies (carbon penalisation for the first Kyoto period and beyond, nuclear energy, non-market based support mechanisms for renewable energy, etc.), and this uncertainty weakens incentives for long-term investment.

Optimising reserve capacity

If security of supply is so essential then who is responsible for guaranteeing it? There is no single answer. New investment in capacity and grid systems requires regulatory frameworks which support a stable investment climate and long-term returns for investors. Sensible guidelines have to be set at the European level and need to be implemented into national laws to ensure a harmonised approach.

System operators should be made responsible for the daily security of supply as they are in charge of the (online) operation of grids and have all the necessary system information and know-how. It is the role of the system operators to provide relief from temporary shortage through supplying reserves which should be allocated using market mechanics.

Today some system operators are purchasing their primary, secondary and minute reserve capacity via auctions. In Germany, primary and secondary reserves are auctioned for 6-month periods. Minute reserve is auctioned for 1-day periods. In France and Austria, for example, there are no primary and secondary reserve auctions, but only tertiary reserve auctions for 1-day periods.

system operators are in a privileged position to bring about any level of security of supply as, for instance, determined by the proposed Security of Supply Commission (SSC). A steering variable could be reserve margins. Once reserve margins fall below a pre-determined critical level, system operators should hold market-based auctions to purchase capacities which they keep in reserve.

The critical question relates to the concrete design of those auctions. As demonstrated by the PJM model, long-term capacity auctions may be very effective in terms of generating additional reserve capacity in a timely, reliable and visible manner. However, they may distort the market more than is necessary to achieve the desired level of security of supply. Accordingly, it may be worthwhile considering alternative solutions based on shorter term auctions as well, aiming to strengthen price signals in short-term markets and relying on market participants to increase their own capacity.

Need for concerted action

In conclusion, it should be said that a number of improvements in the European power sector are necessary to avert further disruptions of supplies. There is a need for concerted action on a number of fronts.

Firstly, there is a lack of investment in new capacity due to regulatory and political uncertainty. Pricing signals have not yet fuelled sufficient investment in power generation. However, we can see that the most liquid wholesale market in Europe – Germany – is attracting a lot of interest in new investment.

Secondly, the unconstrained cross-border transmission systems need to be improved by ensuring mutual assistance between national sub-systems – including common use of reserve capacities and allowing exchanges between systems.

In the meantime, there is the need to determine what level of security is required by various consumers. As technical constraints make it impossible to cater for all different needs, it is important to optimise the efficient use of existing capacities. As explained above, this function should be assumed by the system operators who would act as central 'gate-keepers' of reserve capacities, setting the reserve margins and allocating them solely based on market mechanisms – provided of course that grid users and consumers are prepared to pay the price for having the desired security of supply.