



**European Regulation Forum
on Electricity Reforms**

Stockholm SESSA Conference "Addressing Market Power and Industry Restructuring for Consumer Benefits" Scientific Consensus

SESSA, a programme financed by the European Commission, is a European forum on electricity market reforms (www.sessa.eu.com). One of the aims of the programme is to evaluate electricity markets reforms in Europe and elsewhere, and to identify good examples of market design, market power mitigation, schemes for introduction of renewable energy and many other aspects of electricity market reform.

The programme involves both researchers and stakeholders. An important part of the SESSA programme is a series of conferences, each one focused on a particular set of issues. The first SESSA conference, *Refining Market Design*, was held in Cambridge, England, July 14-15, 2004. (See papers and presentations at <http://www.sessa.eu.com>)

The second SESSA conference, *Addressing Market and Industry Restructuring for Consumer Benefits*, was held in Stockholm, Sweden, October 7-8, 2004. The first day was devoted to an academic workshop in which ongoing research was discussed, while interaction between stakeholders and academics was the key feature of the second day. This brief summary of the Stockholm conference represents the consensus views of the academic SESSA participants, and not necessarily those of the stakeholders who attended the conference.

The Stockholm conference was aimed at assessing market power and industry restructuring from the point of view of consumer benefits, particularly with respect to security of supply, sustainability and prices. Key issues that were dealt with are changes in the structure of the European electricity supply industry, threats to workable electricity market competition and the evolution of the energy mix, notably its renewable component.

Electricity market reform is motivated by the consumer benefits that increased competition and trade across national borders are expected to bring. These benefits include lower prices, resulting from increased efficiency in electricity generation and distribution, as well as from reduced margins between prices and the relevant marginal costs. But a comprehensive measure of consumer benefits also includes several other aspects of electricity generation and distribution. In particular the lower prices should not come at the expense of security of supply, the environment and the long-term sustainability of energy supply.

Market power (i.e., the power of an individual generator or retailer to profitably increase its price over competitive price) is a major potential threat to the consumer benefits of electricity market reform. If market power exists and is exercised there will be a wedge, measured by the so-called Lerner index, between the prices paid by consumers and the relevant marginal costs. Thus the exercise of market power reduces output and redistributes income from consumers to producers of electricity. To the extent that services that consumers value more than they cost are not provided, the exercise of market power leads to social costs. Additional social costs are incurred if firms able to exercise market power are less eager to minimise their costs (or to become more cost-effective).

However, in practice market power is difficult to identify and measure. There are several reasons for this. First, there is the difficulty of measuring the relevant marginal cost of reliably generating and distributing electricity to the final consumers. A

special case is the difficulty of defining the relevant marginal cost of electricity in a hydro power system with storage capacity. In such a system the marginal cost of generating power is the inter-temporal opportunity cost of stored water. Second, market power can also be exercised by a strategy of withholding capacity as has been discussed for the NordPool and the California markets.

The concentration index often used by competition authorities cannot detect that type of strategy. Indeed, if a dominant firm chooses to withhold its capacity, the market price remains high even though the market concentration decreases. Ideally, one would like to combine a concentration index such as the Hirschmann-Herfindahl Index with a markup ratio such as the Lerner index. Third, exercise of market power may be difficult to detect due to the complicated relationships within the sequence of markets (future-, spot-, and balancing markets) i.e. actions taken in one of the markets may also influence either or both of the other markets.

Market power problems in an electricity market may arise for many reasons, but are in general less likely if the degree of concentration is low. Thus measures to reduce concentration, or to keep concentration at an acceptable level, are effective components in any market power mitigation strategy. One way of reducing concentration is to integrate national electricity markets and thus extend the relevant market. Market integration has three components. The first is to create inter-connector capacity that is sufficiently large to allow the cross-border trade that is necessary for area price equalisation. The second is to create a common set of rules and regulations that is conducive to efficient trade across national, or regional, borders. The third is to import competitive pressure into exporting countries by proper pricing of interconnection.

From these points of view the Nordic wholesale electricity market is a good example of a well integrated market, and a case where geographical extension of the market has effectively contributed to dilute market power in the generation segment. At

the same time the slow rate of integration of the European electricity markets (and the failure to agree rules for the more efficient use of interconnection), in conjunction with the high or growing concentration in several national markets, suggests that market power is a potential threat to workable electricity market competition in Europe.

Another way of reducing market power problems in concentrated markets is to reduce barriers to entry. In the wholesale market this amounts to reducing entry barriers for new generators and/or opening up for import. From this point of view the England & Wales market, where significant entry of new generation capacity has taken place, is a good example. However, environmental and zoning regulations in general increase the cost of entry, and the trend in Europe is in the direction of more rather than less stringent environmental regulations on new generation and transmission facilities.

In retailing consumer stickiness plays an important part in restraining competition. In some countries the definition of eligible customers effectively prevents full retail competition. However, experiences in the Nordic countries suggest that full market opening is not sufficient to bring about effective retail competition. Switching and information costs may significantly restrain consumer mobility and in effect deter entry and reduce competition. In addition low consumer mobility opens up for price discrimination of consumers who, by not responding to offers by competitors to the incumbent retailer, have revealed themselves to be less price-sensitive. Furthermore, in retail markets, there is a quite large minimum economic scale for covering advertising and other costs. This works as an incentive for retailers to get bigger.

However if consumer stickiness makes that hard to achieve through organic growth, the answer is to merge with other retailers, as has happened in the UK. The market structure will move from a fragmented set of local monopolies with limited competitive pressure to an oligopolised set of firms, still with localised market power and uncertain competitive pressure. Consequently, larger firms have the potential to market effectively in others' home regions, but may not

wish to suffer the likely retaliation in their own home regions. In either case, however, the fundamental limit on competitive pressure comes from the consumer stickiness.

The relation between wholesale and retail prices is a key aspect of the design of an electricity market. From a social efficiency point of view retail electricity prices should be equal to the relevant marginal costs of providing electricity and associated services to the final consumers. Among other things this means that both short run and long run variations in wholesale prices should, at least on the margin, be reflected in retail prices (at least for the larger consumers with interval meters). If this is not the case both the short run incentives to adjust consumption to current scarcity/surplus conditions and the long run incentives to invest in new capacity will be distorted. As a result the cost of maintaining security of supply will be unnecessarily high.

Wholesale electricity prices exhibit significant seasonal variations as well as short run volatility. In electricity supply systems dominated by hydropower there are also significant annual variations in wholesale prices. Thus one aspect of retail prices being directly linked to wholesale prices is that final consumers are exposed to price risks. For consumers using electric heating and a full set of electric appliances this price risk represents a non-negligible cost, and they are in general willing to pay a premium in order to insure against electricity this risk. This is clearly the case in Sweden where most small customers are on fixed price contracts. In Norway, however, most customers are on semi-fixed contracts and on contracts based on average monthly spot prices.

Contracts between retailers and consumers allocate the burden of price risk between the parties. In standard small-customer contracts the retailer carries the entire price risk in the very short term. At the same time each consumer, within wide margins, is allowed to consume whatever quantity she prefers at the contract price. Consequently the consumer has no economic incentives to reduce consumption when electricity supply is scarce and wholesale prices unexpectedly high. This design of retail electricity contracts makes wholesale "price

spikes” more likely, and the cost of maintaining short run security of supply more costly.

One option to avoid this feature would be to allow retail contracts that only offer insurance against price risks on a fixed quantity (kW per hour, week, month or some other unit of time). With such contracts all consumers face marginal prices reflecting the variations in wholesale prices during the relevant period. Thus, although the income effect of an unexpectedly high price would be small, the consumer would always save money by reducing her consumption. However, in order to increase instantaneous demand responsiveness some kind of real time metering of consumption, as well as automatic demand side management devices would be needed.

The security of supply issue has both short run and long run aspects that can create scope for market power. In the short run security of supply is a matter of having sufficient available capacity on the supply side and flexibility on the demand side, as well as an appropriate set of markets and regulations, to avoid brownouts and blackouts. If security of supply is not ensured in the short run, firms may more easily exercise their potential market power by withholding generation capacity. In the long run it is a matter of having a technology and fuel mix that can sustain fuel supply disruptions and unexpected technological failures. Thus the introduction of renewable electricity, i.e. wind power, power based on biomass fuels etc., has both an environmental and a long-run security of supply dimension.

At current conventional fuel prices and environmental regulations and charges renewable electricity to a large extent is not competitive. Thus the introduction of renewable electricity depends on the value attached to their contribution to long run security of supply. But it also depends on the institutional arrangements for inducing generators to invest in renewable electricity. Direct subsidy has so far been the commonly used method to promote the introduction of renewable electricity.

To some extent the European Emission Trading System (ETS) to be introduced as of January 1, 2005 will stimulate the

investment in new capacity for green electricity generation. In recent years, however, another system with a more direct objective, *tradable green certificates (TGCs)*, has been introduced or considered in several European countries. The aim is to create a market where different types of renewable electricity can compete on equal terms, thus relieving governments and public agencies from effectively being involved in detailed investment decisions in the power industry. The basic design of TGC systems is that generators receive one TGC per unit of “green” electricity generated, while consumers are required to buy and hold a certain number of TGCs per unit of electricity consumed. Thus the demand for TGCs is directly derived from the demand for electricity. In practise there is both a minimum and a maximum TGC price level at which the TGC system becomes a tax scheme on end-use consumption.

So far the practical experiences of TGC systems are limited, but a few observations can be made. One is that the supply of “green” electricity, notably wind power, exhibits quite large hourly and even annual variations. As the demand for TGCs is very inelastic TGC prices may vary significantly between different hours. Another observation is that market clearing prices for TGCs often exceed the predetermined maximum price level. This may reflect withholding behaviour on the part of the generator, i.e. exercise of market power. But it may also reflect a mismatch between the required growth of “green” electricity consumption and the cost of expanding the generation of “green” electricity.

Before any definite conclusion about TGC systems can be drawn several issues about market design and the interaction between TGC and electricity markets have to be analysed. Remaining questions to be answered are for example: Is the TGC system really more efficient than a mere subsidy scheme while taking transactions costs into account? Is the TGC system really compatible with the European ETS- system? How well does the TGC system cope with volatility of wind power generation? How precise is the percentage certificate requirement as a policy instrument for generating renewable generation capacity?