

VATTENFALL' S VIEWS ON THE ELECTRICITY MARKET 2004

PART 1: GENERAL OUTLOOK



Electricity Market Glossary

Bottleneck	Congestion in transmission capacity in the electricity system that can temporary affect the price structure with variation in prices between different areas.
CHP plant	Combined heat and power plant. A plant, which can produce heat and electricity at the same time and thus increases the efficiency of the fuel utilisation.
Cross border trade	Commercial exchange of energy between countries.
DSO	Distribution system operator. Responsible for operating, ensuring the maintenance of and developing the distribution system in a given area.
EEX	European Energy Exchange, the German power exchange. Headquarters in Leipzig.
Electricity distribution grid	Regional and local networks, owned by different network operators.
Electricity transmission grid	National high tension grid, typically owned and operated by the TSO in each country.
Ex-ante tariff regulation	Approval of tariffs prior to implementation.
Ex-post tariff regulation	Tariffs amended after implementation if deemed necessary.
Generation/production	Production of electricity. The words are used synonymously.
Green certificate	A tradable certificate issued for renewable energy. In Sweden called electricity certificate.
GWh	Gigawatt-hour - 1 000 000 kWh.
IEM	Internal Electricity Market
kWh	Kilowatt-hour - Energy unit. Amount of energy produced when running 1 kW of capacity for 1 hour. Amount required to run an 40-watt light bulb for 24 hours.
Liberalisation	Removal of monopoly rights and obligations in order to open up for competition. Sometimes referred to as deregulation.
Lignite	Brown coal.
MWh	Megawatt-hour - 1 000 kWh.
NordPool	The Nordic power exchange.
NTPA	Negotiated third party access. Access to the network granted on the basis of bilateral negotiations between grid owner and grid user.
OTC	"Over the Counter". Trading of physical and financial contracts in parallel to the organised exchanges.
POLPX	The Polish Power Exchange; Towarowa Gielda Energii.
Production/generation	Production of electricity. The words are used synonymously.
PSE	Polskie Sieci Elektroenergetyczne - Polish Power Grid Company - the company which owns the electricity transmission grid. Used to buy all electricity from the producers to resell it to distributors.
PSE Operator	Operates the Polish electricity transmission grid on behalf of PSE and will take it over from PSE in the future to become the Polish TSO.
Regulator	Competent authority that supervises the market to ensure effective competition and fair pricing.
Retailers	Firm at the end of the distribution chain, which normally buys a product from a wholesaler in order to sell it to the final consumer.
Spot market	Short-term physical trading in electricity on an exchange.
System price	The spot price used for settling financial contracts. Based on the spot price obtained in the Nordic region.
TSO	Transmission System Operator
TWh	Terawatt-hour - 1 000 000 000 kWh.
Unbundling	Separation of the transmission/distribution system interests from the other interests of a company.
Value chain	Generation, transmission, distribution and sales of electricity. Applicable to both trading and transport of electricity.
Wholesale market	Where distributors or retailers buy a product in bulk from the producer in large quantities to supply their own customers (end users).

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Foreword

This is the third report that Vattenfall publishes presenting our views on the electricity market. The report is built on descriptions of Vattenfall's home markets, i.e. Germany, Poland and the Nordic region.

The ambition is to give a broad description of the main features of how these markets work and also to place them in a European context. As we at Vattenfall understand it, the general purpose of the liberalisation of electricity supply is to create an open electricity market and to improve efficiency by employing developed market instruments. However, the actual workings of the electricity market and how supply and demand interact to create price(s) are still fairly unknown outside the electricity industry. As a result, the credibility and trustworthiness of the electricity market as well as of its players are sometimes questioned.

It is Vattenfall's firm belief that our best contribution to building trust in the market is by being open and share our knowledge and understanding of the present state of our home markets, the overriding development of the internal electricity market in Europe and how we judge its future development. Our hope and firm belief is that we thereby can improve the understanding of the electricity markets in a wider audience and contribute to building a good basis for reasonable expectations.

The perspective in the description is naturally Vattenfall's but I want to underline that we are not aiming here to market our products or promote our actions. Our ambition is to give our version of the market development as objectively and neutrally as possible.

The 2004 report contains two different parts. Firstly, a part that presents general themes of relevance for the market development seen from a north European perspective, built on market analyses of Vattenfall's core markets, and secondly, a part consisting of three separate descriptions of the Nordic, the German and the Polish markets.

A broad team of more than 30 people from the whole Vattenfall Group has worked together to compile this report. Arne Mogren, Vattenfall Public Affairs, has carried the overall responsibility for this work.

Stockholm, November 2004



Lars G. Josefsson
President and Chief Executive Officer
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Introduction

Market liberalisation has brought about extensive change in the supply of electricity. Above all, customers now find themselves in a completely new situation. They are able to choose between suppliers and different types of contract, although this choice also exposes customers to new risks.

For the liberalised market to work satisfactorily, regulations and codes of conduct need to be drawn up, mechanisms for forming market prices created and the forms for society's market supervision need to be reviewed. Whereas previously market supervision was simply a matter of monitoring the final price, it now has to be adapted to the different conditions in the various parts of the supply chain. In parallel with liberalisation, market integration across national borders is taking place. The main driving forces are economic and competitive. Market integration can reduce costs and/or raise the level of quality. Here, common rules within the EU act as a driving force.

Naturally such a transition requires time. Rules and regulations may set the framework, but the market's various parties must then develop codes of conduct and new attitudes based on radically altered conditions. This process entails a series of gradual adaptations, and will continue until all the parties concerned are reasonably satisfied.

Liberalisation is still in the middle of this process of change. Different parties are putting forward criticism and demands for further changes. There are also elements of bringing the very issue of liberalisation into question. Why has the supply of electricity gone from a monopoly to a competitive market? Essentially the aim is to increase economic efficiency from society's perspective, and it is against this background that liberalisation must be evaluated.

Increased economic efficiency does not necessarily mean lower prices for all customers. The old monopoly systems involved a great deal of cross-subsidies, gold-plating and low-performance capital. The customers' vision is also being obscured by taxes and duties that increase prices for customers. In Sweden and Germany, the final price for small customers comprises over 40 per cent taxes and fees. This is partly due to the introduction of environment-related financial instruments in tandem with liberalisation.

Liberalisation and market integration are an important part of the EU's Lisbon agenda. The Lisbon Strategy is a commitment to bring about economic, social and environmental renewal in the European Union. In March 2000 the European Council set out a ten-year strategy to make the EU the world's most dynamic and competitive economy. Under the strategy, a stronger economy will drive job creation alongside social and environmental policies that ensure sustainable development and social cohesion.

Economic growth will consequently be a top priority for the new European Commission. The most important tool to develop the economy is the improvement and fulfilment of the internal market and within the energy sector the Internal Energy Market. The Internal Energy Market is an important part of the total internal market since energy is vital to society.

This report, in two parts, describes how Vattenfall views the development of the electricity market in countries where Vattenfall operates, and puts this development in relation to developments at European level. The aim is partly to describe and evaluate developments to date, but also to assess future market conditions.

The first section contains Vattenfall's overall view of developments in the electricity market and factors affecting it. Four texts interspersed in the running text provide more in-depth insight into the development of the EU Internal Energy Market, Electricity Generation in the Integrated Electricity Market, Electricity Wholesale Markets and Number One for the Customer. All authors of the articles work within the Vattenfall Group. The first section also contains an extensive interview with Professor Richard Green of the University of Hull, who discusses how liberalised electricity markets work and to what extent reasonable expectations are fulfilled, focusing on the Nordic electricity market.

The second section contains descriptions of developments on the Nordic, German and Polish electricity markets. A separate chapter includes a summary of a review of the economic effects of liberalisation produced by Vattenfall on the basis of several official studies and inquiries regarding electricity supply in Sweden and the Nordic electricity market.

Major changes affecting the EU energy markets

The European electricity industry is able to look back at yet another year of fundamental change. The Electricity and Gas Directives that were introduced and amended in recent years, are now being implemented. Continuing liberalisation, integration of energy markets and the progressively developing Union-wide rules and regulations are some of the forces unleashed on the energy markets; Union enlargement, the introduction of the Emissions Trading Directive and the now proposed Electricity Infrastructure, Energy End-use Efficiency, Energy Services and Security of Supply Directives are others.

More initiatives are expected to follow. Sometimes, these will work in conjunction with market liberalisation. However, they may also be in direct conflict with the development of well-functioning energy markets, for example, by increasing energy prices, directly or indirectly, or making investments more difficult due to increased uncertainty. The new Commission is expected to focus on increasing the overall competitiveness of the European Union, in order to promote economic growth. A lot of work remains to be done with respect to achieving a fully functioning, integrated European energy market, and the Commission appears ready to implement new legislation should this be required to accomplish it. It is safe to say that together, all these new measures will continue to completely transform the business environment of the future.

Liberalisation

In its Third Benchmarking Report of March 2004, the European Commission showed that member states continue to make progress in transforming both electricity and gas markets, but not as quickly as desired. Generally speaking, natural gas is lagging behind considerably. With the exception of the UK, free and equitable access to transportation at reasonable terms, a most important requirement for a well-functioning gas market, remains to be established, and it is not yet possible to speak of a representative, market based reference price for gas. Despite the security of supply question, the lack of gas-to-gas competition may have adverse effects also on electricity markets since natural gas from an environmental perspective is the fuel of choice to replace old coal fired capacity, but cannot compete with new coal at prevailing gas price levels.

Figure 1: Implementation of the Electricity Directive

	Declared market opening (%)	Unbundling: transmission system operator\owner	Unbundling: Distribution system operator ¹	Regulator	Balancing conditions favourable to entry	Biggest generators' share of capacity (%) ¹	Biggest 3 generators' share of capacity (%) ¹
Austria	100	Legal	Accounts	ex-ante	favourable	67	33
Belgium	80	Legal	Legal	ex-ante	unfavourable	59	66
Denmark	100	Legal	Legal	ex-ante	favourable	0	25
Finland	100	Ownership	Accounts	ex-post	favourable	11	29
France	37	Management	Accounts	ex-ante	moderate	78	86
Germany	100	Legal	Accounts	planned	unfavourable	23	61
Greece	34	Legal\Mgmt	Accounts	ex-ante	unfavourable	85	87
Ireland	56	Legal\Mgmt	Management	ex-ante	moderate	80	90
Italy	66	Own\Legal	Legal	ex-ante	moderate	43	72
Lux	57	Accounts	Accounts	ex-ante	unfavourable	0	0
Neth	63	Ownership	Legal	ex-ante	favourable	n.k.	33
Portugal	45	Ownership	Management	ex-ante	moderate	59	74
Spain	100	Ownership	Legal	ex-ante	favourable	37	79
Sweden	100	Ownership	Legal	ex-post	favourable	16	50
UK	100	Ownership	Legal	ex-ante	favourable	16	37
Norway	100	Ownership	Accounts	ex-ante	favourable	12	24
Estonia	10	Accounts	Accounts	ex-ante	unfavourable	15	21
Latvia	11	Legal	Legal	ex-ante	n.k.	0	0
Lithuania	17	Legal	Legal	ex-ante	moderate	0	29
Poland	51	Management	Accounts	ex-ante	moderate	4	25
Czech R	30	Legal	Accounts	ex-ante	unfavourable	43	53
Slovakia	41	Legal	Legal	ex-ante	moderate	29	40
Hungary	30	Accounts	Accounts	n.k.	moderate	5	41
Slovenia	64	Legal	Accounts	ex-ante	unfavourable	16	43
Cyprus	0	Management	None	ex-ante	not decided	100	100
Malta	0	Derogation	None	n.k.	not decided	100	100
Candidate Countries							
Romania	33	Legal	Accounts	ex-ante	moderate	n.k.	44
Bulgaria	15	Accounts	Accounts	ex-ante	moderate	n.k.	45
Turkey	23	Legal	Accounts	ex-ante	unfavourable	n.k.	62
Other Neighbouring Countries							
Croatia	9	None	None	ex-ante	not decided	40	n.k.
Bosnia	0	None	None	planned	not decided	n.k.	n.k.
Serb\Mont	0	None	None	planned	not decided	n.k.	n.k.
FYROM	18	None	None	ex-post	not decided	n.k.	n.k.
Albania	0	None	None	ex-post	no information	69	70

Practices likely to impede competition are shaded in red, positive conditions are shaded in green.

n.k = not known

¹i.e. unbundling from supply activities

²After taking account of import capacity: red if > 40 per cent, Green if < 20 per cent

³After taking account of import capacity: red if > 70 per cent, Green if < 40 per cent

Source: Third benchmarking report on the implementation of the internal electricity and gas market, European Commission, 2004

Figure 2: Implementation of the Gas Directive

	Declared market opening (%)	Unbundling transmission system operator	Unbundling Distribution system operator	Regulator	Transmission tariff structure	Capacity booking procedure	Balancing conditions favourable to entry Y/N	Concentration in wholesale market
Austria	100	Legal	Legal	ex-ante	post\distance	flexible	yes	yes
Belgium	83	Legal	Legal	ex-ante	entry-exit	moderate	moderate	yes
Denmark	100	Ownership	Legal	ex-post	postalised	flexible	yes	yes
France	37	Accounts	Accounts	ex-ante	entry-exit	moderate	moderate	moderate
Germany	100	Management	Accounts	planned	distance	moderate	no	moderate
Ireland	85	Management	Management	ex-ante	entry-exit	moderate	yes	no
Italy	100	Legal	Legal	ex-ante	entry-exit	flexible	yes	yes
Lux	72	Management	Management	ex-ante	postalised	moderate	moderate	yes
Neth	60	Management	Legal	ex-ante	entry-exit	flexible	moderate	moderate
Spain	100	Legal	Legal	ex-ante	postalised	flexible	yes	yes
Sweden	51	Accounts	Accounts	ex-post	postalised	moderate	moderate	yes
UK	100	Ownership	Ownership	ex-ante	entry-exit	flexible	yes	no
Estonia	80	None	None	ex-ante	not decided			yes
Latvia	0	Legal	Legal	ex-ante	not decided			yes
Lithuania	80	Accounts	Accounts	ex-ante	postalised			moderate
Poland	34	Accounts	Accounts	ex-ante	postalised	no information		yes
Czech R	0	Accounts	Accounts	ex-ante	not decided			yes
Slovakia	33	Legal	Legal	ex-ante	postalised			yes
Hungary	0	Legal	Accounts	ex-ante	not decided			yes
Slovenia	50	Accounts	Accounts	ex-ante	postalised			yes
Candidate Countries								
Romania	25	Legal	Accounts	ex-ante	postalised			moderate
Bulgaria	80	Accounts	None	ex-ante	postalised	no information		yes
Turkey	80	Accounts	Accounts	ex-ante	not decided			yes

Practices likely to impede competition are shaded in red, positive conditions are shaded in green.

NTPA = Negotiated third party access

Source: Third benchmarking report on the implementation of the internal electricity and gas market, European Commission, 2004

Increased interconnection and cross-border trade are seen as key conditions to achieve fully efficient and integrated electricity markets, requiring investment to remove bottlenecks and implementation of common operative rules and regulations. The technical and practical obstacles preventing this integration may be larger than expected, not least in terms of the complications involved in co-ordinating the processes to provide planning permissions and concessions. The recently proposed Directive on Electricity Infrastructure and Security of Supply therefore aims specifically to increase the level of co-ordination between member states in approving investments in electricity interconnection.

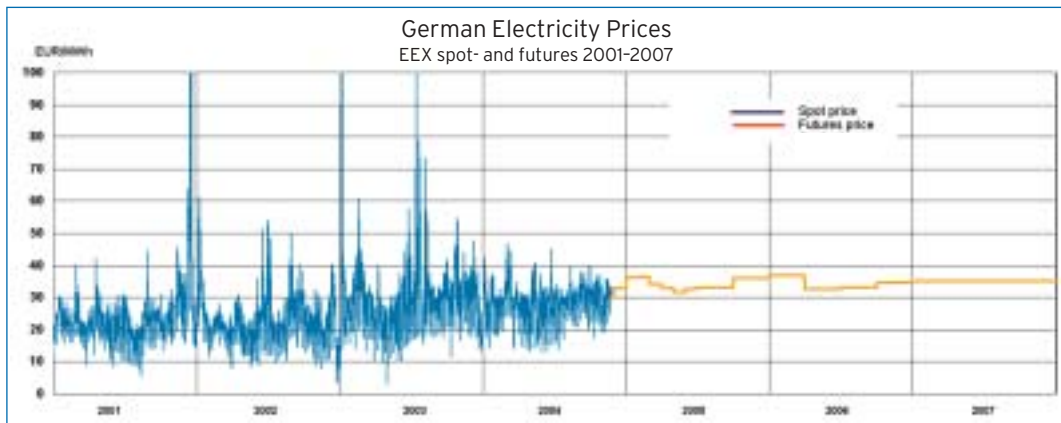
Price developments since liberalisation

Due to the high electricity wholesale and retail price levels of the past two years, there has been an ongoing debate in Sweden, and more recently also in Germany, about whether liberalisation has achieved its intended purpose of bringing down prices through competition.

Figure 3: Wholesale market prices



Source: NordPool, updated November 22, 2004



Source: European Energy Exchange, EEX, updated November 22, 2004



Source: Polish Power Exchange, POLPX, updated November 22, 2004
No future prices are available on the Polish market

While it is true that the cost of using electricity for the consumer has risen significantly recently, it would be incorrect to surmise that this indicates that competition is not working as intended. In fact, electricity costs have risen because of several factors, some of which have been introduced on purpose, not by the energy industry but by the EU and elected governments.

In the case of the Nordic area, the increase in wholesale prices is due to low precipitation. In Germany, old, inefficient plants have been decommissioned, and the cost of the marginal capacity in the system, i.e. coal fired plant, has increased due to high input prices for coal. None of these factors are due to undue influence from electricity producers. The decommissioning of plants is a perfectly justifiable action, in both economic and environmental terms.

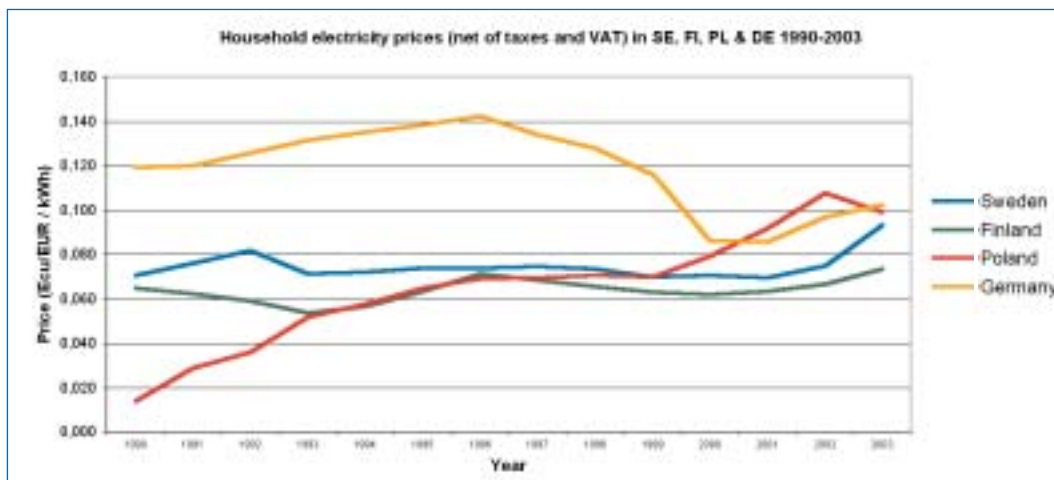
As far as the Nordic countries are concerned, the responsible ministers have agreed that competition in the Nordic electricity market is working, and that market intervention to cap energy prices would not be justified. In a recent statement (September 2004), the five Nordic energy ministers jointly declared:

“The Nordic ministers for energy agree that the situation during the winter 2002/2003 showed that the Nordic electricity market does work satisfactorily and is capable of handling stressed conditions [...]. The Nordic ministers of energy agree that high prices are not a sufficient justification for market intervention. Price formation is, amongst other things, important in the short and long term to balance supply and demand, to maintain the confidence of market actors in order to create conditions for investment [...]. It is also important to have a long term perspective that gives the market a stable framework.”

Vattenfall is convinced that this line of argumentation is valid also for the German market. Poland has not been liberalised in practice, so it is not possible to comment on price movements from a competitive wholesale market perspective.

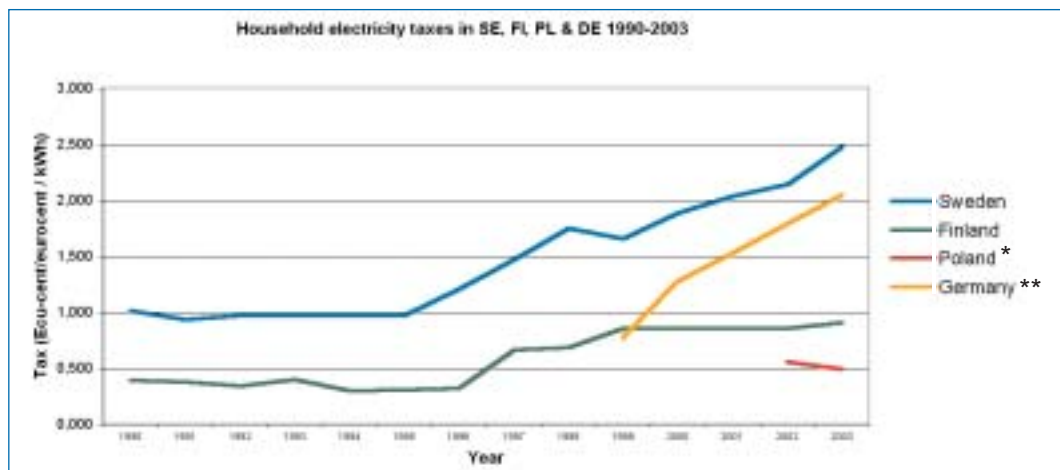
But household consumers have seen their energy costs rise even more than wholesale prices would suggest. This is due to factors that are externally imposed. In the graphs below, we are showing the development of household prices in Vattenfall’s four core markets, since liberalisation. As is clearly visible, electricity prices in all three markets where customers are free to choose their supplier fell in the years following liberalisation. Distribution charges have risen very slightly, less than the rate of inflation, in both Sweden and Finland. The situation in Poland is very different from the other three markets; here, prices have been raised gradually on purpose following the shift in political and economic regime in order to bring them in line with international market levels.

Figure 4. Household electricity prices and taxes in Vattenfall’s core markets



Electricity price developments in EUR for the 5,000 kWh household segment (in Germany 3,500 kWh) and for all four countries studied 1990-2003 (prices excluding taxes and VAT and for Germany also excluding concession fee, Kohlepfennig and CHP and RES support).

Source: SwedPower



- * Energy tax on electricity was introduced in 1999
The tax has been constant, the slope depends on currency exchange rate fluctuations
- ** Energy tax on electricity was introduced in 2002

Source: SwedPower

Only in the last two years have electricity prices increased in the liberalised markets, an effect which is due to the rise in wholesale prices. Taxes however have risen in all Vattenfall's core markets, and most significantly so in Sweden. In both Sweden and Germany, taxes now constitute over 40 per cent of total household electricity costs. The rise in total cost to consumers is thus primarily due to increased energy taxes.

A recent study of the deregulated industries of domestic aviation, telecommunications, postal services, electricity and rail transport in Sweden by the Competition Authority¹⁾ concluded that the effects of liberalisation have been mostly positive, and that for electricity specifically, the increase in prices to household customers is mainly due to taxation. As can be seen, total taxes have risen significantly since liberalisation not only in Sweden but in all three markets, by as much as 150 per cent in the case of Sweden, 100 per cent in the case of Finland and 100 per cent in the case of Germany (since 1999, when electricity taxes were introduced in the first place)²⁾. Charges that have been introduced or raised include the green certificates charge in Sweden, and the CHP and RES (Renewable Energies Act) levies in Germany.

Similar developments can be shown for Norway and Denmark. This is not an effect that can be ascribed to non-working competition. It has been very deliberate; in order to reduce consumption, provide incentives to investors in renewable energy sources and to make electricity production from carbon-based fuels more costly. It is to be expected that this development will continue.

1) Report from the Competition Authority "Monopolmarknader i förändring", July 2004.
2) Source: Eurostat

Union Enlargement

Ten new member states joined the EU on May 1, 2004. As new EU member states, they too will be required to implement the Electricity and Gas Directives, but have been granted a more generous timetable. Most have already begun to reform their energy sectors, but progress varies. The efforts to integrate ten further energy markets into the future integrated European energy market is of course likely to have a huge impact, in the long run, on the Internal Electricity Market (IEM). In the medium term, the Eastern European markets are expected to form their own regional market, sharing, as they do, the former CENTREL transmission system.

Emissions Trading

The members of the European Union (EU 15) have jointly undertaken under the Kyoto protocol to reduce emissions of greenhouse gases by 8 per cent from the 1990 level by 2008/2012. The Kyoto protocol offers three flexible mechanisms as tools to realise emission reduction - emissions trading, joint implementation and the clean development mechanism.

The European Parliament in 2003 took the decision to implement a CO₂ emission trading system within the EU by 2005. The system is similar to the one suggested by the Kyoto protocol but with companies participating instead of governments. The purpose is to use market mechanisms to effectively allocate physical reduction and abatement measures in order to reduce emissions.

Industrial energy users as well as power generators will be granted emission allowances for the first trading period (2005-2007) in accordance with national allocation plans, which have been developed by each member state in accordance with the guidelines provided by the European Commission. The allowances can be used for production that emits CO₂ (usually involving burning of a carbon-based fuel), or sold.

Principles for allocation vary substantially between countries. The European Commission is expected to define a more detailed guideline for the national allocation plan for the second trading period (2008-2012), in order to achieve further harmonisation and transparency. In subsequent trading periods, the number of allowances will be gradually reduced to correspond to reduction objectives.

In the first period (2005-2007) allowances will be granted at no cost. In the second period, 2008-2012, a small part (maximum 10 per cent) may be auctioned in some of the member states.

By now it is clear from the allocation plans submitted to the European Union that national stakeholder interests to a large extent have influenced the way in which governments have chosen to allocate emissions rights. Because of this, the Directive can be expected to have different effects in different countries, depending, for example, on indigenous energy resources, preferred fuels and economic dependency on energy intensive industries. Allocation seems generous in many countries, which means that the pressure on the market will, at least initially, not be too high. Supply and demand are however expected to create a well-functioning market.

Trading commences on 1 January 2005 and is expected to have visible effects on the electricity market. Most of the necessary guidelines at EU and national level have been finalised but quantitative market effects and costs for different players in the market are still uncertain. Due to the added cost of the required emission rights, wholesale market prices are expected to rise in all markets that have significant amounts of fossil-based power generation. Some countries intend to use the clean development mechanism, as defined by the Kyoto protocol, to reach their Kyoto target.

Future investments in the power sector need a stable political framework. Stepwise ruling for allocation of allowances for periods of 3-5 years creates an instability that threatens new investments. The allocation rules for the second and following trading periods are still unknown, something that might influence the behaviour of market participants in the first period.

The article below outlines our views on the continued work of the EU to liberalise the energy markets, and what we believe needs to be done to achieve this vision. In summary:

- Vattenfall is in full agreement with the Commission's Medium Term Vision for the Internal Electricity Market (IEM)
- We believe that four key criteria must be met for the IEM to work satisfactorily
- Regional markets are a step in the right direction, as demonstrated by the existence of the Nordic electricity market
- Investments in cross-border capacity are necessary, but expectations should not exceed what is economically and practically possible
- Care should be taken to strictly implement existing directives before introducing new ones which may have counterproductive effects

The development of the EU Internal Energy Market

Jan Sundell, Group Function Strategies, Lars Jacobsson, Brussels Office

EU regulation of the electricity and gas markets has become more and more important. This is especially evident when looking at the new Commission's focus on the Lisbon agenda. It is expressed as "making Europe the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater cohesion by 2010". As the realisation of the internal market is one of the corner-stones of the Lisbon strategy, it is easy to understand the importance of liberalisation of the internal energy markets as part of the total market.

Initiatives to change and harmonise energy market rules and structures can therefore be expected to be increasingly driven from Brussels.

Vattenfall has a clear view on how to develop the Internal Energy Market

According to the Commission's strategy paper "Medium Term Vision for the Internal Electricity Market" (March 2004) the overall objective for the IEM is as follows:

"The Community is seeking to create a competitive market for electricity for an enlarged European Union, not only where customers have choice of supplier, but also where all unnecessary impediments to cross border exchanges are removed. Electricity should, as far as possible, flow between Member States as easily as it currently flows within Member States.

Improved cross border flows will increase the scope for real competition which will

drive economic efficiency in the sector, leading to benefits for customers both in the business and the household sector in terms of lower energy prices, improved service and products tailored to their own needs. These benefits will feed through to higher overall economic growth in the European Union.

Competitive electricity markets must deliver a secure, reasonably priced and continuous service to final energy customers. The electricity market will need to be carefully monitored and appropriately regulated in order to ensure that this objective is delivered."

Vattenfall, as one of the major players on the European electricity market, is in full agreement with this objective and is continuously working to support its realisation.

Vattenfall has long experience from the liberalised markets in the Nordic countries. All Swedish electricity customers have had the right to choose their supplier since 1996. However, the market did not function satisfactorily immediately. In order for the market to work more effectively, there have been many improvements to the regulatory framework over the years. Furthermore, the network operators and the electricity suppliers alike are still aiming at making processes work more smoothly, and to earn the confidence of customers.

In Vattenfall's view, four key criteria have to be met in order for the IEM to work satisfactorily:

1. Customers must be able and free to easily change their energy supplier. This presupposes that the switch is simple and cheap, and that the process is fast and reliable. Without customer confidence and satisfaction, the market will not be able to claim to be working well. A key condition to achieving this is the complete unbundling of monopoly network services from competitive energy sales activities.
2. The pricing mechanism on the wholesale market must be made transparent and credible, providing representative and readily accessible market prices. This must be realised in all regional markets and their

sub-markets. It requires a transparent market place on which a large number of transactions between anonymous parties take place on a regular basis. Without a transparent wholesale pricing mechanism, the pricing on the end-user market can never become transparent and trustworthy.

3. A common set of market rules and regulations is needed, adhered to, upheld and improved upon by all market participants, jointly taking responsibility for the creation of a well-functioning market, which in a balanced way takes into account the interest of all participants.
4. Effective market supervision is required. Liberalisation is an ongoing process, and the market cannot be expected to work flawlessly right away. Finding the right balance between rules and regulations, consumer interests and market players takes time. Effective market supervision is an essential tool in identifying, evaluating and rectifying market imperfections.

Creation of Regional Markets is a pragmatic and good approach

The idea brought forward by the Commission to establish regional markets as an intermediate step towards a total internal European electricity market is, according to Vattenfall, a worthwhile and pragmatic approach. The aim is to consolidate several national markets that naturally fit together into larger areas (e.g. the Nordic countries into the Nordic Regional market, Spain and Portugal into the Iberian Regional market). The largest challenge may be to establish the Regional market of Germany, France, BeNeLux and Austria. The task of harmonising the rules and regulations that will make these national markets work together is a fundamental one that will take many years of hard work, where the EU institutions, alongside national regulators, will have to play a decisive role.

The establishment of Regional Markets and promotion of Cross Border Trade (CBT) in order to increase competition are important measures, but not enough to create real competition. The need for harmonisation of rules and regulations in general and for the development of well-functioning wholesale

markets are other important prerequisites. In order to increase CBT by reinforcing the transmission networks it is important to develop the incentives for the TSOs (Transmission System Operators) to make such investments.

The possibilities to create competition by increasing CBT should however not be exaggerated. It is not possible to reinforce the transmission networks, to the extent that "the electricity flows as easily between Member States as it currently flows within Member States". That would not be economical, as costs would outweigh benefits, and it is unlikely that all permits required for so many transmission lines could be obtained.

Well-functioning wholesale markets are key

Creating competition by increasing Cross Border Trade is as said earlier a development in the right direction. However, focus should also be placed on the establishment and development of wholesale markets, which are of crucial importance to create transparency and trust in the market mechanisms. In fact, well-functioning wholesale markets are prerequisites for the market as a whole to work. See article on electricity wholesale markets on page 33 for a more detailed discussion. Developed wholesale markets also have effective surveillance means to discover possible abuse of a dominant position by any player. Retail markets also need the efficient pricing mechanisms in the wholesale market to work well.

Strict implementation of existing directives rather than new directives

It is important not to erode the scope of the IEM by new legislation on specific issues, that would exempt certain generation techniques, market sectors or electricity uses from the market, e.g. CHP, energy end-use efficiency,

labelling, Security of Supply, Emissions Trading, Renewables. New support systems should be designed so that they do not distort the function of the IEM.

For the IEM to develop as intended, it is required that the regulatory frameworks on the different markets are harmonised over time. This may not be achievable in the first step, but is critical in the longer term. The idea behind the development of Regional Markets focuses on harmonising wholesale markets. But there are other areas that would benefit from harmonisation too:

- Network regulation
- Supplier switching processes
- Support schemes for renewables (Communication from the Commission expected by October 2005)
- Allocation principles for CO₂ emission allowances

Other rules that need harmonisation in order to facilitate a merger of the national markets into regional markets need to be identified, and the Commission, CEER, national authorities and other actors need to work hard in order to bring the markets together. In this development, the role of the TSOs should not be underestimated. Without the active participation of the TSOs, the desired harmonisation and the development of the IEM will not take place.

Vattenfall is of the opinion that the activities by the EU Institutions regarding the Internal Electricity Market should shift from new legislation interfering with the present rules, to a more powerful implementation and surveillance of the existing rules. The existing directives are sufficient to create the IEM if properly implemented in the member states with an adequate degree of harmonisation.

EU Institutions can, together with the member states, their regulators, TSOs and other players achieve a situation, where

- National/regional monopolies are broken up
- Cross Border Trade takes place based on market mechanisms
- Mature and liquid wholesale markets work
- Investments in new capacity are made and investors feel that the regulations are credible and stable.

Environmental legislation will continue to have a big impact on the electricity market

The EU has taken strong initiatives in various environmental areas. The most obvious example is that the EU has committed itself to taking a leading role in combating climate change. The Lisbon agenda also includes a dimension of environmental sustainability, agreed in Gothenburg in 2001.

The EU is a strong driver of environmental legislation in the Member States. Some 80

per cent of the national legislation in the environmental area is based on decisions taken by EU Institutions. This means that the environmental area is predominant in the EU legislative process. Based on the 6th Environment Action Program, some important initiatives that concern the electricity sector are the following:

- Climate Change, including the Emissions Trading Scheme
- Directive on Environmental Liability
- Thematic strategy Clean Air for Europe (CAFÉ), including
 - review of the Large Combustion Plant Directive
 - launch of a Small Combustion Plant Directive
 - review of the National Emissions Ceilings (NEC) Directive
- Mercury policy
- Thematic strategy on waste prevention and recycling
- Thematic strategy on sustainable use of resources

Do liberalisation and competition meet expectations?

During the past two years, the Nordic retail markets have experienced very high electricity prices, due to a combination of extremely low precipitation and rising energy taxes. Vattenfall believes that electricity prices will remain high in the future as well, even in years of normal precipitation and in so called wet years. That is to say, price levels will of course still fluctuate, but they will do so around a higher average level than experienced in recent years. This will be the result of rising Nordic electricity demand and environmental measures such as emission rights trading beginning to take effect, its very purpose being to increase costs. Seeking explanations and ways to force politicians to counteract the perceived problem of rising electricity costs, public debate has tried to blame the deregulated electricity market for the phenomenon, claiming that producers are abusing dominant positions and network operators are not passing on efficiency gains to consumers. But is it really that simple? We have sought answers in conversation with Professor Richard Green. Professor Green is attached to the University of Hull, and specializes in research of the economics and regulation of the electricity supply industry and other network utilities. He received his degrees in Economics (BA, M.Phil and PhD) from the University of Cambridge. Currently, he is together with Niclas Damsgaard of the Consultancy firm Econ engaged in a research project for the Swedish Center of Business and Policy Studies, evaluating the effects of the liberalisation of the electricity market in Sweden.

Interview with Professor Richard Green, October 6, 2004



Professor Richard Green, expert on economics and regulation in the electricity supply industry.

Professor Richard Green visited Sweden in the beginning of October to participate in an EU wide seminar organised by the Stockholm School of Economics, focusing on the European power market development and liberalisation. Vattenfall met with him to obtain an outside view of a highly experienced academic concerning the present status of European electricity markets.

Vattenfall: Before going into the present events and situation of the European power markets and power industry, I would like to hear your thoughts on the initiation of liberalisation in Europe, or liberalisation process as many prefer to call it. What was the trigger that started it?

Prof. Green: This may sound parochial, but it largely began in the UK in 1990. It started almost by accident - but an accident waiting to happen! The UK Government had previously privatised the telecom sector with the aim to get private investors to contribute to necessary investment in that industry. There was also the view that the Government was not the right party to conduct the business and it would be more efficiently run by the private sector. In addition, the telecom privatisation had proved to be politically very popular with the public. However, the Government had also discovered that the privatisation as such was not always enough - competition was also needed. When the privatisation process had reached the electricity industry the Government was also introducing competition in the sector.

A little later, during 1991, Norway started to deregulate its electricity market. So the topic was also more widely on a general agenda.

Vattenfall: The main driver today in the liberalisation process is without doubt the EU. Their revised directives for electricity and gas markets are valid from the first of July this year. What are the drivers behind the EU's actions in this respect?

Prof. Green: There has been very much of a change in the intellectual climate during the 1990s in favour of deregulatory solutions. Several countries had already before the EU directives moved into a deregulated market framework and had proved it to be beneficial to the society in general. So I believe that the EU has the general view that deregulated markets are the most beneficial way to organise electricity and gas supply in general by delivering low prices through competition and giving the customer possibilities to choose. And they drive the development along these lines quite hard.

Vattenfall: The liberalisation is in many cases done in parallel with privatisation of state owned companies in the energy sector. Do you see these two trends as just “two sides of same coin” or are they independent of each other?

Prof. Green: I don't think that the developments are so strongly linked to each other. You can have liberalisation without privatisation, as long as there are enough independent companies in the industry. Liberalisation is about market rules and structure, not about ownership. However, we learned after the early privatisations in the UK that if you privatise without properly opening the markets, you won't get good results - you are replacing a Government monopoly with a private one. It is of course important that the state owned companies moving into new markets do not have Governmental support for their competitive actions from their home countries putting them into a better position than privately owned companies.

Vattenfall: A debate now and then pops up in Sweden about the number of actors in the power market, i.e. whether there are sufficiently many actors or not for competition to work satisfactorily. Vattenfall around 20 per cent of the generation capacity in the Nordic electricity market, Sydkraft and Fortum about 14 per cent and 7 per cent respectively. How would you like to characterise the number of actors needed for a well-functioning market?

Prof. Green: The question of whether a market is functioning cannot be limited to

the number of companies active there. Furthermore, it is not sufficient to look just at one country in isolation - you must also include cross border trade. In theory, one could very well imagine a country with only one producer but a well functioning market with import coming in there. National markets may look concentrated but can due to the cross border links experience fierce competition and have low prices.

I don't mean that the prices have to be exactly equal in different countries all the time, that type of equilibrium would require investments in cross border transmission that would not pay off in the longer term. As long as prices are reasonably close to each other, as they are in the Nordic area, the framework is working.

Seen from another angle, the down stream integration of generating companies does not necessarily harm the development of competition. It has the advantage of being a “natural hedge” for the power generators, as they are not forced to worry about how the wholesale price develops. The integration would encourage a foreign generating company to move into a country, as they would have their output secured. It is simultaneously protective for the customers securing that they receive their power for the right price. This conclusion assumes that the consumers are mobile. If this precondition of mobile customers does not hold then we have a problem. We have e.g. in the UK seen that the 50 per cent of customers who have not changed supplier pay some 5 per cent to 10 per cent more for their electricity than those who have switched.

The inertia of these customers costs them some £20 more per year each and a question is if some kind of increased price regulation should be used to protect them. However this protection could cause some other costs or distortions eroding the benefits, so there is a delicate balance to nurse.

Vattenfall: Another argument made in the Swedish debate is that the prices should be average prices, not prices based on short-term marginal cost. How would you like to comment on that?

Prof. Green: It is a quite common misunderstanding that prices should reflect average costs. Average prices would be lower than the marginal cost and would therefore stimulate increasing consumption. These additional costs would then not be covered by the price. So the principle would lead to a situation where the society needs to make sacrifices in other areas to pay for those parts of power generation that do not cover their costs. It would usually not be seen as reasonable to subsidise power consumption and sacrifice e.g. education or health care, and would not be an optimal use of resources.

An additional remark needs to be made here as the problem sometimes arises from the fact that the companies are argued to make too high profits. If high prices and low average costs produce windfall profits in an industry there may be a solution in the tax system. For example, a tax on oil companies can be based on the difference between the selling price of oil and the companies' production costs. The companies recover all their costs before they start to pay tax and so it should not affect their production decisions, but the rest of society shares in the extra income from the high prices.

Vattenfall: To keep the focus on Sweden and Vattenfall there are also proposals to split Vattenfall, as the company is so big. What's your view on that type of measures?

Prof. Green: The issue should be seen in the context of market functioning - not related to the size of the company. Large companies are in many cases good for competition, as they have enough resources to introduce more efficient systems, for example within IT. They can afford to spend resources on R&D to develop new products. Large companies are also able to benefit from economics of scale leading to lower prices. If there is a problem with market power, e.g. if Vattenfall could influence prices at NordPool, then a split of the company into smaller entities might prove beneficial. On the retail market, however, it is not so much the size of a company that creates market power as the inertia of consumers. It is by switching between suppliers that the consumers can make their voices heard most efficiently.

A problem with contracts that are not limited in time, like many electricity contracts, is that the customers don't get a reminder about contractual conditions and continue with the same supplier. By contrast, when you get for example your insurance bill you often shop around and check if the conditions you receive are in line with competitors.

Vattenfall: I'd like to move to another topic, the increasing influence of authorities in the electricity sector. In parallel with the market liberalisation there are an increasing number of interventions in the market by authorities, e.g. to curb emissions of green-house gases, to increase the share of renewable energy sources or to enhance energy efficiency. Aren't these different actions in contradiction with the liberalisation efforts?

Prof. Green: No, I don't really see it like that at all! The actions you are mentioning are aimed at protecting the environment. There are many other similar interventions, for example in the area of health and safety in the working place. The market mechanism is usually not effective on its own in dealing with topics such as environmental hazards. The system with "Green Certificates" on the other hand provides incentives for the industry to develop and choose the most efficient technology to reduce emissions of green house gases. The Government sets the long-term direction and goals but leaves it to the industry to decide about what technologies to choose.

Vattenfall: But aren't the different measures overlapping each other? The CO₂ emission trading is starting soon, the Green Certificates aim in the end also to reduce green-house gases. Do we really need both?

Prof. Green: It is questionable if only one of the mechanisms would be enough to do the job. It depends very much on the situation and how the schemes are organised in detail. I would rather see them as two complementary systems.

Vattenfall: When liberalisation was introduced groups of stakeholders had different expectations on what the process would deliver. How do you assess the outcome of the process so far?

Prof. Green: Looking at the UK there have been quite drastic changes. The prices went down by nearly 1/3 and that is of course an impressive achievement. This reflects the fact that the efficiency of the sector has increased. It is important to emphasise that the price reductions have not occurred at the expense of investments in the sector.

A sector that experienced adverse impacts from the reforms was the coal industry. A lot of mines have been closed and the employment has gone down as a consequence. But it has been possible to manage the reductions in manpower through voluntary agreements.

Questions have been raised (in the UK) regarding whether the investments in distribution and transmission networks have been sufficient since liberalisation, as we will be facing large reinvestment needs in the near future for grids built in the 1950s and the 1960s. The Regulator is in the process of amending the regulatory framework to give the companies incentives to carry out sufficient investments.

Prices have recently been rising again as a consequence of rising gas prices. But that has other drivers, mainly the general increase in all fuel prices on the world markets over the last year or so.

Vattenfall: If we look a little ahead from now, what kind of amendment do you envisage to be made in the regulatory framework?

Prof. Green: I believe that the EU will continue along the path they have taken. There will be differences between countries also in future due to the “subsidiarity principle”. Unbundling will perhaps go even further but also integration downstream and across borders. If that reduces costs, or gives a company enough size to be a serious competitor in a market, that could be good. If it goes too far, then the market could become less competitive, particularly if customers don't shop around. New entrants to the market could be frightened off by the perception that integrated incumbents and immobile customers make the market unattractive.

The cross border trade also needs more attention - many national markets need injections from outside to make the competition to really work. It is therefore easy to envisage regional markets like NordPool developing also in other parts of Europe. Relatively small flows of power between countries are often sufficient to make the markets move together. A detail related to this is the handling of imbalances on the different markets. If new entrants cannot balance their positions costeffectively, this will be a barrier to entry. NordPool works well in handling imbalances, and it would be good to see it more widely adopted.

Electricity generation in the future integrated and liberalised energy markets

Typically, generators will say that in a liberalised, well-functioning energy market, investments in new generation capacity will be made when the market provides the right price signals for it. In fact, investments made at the right time can be viewed as an indicator for whether markets are functioning as intended. As long as supply suffices to meet demand, prices are unlikely to reach required levels for a sustained period of time (which is necessary for investments to take place).

This is also Vattenfall's position. But when will the moment for investment arrive? Is it likely to appear instantly, or will it be a gradual process?

Generators of course are companies owned and operated by human beings. We all have different views on expected future demand and supply, future price levels, what risks we are comfortable taking and what returns we require on our investments. This explains why investments occasionally are made by some generators, while others insist that prices are still too low to generate required returns and prefer to wait. Vattenfall's views regarding expected future supply and demand are outlined in Part 2 of this report.

In addition, viewed from the present, the right moment or the right price for investment are veiled behind a cloud of uncertainty. In fact, expected prices are something of a moving target, subject to influence by a number of different and sometimes interacting factors, including investments made by other generators. Because of this, one should not expect the "moment of investment" to be a single point in time. Rather, it is likely to stretch over years.

Much of the uncertainty which influences future market prices can be assessed based on historic experience. This includes factors such as demand development, and availability of existing capacity. Others are impossible to predict, such as for example political or regulatory measures that may be introduced in the future. Any investment in new capacity involves taking risks regarding beliefs about the future, and depending on how vulnerable generators are to those risks, they can be expected to be more or less cautious about taking them. Only when reasonably comfortable that both capital and operating costs of the new plant can be covered at expected price levels, will a generator decide to make an investment.

The development of generation capacity is not expected to follow traditional patterns in the future. Prior to liberalisation, capacity expansion was a matter of planning, based on forecast demand development, available supply, and sometimes political preferences for certain types of generation, such as for example nuclear energy in the aftermath of the oil crises of the 1970s. In a liberalised market, capacity expansion is the result of market price signals, and the economic attractiveness of various types of capacity. The presence of market forces, in combination with environmental and other politically driven initiatives, will heavily influence what type of plants are built, where and when. In many areas, higher wholesale price levels are required to warrant economic investment in new capacity, in others, the legal and regulatory frameworks need to mature and stabilise before investments can be considered. In particular, it is safe to assume that it is first when the effects of new fiscal and environmental legislative measures have filtered through to the wholesale markets and been properly understood that investors will feel safe to initiate new projects.

But effects may not always correspond to expectations, mainly because the processes affected are complex and not all consequences can be foreseen.

In connection with the introduction of the Emissions Trading Directive, there has been much debate about the economic benefits for generators who possess non-CO₂ capacity (such as hydropower, or nuclear energy). Because these plants do not have to pay for emission rights, the only effect on them of the higher prices resulting from the ETS will be increased profits. This is perceived, by some, as unfair. Before we dismiss it as such however, there are a few things we need to consider:

1. The ETS is intended as a means to steer investments towards low-CO₂ alternatives. The idea is to make high-CO₂ alternatives less economically attractive, by means of market forces. With emission allowances becoming increasingly scarce, the price for them will rise and thus the costs for emitting CO₂ will increase. In this way, the general price level for electricity will also rise, thus creating "room" for higher cost alternatives.
2. In effect, the demand side is forced to finance the transition towards environmentally more benign fuels (via higher prices). If costs become too high, consumers can elect to cut back consumption. A particular problem here is that some consumers consist of energy-intensive industries, themselves exposed to world market prices for their products, and potentially unable to compete on the basis of higher electricity costs.
3. One alternative to this sort of market-based steering mechanism to achieve environmental objectives is to use subsidies. The problem with subsidies is that they are economically less efficient, and more of a burden on the public purse, since they require continuous hand-outs to technologies which are, at present, unable to survive on their own merits. There is also a risk that subsidies might be indiscriminate, i.e. unintentionally awarded to plant owners that do not really need them. This could be the effect, for example, of problems in fairly defining in detail which plants need the subsidy and which do not, without making legislation overly complex. Subsidies would also remove incentives to economically improve the generation technologies concerned. A second alternative, which is also used, is taxation. This is effective in raising the cost of certain types of generation, but equally blunt as instrument in steering towards renewables.

In the article below, we discuss where investment in new European capacity will be needed in the future, and also the determinants of what types of technologies are chosen, and where.

- New capacity will be required in Europe during the next decade, both replacement and new build
- The choice of fuel/technology will depend on economic attractiveness, which may be different in different countries, and national preferences
- Four key criteria determine whether markets are attractive from a capacity investment perspective
- Security of supply depends on finding market based solutions for making reserve capacity available

Electricity Generation in the Integrated Energy Market

Expected development of installed capacity in Europe

There is a strong political desire to further the use of renewable energy in Europe. However, biomass availability is too low in relation to demand, and for wind-, solar- and hydro powered alternatives there are obstacles in the form of lack of suitable sites (adequate wind conditions, adequately strong solar radiation, sufficient flow of water). These obstacles make it extremely difficult to reach the political goal of replacing and increasing current capacity with renewable energy. The share of renewable generation is expected to increase slowly but remains relatively small in proportion to total generation, but this depends on national policies.

At the expected future growth rate of electricity consumption, a large amount of new capacity will be required from around 2010. Should natural gas and coal prices fall from their presently very high levels, this new capacity is expected to be mostly coal and/or gas fired. The price of emission rights is expected to rise, and the cost will be reflected in the wholesale price. Investors however are likely to remain cautious.

Although coal prices have risen to very high levels after decades of low and stable devel-

Elsa Widding, Group Function Strategies

opment, coal is currently the most competitive alternative for new base load production. This is due to the fact that gas prices, being linked to oil prices, have risen even more. As a result it is not until 2010-2012, when CO₂ allowance prices are expected to have risen significantly, that coal fired generation begins to lose competitiveness against gas in some countries.

The contributions of nuclear power to meeting energy demand in Vattenfall's core markets are expected to decline in the future. This is due to political decisions in both Germany and Sweden to gradually phase out capacity. In Sweden, the second Barsebäck reactor will be decommissioned in 2005.

However, as there is still no satisfactory solution to how to replace nuclear power without augmenting the global climate change problem, public opinion may be shifting again in favour of retaining or even expanding nuclear power. Several countries, e.g. Finland and France, are already contemplating or even planning for this.

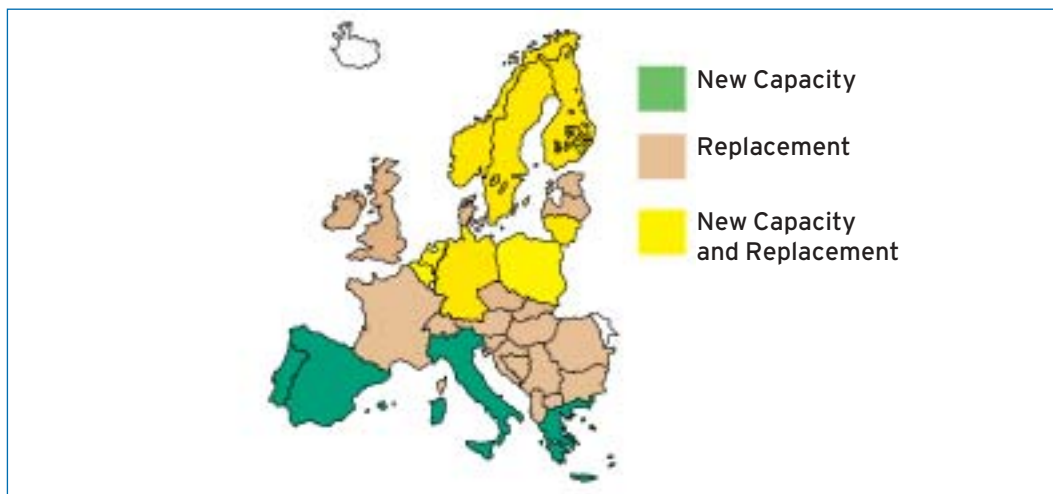
In many European countries, replacement of large amounts of existing capacity, both fossil fired and nuclear, is foreseen within the next ten years. New capacity will most likely

enter the markets either as replacement of existing capacity or as new capacity. In the non-EU Eastern European countries where the capacity is subsidised by the government, it is likely that large investments will be undertaken later than in countries such as Poland and the Czech Republic. Poland will have to adjust to the EU Large Combustion Plant Directive. Retrofitting with equipment such as flue-gas desulphurisation and low-NO_x burners will lead to decreased efficiencies and increased operating costs.

As a result of the ongoing economic development of the country, energy demand is expected to rise rapidly. In combination with the large replacement needs of old capacity, this is expected to lead to a large amount of investment in modern technology.

The Mediterranean countries (Italy, Spain and Greece) are expected to experience the highest demand growth rates in Europe, resulting in large needs for new capacity.

Figure 5: Expected long-term investments in generation capacity



The fuel perspective in various countries

Despite the political debate on whether or how to reduce fossil fired capacity in Europe each country will to a large extent implement the EU requirements in consideration of national conditions. In Germany for example, 20,000 MW of nuclear capacity will have to be replaced. Another 20,000 MW of capacity will have to be phased out up to 2020 due to old age. The National Allocation Plan (NAP) of CO₂ emissions is based on historical emissions and recognizes the emission levels of new capacities. It is expected that the current fuel mix, largely based on domestic fuels such as lignite and hard coal, will be retained. New and replacement capacity can thus be expected, in most cases, to be either coal or lignite fired.

In other countries with good access to indigenous or low cost natural gas, this fuel is favoured over others, offering the added

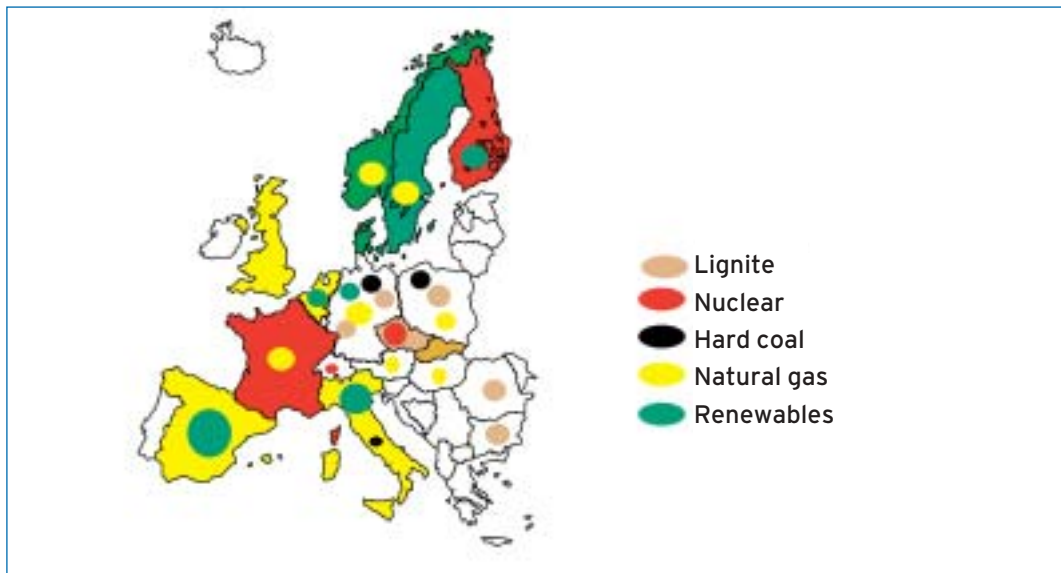
advantage of emitting less CO₂ than coal and oil. The Netherlands, UK and Belgium are examples of countries favouring the use of natural gas. Nuclear remains the technology of choice in only two countries, France and Finland. Figure 6 indicates which energy sources are likely to be preferred in different countries.

In the Nordic region, it is expected that existing capacity will suffice to meet base load demand throughout the next ten years. Wholesale price levels in the Nordic region, despite having risen in relation to earlier years due to low rainfall, are thus expected to remain, on a relative basis, among the lowest in Europe. At these price levels, new capacity will not be profitable without subsidies. Additional capacity will enter the market only as a result of political decisions to increase the amount of renewable capacity. From an investment perspective, the Nordic market

is considered as high risk due to the sensitivity of the system marginal cost to water availability. In years with high water avail-

ability (wet years) the wholesale price can fall dramatically.

Figure 6: Preferable fuels for new capacity. Shading indicates political preferences regarding types of power generation capacity. Unshaded countries are open to several types, depending on economic attractiveness.



The market perspective

All European markets are undergoing a period of market reform due to EU directives, and since many investments will take place during a transition period, a main prerequisite for any investor is to fully understand the price setting market mechanism not only today but also tomorrow and in the long-term future. This means that investment evaluations in generation need to be based on how existing plants and new plants are expected to be run in the future. For investment in new generation, a number of factors are crucial for determining the market attractiveness:

- A growing supply deficit due to expected demand growth or decommissioning
- Expected long-term average wholesale market prices above the full cost of new capacity
- Existence of a transparent and liquid wholesale market price
- Stability in the political and legal structure.

Obstacles for new investments

Prior to liberalisation of the electricity systems, generators were guaranteed

full cost recovery, as all costs could be passed through to customers. A large amount of surplus capacity was kept in order to ensure security of supply.

In a liberalized, competitive market with many players, the wholesale price is always under pressure. This forces generators to cut costs and increase efficiency as much as they can, in order not to be squeezed out of the market by their competitors. However, if too much capacity is shut down due to competition, a security of supply risk could arise instead, as there is no surplus capacity left to be used for regulation purposes. There are, simply put, no incentives for the generator to maintain capacity with low utilisation and high cost. As a consequence, much of the European surplus generation capacity is slowly being decommissioned for purely economic reasons. In specific regional markets (especially with high portions of hydro power) it may be useful to establish a separate market based solution for capacity, allowing old plant to be held on reserve and used only to cover peak demand while still achieving adequate cost recovery, is required.

Wholesale Energy Markets

What are wholesale markets?

Wholesale markets exist for many different products, and different reasons. In some cases, they are the link between producers of certain raw materials, and manufacturers who use these raw materials in producing other goods. In others, (e.g. electricity) they are the link between producers and consumers, via retailers who purchase electricity on an open market.

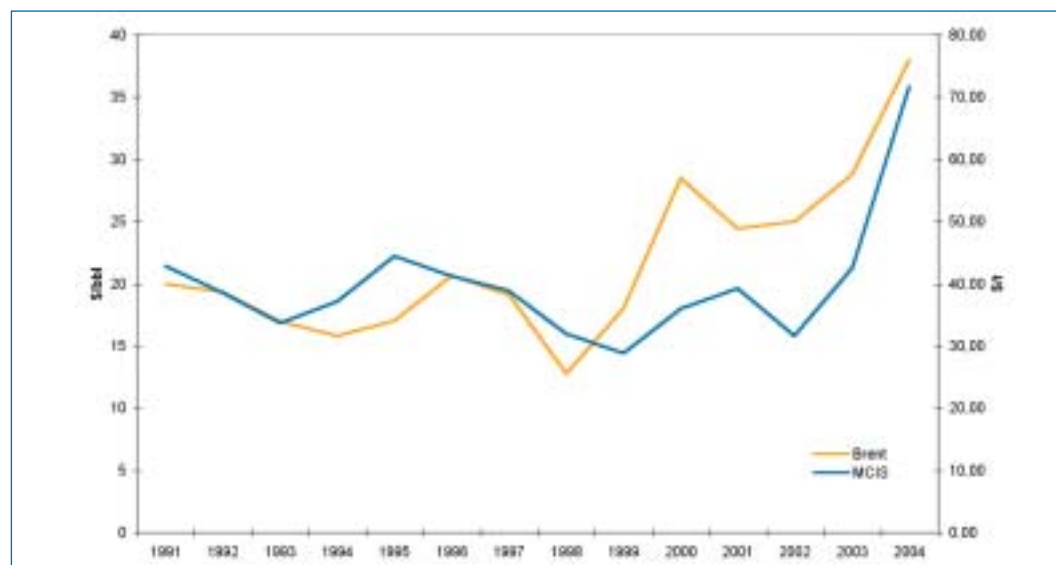
Wholesale markets are based on the physical trade of an underlying commodity, such as electricity, crude oil, or gold. Physical trade involves the actual exchange of goods for cash. In addition to the physical wholesale market, there may be a financial (also called paper) market. Here trading never or rarely results in the physical delivery of the underlying commodity. Financial markets exist for hedging purposes.

Many goods are traded on wholesale exchanges. Wholesale exchanges are anonymous markets where buyers and sellers meet and trade standardised contracts via the exchange without ever knowing who the counterparty behind the transaction is. But wholesale markets can consist of a group of market participants in regular telephone contact with each other, trading contracts which are tailored to individual needs. These markets are called OTC (over the counter) markets.

Wholesale markets for energy

Fuel prices are important for the electricity market through their direct and indirect influences on electricity generation costs. The wholesale markets on which these fuels are traded are different, depending on the underlying characteristics of the fuel, where and how it is produced, what form it has (liquid, solid, or gaseous), the number of market participants and frequency of trades, how it is transported, and whether and how it can be stored. They also differ in terms of maturity and sophistication. Most importantly, prices on these wholesale markets do not necessarily move in parallel, since the factors that influence supply and demand are not linked.

Figure 7: Coal and Crude prices



Source: BP Amoco, The McCloskey Group

World market prices on fossil fuels have recently risen to unprecedented levels. This is due to several factors that work in conjunction, not least the current shortage of transport capacity, rising world energy demand and global political developments. High fossil fuel prices cause electricity prices to rise, as fossil fired plants tend to be the marginal cost capacity, both on the Continent and in the Nordic system.

Coal

Coal is produced globally. Main producing areas of relevance for the international market are the USA, Colombia, Russia, South Africa, China, Indonesia and Australia. In these areas, hard coal is produced with large economies of scale. Mines in Germany, the UK and elsewhere in Europe have been unable to produce profitably unsubsidised at these low cost levels, which is why most have ceased production.

Physical trade of hard coal takes place bilaterally on a world market. It is a relatively small and illiquid market with few participants. Financial products are also traded OTC - there is no exchange for coal or coal products.

Lignite is usually mined in open cast mines and converted to electricity in close vicinity to the mine, as transport costs for this fuel, which has a low energy content, would be prohibitive. In many cases, lignite mines are integrated with lignite fired power plants, so there is no actual market place, or reference price, for lignite.

Hard coal prices have been fairly stable for many years, but risen substantially during the last year. This is due to a supply/demand imbalance as well as high transport costs. Transport costs have risen both as a result of high oil prices and a shortage of shipping capacity, which has caused freight rates to increase. It is reasonable to expect that when coal supply catches up with demand (via increased levels of production) and transport costs normalise, coal prices will revert back to previous levels. There is no shortage of resources to mine, and a long-term trend of decreasing real terms prices is likely. As coal is one of the most important power generation fuels, and usually the marginal cost capacity in the merit order, its influence on electricity prices is significant. This applies both for Germany and for NordPool.

Crude Oil

Crude oil, as well as oil products, are traded on exchanges and via telephone markets around the world, both physically and financially. It is a very sophisticated and liquid market.

Crude oil prices are currently high due to a combination of political instability in the Middle East, strong global demand growth, primarily in South East Asia and in the USA, and low world oil surplus production capacity. OPEC has over the last few years been successful in managing its production quota in order to influence the crude oil price, but more recently, marginal increases in production levels have failed to stabilise oil prices, as political instability influences supply concerns more than actual production levels. In the medium to long term, the market share of the OPEC countries will grow as production from non-OPEC countries continues to decline. More production can conceivably be made available in the short run, but few very large discoveries remain to be made. This means that in the longer term, it is likely that the world will have to get used to higher oil prices. Crude oil prices influence the price of electricity indirectly via natural gas prices.

Natural Gas

In continental Europe, natural gas has traditionally been purchased on very long-term contracts, often spanning 20 years or more, with prices indexed to oil products. Gas prices thus trail oil prices very closely, although there is usually a time lag, which is due to the fact that the gas price is indexed to an average of historical oil prices that prevailed during a period prior to the relevant gas pricing period. Contractual gas prices thus show less volatility than oil prices, as oil price fluctuations are smoothed out over defined periods.

The traditional logic behind the oil price link is that natural gas competes with oil, the primary alternative in most applications. If gas buyers can be sure that the gas price stays competitive with oil, they are able to sign gas purchase agreements in which they essentially commit to take and pay for a certain volume of gas over a long period of time. This in turn is a requirement for the producer to be able to finance the upfront capital investments necessary to develop gas resources. Natural gas as a price driver is only relevant in Benelux and for the peak in Germany.

Electricity

Electricity too is traded on wholesale markets, although the element of competition was introduced not too long ago. Wholesale markets for electricity emerged with the introduction of liberalisation, as a means to increase the amount of market players able to participate in the market. However, long before, exchange of power took place between generators, in order to optimise the operation of the system. This could be described as an early stage of wholesale markets.

The power “exchange” that took place within Nordel between the Nordic generators can be seen as an early form of wholesale market. Generators would declare the cost of marginal production to each other, i.e. the cost associated with producing the last kWh needed to supply their own customers. This kWh was of course produced in the most expensive plant of the individual generator, a plant that was capable of being “regulated up and down”, i.e. run at different capacities. If another producer had a marginal plant with lower cost, a trade would take place between the two, whereby the more expensive generator bought power from the less expensive one, at a price equal to the average of the two marginal costs. This ensured that marginal plant was taken into operation in the most economic order, and that as few plants as possible (only the last and most expensive one in the system) was run at less than full capacity. In other words, the trading model made it possible to optimise the use of hydropower in the entire Nordic system.

In other parts of Europe such exchanges also took place before liberalisation, for example the trade between the Swiss and Austrian hydro systems and Germany. There were, however, important differences between the Nordic area and Continental Europe. Nordel had a combination of technical and commercial rules to govern how the exchange of power should be handled, but in the UCTE area there were only technical rules. These early trading rules between the Nordic generators are a probable reason explaining why the development into today’s Nord-Pool went so smoothly.

Generators and the wholesale market

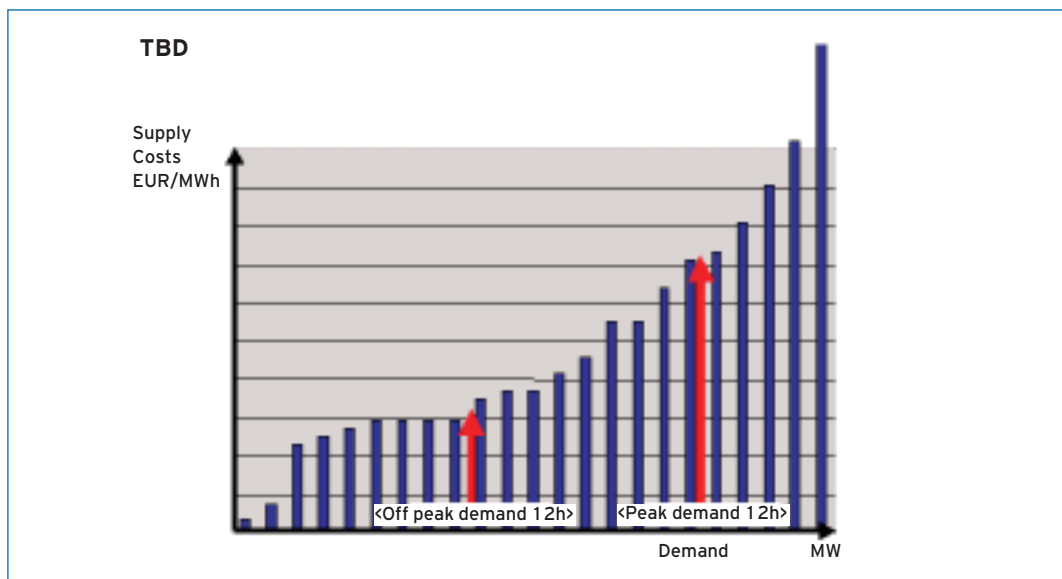
In a functioning electricity market it is the marginal cost that sets the price in the system. Economists differentiate between long run marginal cost (LRMC) and short run marginal cost (SRMC).

The merit order curve (Figure 8) lists capacity, from left to right, in order of short run marginal cost. The wholesale price is set at the point on the merit order curve where supply intersects with demand, i.e. at the short-term cost of the last kWh produced at any time. This is entirely logical if we consider the incentives of an individual plant owner to run his plant. An existing plant has two kinds of cost, fixed cost (consisting mostly of capital cost) which exists regardless of whether the plant is operated (dispatched) or not, and variable cost, which is incurred only when the plant is run. In order for a plant owner to allow his plant to be dispatched, the expected price must at least cover variable cost. If it does not, the plant owner would incur a loss for every kWh produced, and receive nothing to cover fixed costs. The marginal cost is thus, in the short run, equal to variable cost, hence the term short run marginal cost. Prices above variable cost also contribute to covering fixed cost. This means that the more hours of utilisation a plant has when prices exceed variable cost, the more of fixed cost will be recovered.

Under ideal conditions, full cost recovery can be achieved. If a plant fails to contribute to covering fixed cost over a longer period of time (for example because the plant is old and has high variable cost due to low efficiency), the plant owner is likely to consider shut-down. In the long term however (usually defined as 10 years or more), new capacity may be needed to cover demand, if demand is growing, or old uneconomical capacity is phased out. Needless to say, no one would invest at price levels that only cover the variable cost of a new plant. For investment to take place, the expected average price over time must cover the full cost, variable and fixed, of the new plant, including a return on the investment, and the plant must have a variable cost low enough to ensure it achieves a high utilisation. Thus the long run marginal cost equals the full cost of the lowest cost type of new generation capacity. As a result, it is first when plant with a short run marginal cost equal to or above the long run marginal cost is used frequently enough to set the average price level that new investment will occur. Here the long-term prices on the wholesale market can serve as an indicator for investment planning.

The dispatching of plant takes place according to the following principles. Generators will bid in their respective capacities into the market to maximise the likelihood of achieving high rates of utilisation. Under perfect competition, these bids will be equal to variable cost. During off-peak periods when demand is at its lowest (usually during the night), only power plants with low variable cost will set the price. In the peak period, when demand is at its highest, more costly power plants will set the price. Thus spot price levels vary with every hour of the day, and with the seasons and weather conditions.

Figure 8: Generic merit order curve



Most types of new capacity require very long utilisation times to cover their fixed costs. Typically they need to run in base load, i.e. for more than 8,000 hours per year (i.e. close to 100 per cent utilisation, allowing only for maintenance shut-down). New plant which have lower variable cost than existing plant will enter the merit order from the left, run in base load, and push all existing capacity in the system to the right. Investments in plant with variable cost higher than the (base load) marginal cost in the system are unlikely to take place, unless they are subsidised; since they cannot, on their own merits, achieve profitability. For an investment in generation capacity to be profitable, it is crucial for the plant to achieve sufficient utilisation. Peak load plants are usually old plant with low capital costs, where utilisation levels are less crucial for achieving profitability.

Consumers and the wholesale market

Most electricity users are obviously small and buy their electricity from an electricity supplier, such as for example Vattenfall. Consumers buy electricity based on an agreement with the supplier with certain contract terms, such as fixed price over a year, or variable price tied to an average monthly spot market price. The supplier then purchases the volumes required to meet the needs of his customers on the wholesale market. He is thus directly exposed to hourly variations in the purchase price, while receiving sales prices that are stable over a month or even years. This means that the retailer absorbs some of the price risk of the consumer.

Without an electricity supplier, the electricity consumer would (in theory) have to trade on his own behalf on the exchange, which could be complicated, expensive and risky. Certain minimum volumes and financial securities are also needed for being allowed to trade on the exchange. These services are performed by the retailer on behalf of the consumer. In addition, the consumer's total cost will include electricity taxes, network charges and VAT.

In the following article, the topic of electricity wholesale markets, their role and function, is explored more in-depth. We conclude that the development of wholesale markets is essential for the success of EU electricity and gas market liberalisation and the IEM concept. Wholesale markets are a prerequisite for competition on retail markets where customers have the right to freely choose supplier. The current development of wholesale markets is promising but more co-operation will be needed between the EU Commission, member states, regulators, transmission system operators and market actors to guarantee success.

Electricity Wholesale Markets

Gunnar Lundberg, Group Function Strategies

Wholesale trading is the heart of a well-functioning electricity market. In fact, it is the essence of liberalisation. Without liquid wholesale markets and reliable price formation, liberalisation would be meaningless from a consumer perspective. If wholesale markets do not work, the benefits for both large and small retail customers of switching their supplier will be close to zero.

Wholesale markets after liberalisation

There are different models for electricity market liberalisation in different parts of the world. In the Nordic area, wholesale competition and retail competition were introduced in parallel, along with very light-handed regulation. An integrated Nordic market was created, in order to limit the dominance of strong national players such as Vattenfall in Sweden and Statkraft in Norway. NordPool was set up as the Nordic electricity exchange

owned by the Norwegian and the Swedish transmission system operators (TSOs).

In the UK, retail competition was introduced at the same time as wholesale competition. Liberalisation started with the breaking up of the Central Electricity Generation Board into three generation companies, Powergen, National Power and British Energy, and 12 regional electricity companies, RECs. A transmission grid company was established and a power pool was set up into which all generators had to bid their power at marginal cost. However, since it was no auction where the demand side has an influence on the price as well, the system was susceptible to manipulation by the large generators, who conveniently played it to produce high pool purchase prices. For this reason, the original Pool was replaced by NETA (New Electricity Trading Arrangement), a system more akin to Nord-Pool, in 2001.

In the European Union, the European Commission is driving liberalisation via the so-called Electricity and Gas Directives. The directives set rules for retail competition, cross border trade and for regulatory authorities. Development of wholesale markets is left to the market itself. In a strategy paper by the Commission the concept of regional markets across Europe is introduced. The idea is that within such a regional markets there shall be harmonised rules to facilitate wholesale trading.

Electricity exchanges have been set up on many markets in Europe. In many cases these markets are too small to provide a sufficient turnover for the exchange to cover costs for IT systems, etc. A consolidation of exchanges is required. There is no need for more than one spot market within one regional market, prices will still vary between different locations. The goal should be to achieve a minimum spot market volume of 10–20 per cent of physical consumption. In a second step a further concentration of market places for trading in financial contracts (see below) can be made.

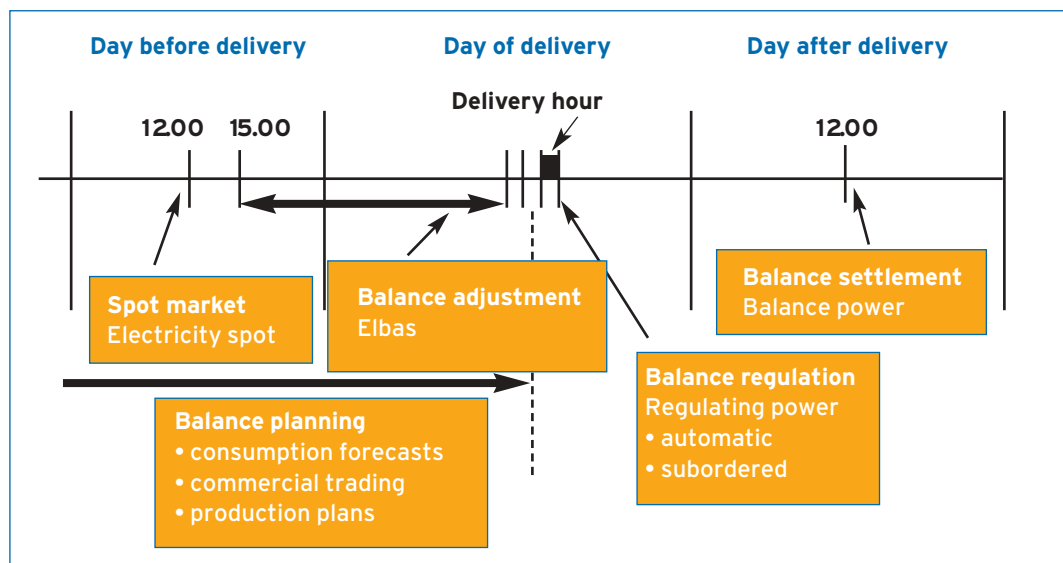
Generally speaking, market participants are interested in having a transparent trading platform with high liquidity, a high number

of players and therefore lower transaction costs. Competition between several small exchanges might end up in lower volumes for each. This was one reason for merging the two German power exchanges in 2002.

Prerequisites for a well-functioning wholesale market

The transmission system (400–200 kV) plays an important role for the market to function well. First of all, there must be access to the network and the rules of access must be transparent and known in advance. If more than one transmission system is involved, certain rules must be harmonised between them, and there must be clear and transparent rules for transfer of power between them. There will always be congested sections within a transmission system or between different systems. The management of such congestions – often called bottlenecks – must be handled in a transparent, fair and harmonised way so that all market actors are treated the same. To connect national markets into larger regional markets more interconnection capacity is needed. For competition to work properly, network congestion must not be too frequent or widespread. The fact that wind power due to its irregular production patterns demands huge amounts of extra transmission capacity needs to be kept in mind.

Figure 9: Time table for trading and balance



A wholesale market needs a large **number of market participants**. Otherwise competition and credibility will be limited as the market power of individual actors and thus the risk of abuse of dominant position arises.

The wholesale market also needs **liquidity** to be trustworthy, since too few transactions or too small a volume traded on the market in relation to total consumption would not produce a representative market price. Liquidity or turnover can be measured in different ways. An often used measure is to relate market turnover to the electricity consumption. For a spot market to have adequate liquidity, the majority of experts claim that the traded volume has to be at least 10-20 per cent of total electricity consumption in the relevant region. In existing wholesale markets the bid-ask spread is an important indicator for liquidity. For a well functioning financial market the traded volume is often many times higher than consumption. The turnover on NordPool's financial market is normally 10 times consumption and on the US gas market more than 100 times consumption. Liquidity is typically higher for contracts in the near future and lower for contracts say three years in the future. The ability of markets to provide price signals to investors would be better if liquidity in such longer-term contracts would increase.

Clearing of counterparty risks has proven to boost liquidity. A clearing function is essential to attract also financial actors to the market. This applies to the OTC market as well.

Last, but not least, **market information** must be available to all market participants to provide transparency and reduce market uncertainty. A definition of which market information that needs to be made available can be stipulated by the electricity exchange or specified in legislation. Examples of such market information are hydro reservoir levels and maintenance schedules of power stations and transmission lines. Undertakings of unplanned maintenance should be notified immediately before positions in the market are taken.

Functionality of wholesale markets

A wholesale electricity market consists of the physical spot market (normally day-ahead), standardised financial markets (futures and forwards contracts, options) and the balance market (to adjust imbalances between predicted and actual supply and demand). The OTC market and bilateral trade between the market actors are also parts of the wholesale market. The trade in regulation power taking place between transmission system operators and generators to keep the frequency at 50 Hz can also be regarded as part of wholesale markets, as well as other markets for trade closer to the operating hour than the day-ahead market. Sales from power suppliers to industrial, commercial and household customers, i.e. end users, take place on the Retail market.

The spot market

The spot market is the term we use for trade in physical wholesale power. Spot trading refers to the act of making physical volumes of power available within the next period of trading (in the case of electricity, usually the next 24 hours), in exchange for cash payment. Spot trading can take place on an organised exchange, where the transparent spot market price, which acts as a reference price for all trade, is set. The spot price is based on bids for supply and demand. On NordPool and some other markets, these bids are submitted on the day before the power is actually generated, sold and consumed. That is why the market is called a day-ahead market. Spot trading can also take place on the OTC (over the counter) market. The OTC market is different from the organised exchange in that it is based on bilateral agreements between sellers and buyers, where the individual parties are known to each other. This has the advantage of providing the means for tailoring contracts to the needs of the contract parties. The disadvantage is that the reference price will not be as transparent as on an exchange and thus less trustworthy.

As price differences between the markets would lead to arbitrage opportunities both places provide nearly the same prices, but power prices and turnover at the exchange are officially and published every day.

This transparency is the outstanding benefit of trading on the exchange. The daily spot prices serve as a reference price for the whole market and at the same time provide the underlying price for the financial market.

The financial market

The financial market can be operated by a physical power exchange such as Nordpool or by the OTC market. The products on a financial market are standardised contracts. Futures and forward contracts are agreements between a seller and buyer about delivery of an agreed volume at a certain price at a specific time in the future. Settlement of futures contracts involves both a daily mark-to-market settlement and a final spot reference cash settlement, after the contract reaches its due. Mark-to-market means that every day, buyer and seller check how much the agreed futures price deviates from the spot price, and split the difference between them. Futures contracts rarely expire into physical delivery, they are only a means to hedge price exposure. For forwards there is no daily mark-to-market settlement and physical delivery does take place at maturity.

On NordPool, futures are traded up to one year in advance, forwards up to four years. The counterparty is NordPool Clearing, an institution that guarantees the fulfilment of traded contracts. On other markets too it is gradually becoming possible to trade in such financial contracts. For example, the Leipzig power exchange, EEX, has also introduced a clearing function which has increased liquidity on the EEX.

Options is another product offered on the financial market. An option is an insurance against high or low prices. It provides the right but not the obligation to buy or sell a product in the future at a price agreed today. The buyer of an option is paying a charge to reduce his risk. The seller of an option is receiving this charge as compensation for assuming the risk.

Contracts on the financial market can be traded many times over during the contract period. That is why the turnover on the financial market is typically many times higher than the physical consumption of electricity.

Consumer Markets

Retail market prices reflect wholesale market price levels, but in order to shield consumers from the need to make risky decisions on a daily basis, retail electricity supply has been packaged and simplified into products and services that allow the customer to choose between preferred levels of risk exposure, contract intervals, etc.

From a customer perspective however, electricity supply is not just a question of choosing the right contract. The energy price constitutes but one of three parts of the total cost of electricity. Other charges include those for network services and taxes. In Sweden, customers that have chosen a supplier different than their network operator cannot avoid receiving two separate bills.

A public misconception often seems to be that electricity prices should correspond to the variable cost of individual producers, since capital costs have been recovered long ago. This is not a reasonable expectation, and would have adverse consequences. Market prices are set on an auction-based power exchange, and as such based on marginal cost, i.e. the wholesale price will always reflect the variable cost of the last (most expensive) plant required to meet demand at any one time, regardless of the cost of other, less expensive plant. This pricing mechanism has been defined by economic theory and experience to be the best way to ensure that generation plant is utilised in the most effective order. If market prices were instead based on variable cost of the least expensive plant in the system, more expensive marginal plant would not be made available and supply would not suffice to meet demand.

Retail markets vary significantly between countries, both in terms of structure and in terms of consumer behaviour. The market realities experienced therefore also vary between countries. What is perceived as unsatisfactory by consumers in one country may not matter to consumers elsewhere.

It may not be possible to transfer marketing concepts, products and services, or market knowledge and experience, between countries without significant adaptation to local conditions.

Vattenfall's electricity customers consist of both small and large energy consumers. Large (industrial) energy consumers differ from small ones not only in terms of the volumes they consume, but also in terms of purchasing behaviour and requirements. Since energy often forms a large part of their overall costs, their competitiveness is vulnerable to price volatility. For this reason they focus very hard on keeping costs stable, and may purchase services such as portfolio handling or risk management products as well. Because there are so few large customers, and they consume very large volumes, Vattenfall can afford to offer them specialised, tailor made services to meet their needs.

For our many small customers, both households and commercial enterprises, we are working with different solutions. They are offered standardised products, which can be both fixed price (to reduce variability and risk) or variable price (if the customer wants the price to follow the market). We have introduced customer service centres and interactive websites in order to meet our customers in a way that we hope will be convenient and satisfactory for them and cost-efficient for us. The fact that we in Sweden have to rely on external data from network operators in billing our electricity customers continued to create problems, but - for us as well as our competitors. The work aimed at finding solutions to remedy these problems in a way that is satisfactory to our customers is ongoing.

In order to describe how Vattenfall is working to meet customer needs, we have included some examples in the article below.

Number One for the Customer

Vattenfall takes its customers and their problems seriously and works hard to remedy them.

The entire electricity industry in Sweden has recently suffered from reduced customer satisfaction. The same phenomenon has been observed for example in the UK, another market which has been liberalised and where all customers, including households, have been able to switch their supplier, for some time. As such, it may thus be a phenomenon which is related to market maturity, but market structure (i.e. unbundling of networks and sales), is also likely to have played a role in this. Simply put, the industry has had to struggle to set up the right processes and systems to allow efficient and smooth customer switching, metering and billing as it now involves a transfer of data between separate companies. This is of course no excuse, but an identification of where the problems originate. The important thing now is what is done to solve the problem.

Monica Karlsson, No 1 for the Customer

In the Nordic area, there has been evidence that customers have experienced poor service, for example difficulty to access customer service centres, incorrect invoices, invoices that are difficult to understand, upfront payments based on estimated consumption and problems when switching electricity suppliers. But dissatisfaction is based on other factors as well.

Analysis shows that there are four main reasons why our customers, in particular in Sweden, have not been fully satisfied:

- a) End-user electricity prices have not decreased perceptibly after liberalisation. Rather, they have increased. In the Nordic area, this is partly due to weather - too little rain has reduced the dam levels, leading to less hydroelectric power being produced. In addition, consumers are paying higher electricity taxes than before regulation.

- b) In Sweden, the interest in switching suppliers is considerable, but it is difficult and takes too long.
- c) Customers often do not fully understand the difference between the two main products of the utilities: network services and electricity, which are sold separately.
- d) Many customers find electricity bills complicated, and do not understand how they are calculated.

The industry is working hard to improve customer relations and to make it easier for our customers to understand our business, and our bills. Efforts are being made to facilitate the switching of electricity suppliers.

At the end of 2002, Vattenfall launched an ambitious programme called "Number One for the Customer" with the purpose of building trust and improving customer confidence in our business in all our core markets.

At the centre of this initiative is the installation of remotely readable meters. With Remote readers that automatically and continuously update the database for meter reading it makes it possible to invoice customers on the basis of actual, rather than anticipated, consumption. The resulting "exact invoices" will be easier to understand and allow improved control over own electricity consumption. This makes prepayment and settlement obsolete and the customer obtains a clearer and simpler electricity bill.

More than 50,000 meters have already been installed. By 2009, all of Vattenfall's Swedish and Finnish network customers will have automatic meter reading.

Other elements of the Number One for the Customer programme include the introduction of supplier guarantees, interruption guarantees, all inclusive flat rate tariffs, and the introduction of a customer ombudsman. The customer ombudsman is a novel feature, which has previously been successfully implemented by the Swedish insurance industry. The role of the customer ombudsman is to defend customer interests internally and

ensure that their complaints are treated in a reasonable, responsible and fair manner. Vattenfall hopes that the rest of the industry will follow and implement similar functions within their organisations.

In addition, Vattenfall has initiated and recently taken active part in an industry wide effort with the objective of improving customers' trust in the industry. It comprises for example suggestions for new regulation, improvement of the information flow between actors and standardisation of customer and invoice information.

As many other actors within the industry, Vattenfall is now concentrating efforts to modernise and upgrade billing and customer management systems in all four countries. New systems will help us offer our customers timely, reliable and qualitative services. The implementation has reached varying stages in the different markets due to differences in time schedules and decision-making processes.

Additional measures on all markets are being taken to meet customers' demands for simplicity, empathy and reliability.

Despite the fact that the actual price of electricity only constitutes a minor part of most consumers' total cost for energy, the energy market has a significant focus on price as the only element of total energy cost that can be influenced. Offering competitive prices and products meeting real customer needs is thus as essential to improving customer satisfaction as it is to retaining existing customers and attracting new ones.

Conclusion

The liberalised electricity market is still at an early stage and both consumers and suppliers are still learning how to deal with the new market situation. Consumers have to inform themselves about prices and contracts to an extent that was previously unnecessary, and suppliers have to get used to the concept of meeting customer needs rather than just supplying electricity. This process is expected to continue, until all parties have found the right balance between customer needs, supply security, service costs and efficiency.

As an active participant on the liberalised European energy market, Vattenfall believes that it is important to continuously follow and assess the progress of competition and integration. Liberalisation is a gradual and iterative process, no one yet knows all the details of how a well-functioning market

should be organised. All market participants, consumers, distributors and producers alike, have a responsibility to participate in working toward a market which works satisfactorily for all stakeholders.

The supply of electricity is an important part of the European economy. To be able to make a significant contribution to Europe's competitiveness, continued progress towards openness and competition is vital, while it is also important that the conditions are in place to properly harness the advantages of scale, skills and scope. Liberalisation goes hand in glove with market integration, and clear rules create increased competition and competitiveness. Under these conditions, Europe's electricity industry can contribute to Europe's competitiveness.



