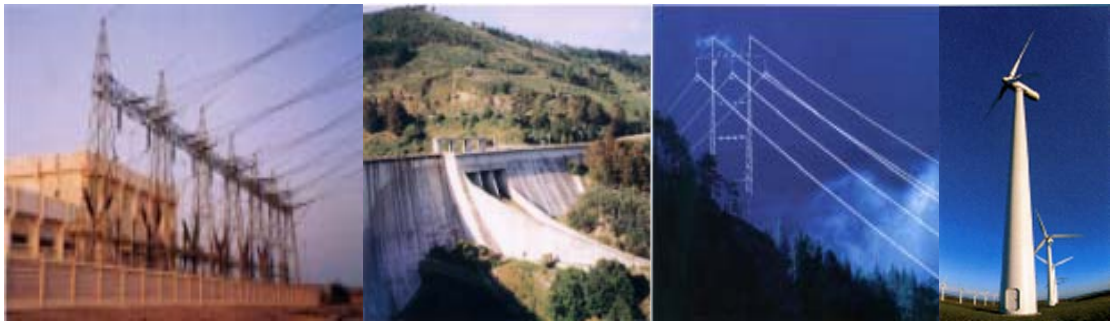
Review of EU Electricty Markets



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IPA Energy Consulting

1 REVIEW OF EU ELECTRICITY MARKETS

This report provides a brief review of the organisation of electricity markets in the EU-25 highlighting the organisation of the markets and their characteristics. These are summarised in the table below.

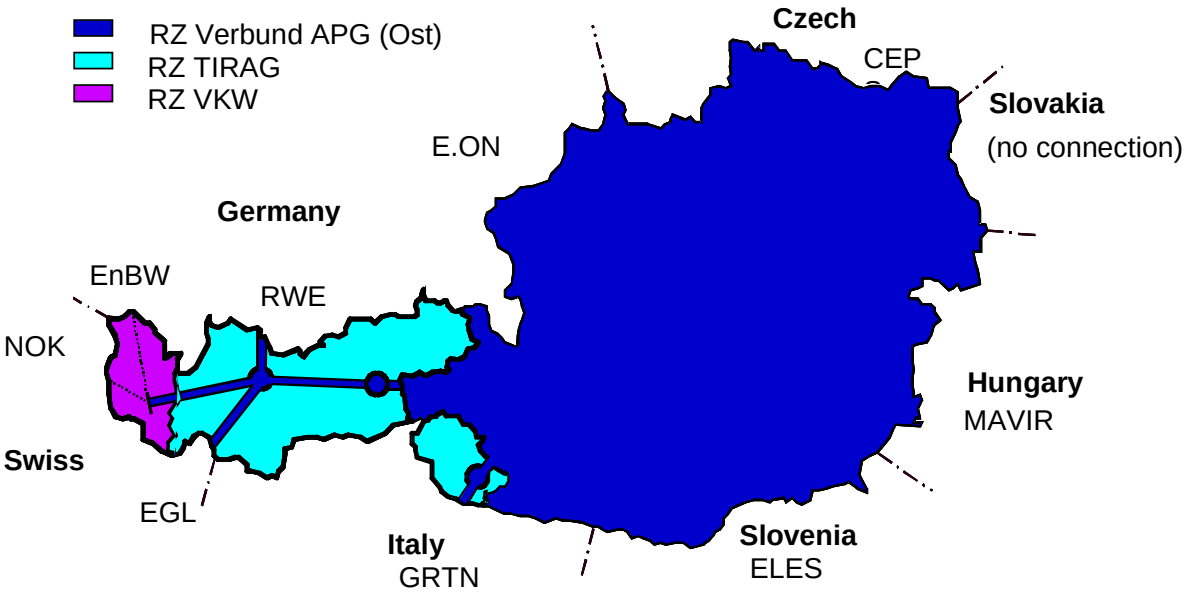
Country	**Balancing Model**	**Power Exchange**	**Transmission Unbundling**
Austria	Bilateral, Net Pool	EXAA http://www.exaa.at/cms/4/	Legal
Belgium	Bilateral, Net Pool	Belpex* http://www.belpex.be/	Legal
Czech Republic	Bilateral, Net Pool	OTE http://www.ote-cr.cz	Ownership
Cyprus	Bilateral, Net Pool		
Denmark, Norway, Finland & Sweden	Bilateral, Net Pool	Nord Pool http://www.nordpool.com/	Ownership
Estonia	Bilateral, Net Pool		Legal
France	Bilateral, Net Pool	Powernext http://www.powernext.fr/	Legal
Germany	Bilateral, Net Pool	EEX http://www.eex.de/	Legal
Greece	Gross Pool		Legal
Hungary	Bilateral, Net Pool		Ownership
Ireland	Bilateral, Net Pool		Legal
Italy	Bilateral, Net Pool	IPEX (GME) http://www.mercatoelettrico.org/	Ownership
Latvia	Bilateral, Net Pool		Legal
Lithuania	Bilateral, Net Pool		Ownership
Malta	n/a		
Netherlands	Bilateral, Net Pool	APX http://www.apxgroup.com/	Ownership
Poland	Bilateral, Net Pool	POLPX http://www.tge.pl/	Legal
Portugal	Bilateral, Net Pool	OMIP http://www.omip.pt/	Ownership
Slovakia	Bilateral, Net Pool		Legal
Slovenia	Bilateral, Net Pool	BORZEN http://www.borzen.si/	Ownership
Spain	Bilateral, Net Pool	OMEL http://www.omel.com/	Ownership
UK	Bilateral, Net Pool	APX UK http://www.apxgroup.com/	Ownership

*Belpex expects to start its activities in September 2006.

1.1 Austria

Since 1 October 2001, the Austrian electricity market has moved from its previous integrated monopolistic structure to an unbundled market organisation based on the balance group model similar as in Germany. All customers are now eligible to choose their electricity supplier. The basis for the new market model is the Austrian Electricity Industry Organization Act (ElWOG 2000). E-Control GmbH, as the regulatory authority, has the task of strengthening competition in a functioning electricity market with reliable supply.

Austria has three TSOs: Verbund APG, TIRAG and VKW-UNG. Each company is responsible for the TSO activity in its own service area and is responsible for the power-frequency control within this area. Verbund APG is the largest of the three TSOs and, as well as acting as TSO is also the control block manager under the UCTE for Austria. TIRAG and VKW-UNG do not form part of the Austrian control block; instead they are part of German control blocks.



During the market liberalisation in 2001, new Clearing and Settlement Companies (C&S) were established:

- APCS Austria Power Clearing and Settlement AG; and
- A&B Ausgleichsenergie und Bilanzgruppenmanagement.

These separated C&S were installed to guarantee an independent financial clearing, settlement and procurement within the market. In most markets, the TSO or Market System Operator takes this role, but in Austria a separate entity has been established in the market. APCS is responsible for the market of Verbund APG (covering around 90% of market volume) whilst A&B covers the areas of TIRAG and VKW-UNG TSOs.

The basis of the organisation of the market is the balance group (BG) where each participant in the market (electricity producers, traders and consumers) is obliged to join a

balance group. By combining several market participants (generators, consumers) within balance groups organized on market principles it is possible to optimize the management of fluctuations in generation and demand. Every provider of electrical energy should feed, as exactly as possible, the amount of energy into the grid which corresponds to the consumption by its customers. In the case of large-scale customers, requiring them to provide detailed information about their purchase needs in advance solves this. Small customers are condensed into groups, to which standardized load profiles are allocated.

Each BG (through the Responsible Balance Group Agent) reports the corresponding target values to the Balance Group Coordinator (C&S agencies, which is responsible for the settlement of the supply of balancing energy); then the grid operator reports the actual, measured data to the C&S. Deviations between the actual generation/infeed and/or purchase values from the target values are compensated by balancing energy dispatched by the respective control-area manager in real time. The C&S allocates the costs for the individual quantities of balancing energy after the fact to the respective balance groups. Each balance group manager is allowed to operate his own power plants for self regulation.

The Energy Exchange Austria (EXAA) located in Graz started operation in 2002 and provides fully electronic trading platform accessible via the internet. Spot trading was introduced on March 21st 2002 and the portfolio is said to be expanded by new products including OTC clearing for electricity contracts and futures trading and also trading of certificates of origin and certificates for CO2 emission. The EXAA wants to take an active part in the European energy electricity market and also intends to address neighbouring regions, especially the EU candidate countries from south-eastern Europe.

Trading proceeds at EXAA according to the Double-Auction-Bidding concept – buyers and sellers are equal trading participants and can place both buy and sell orders at the same time. Individual orders are recorded in a closed order book in such a way that the market participants cannot see each other's orders. On exchange days an auction is held at a specific time daily. The market participants are informed immediately after the auction about the prices per product calculated in the auction (Market Clearing Price) as well as their allocation of volumes. The physical fulfilment of deals takes place the next day (day-ahead-trading).

The main goal in setting up an electronic trading platform with an auction system is bundling liquidity. In addition, trading activities are said to be more efficient because there is less work involved in closing deals than in bilateral trading. [1]

1.2 Belgium

As other European member states, Belgium has transposed the EU Electricity Directive into national law. The new Belgian electricity law was passed and published in 1999. In order to implement the law fully, a substantial number of Royal Decrees were required.

Elia is Belgium's electricity transmission grid operator, in charge of transmitting electricity from the generators to local distribution system operators and large industrial consumers. An independent company, Elia owns 100% of all Belgian very high voltage network infrastructure from 150 to 380 kV and approximately (ownership and rights of

[1] Statistics and prospects for the European electricity sector (1980-1990, 2000-2020), (EURPROG 2004); http://www.verbund.at; http://www.exaa.at

use) 94% of Belgium's high voltage network infrastructure from 30 to 70 kV. Elia's network is a key link between France, the largest electricity exporter, and the North European electricity markets, as well as Belgium's generators and consumers. Elia also acts as a system operator and a market facilitator and is responsible for purchasing ancillary services and reserve.

Network access in Belgium is a mixture of regulated and negotiated TPA. The majority of the eligible clients have a right of access on payment of the published transmission tariffs. However, in a limited number of cases (i.e. transits, large volume transmissions), access may be on payment of a negotiated tariff.

All companies connected to the federal transmission grid are free to choose their supplier. The market has been fully liberalised in Flanders, including for residential users. In Wallonia and Brussels, liberalisation is limited to consumers using over 10GWh/year and business consumers. Residential users in Flanders will be free to choose their supplier from 1 January 2007 and those in Brussels will become eligible on 1 July 2007.

Four different supply licences are available in Belgium since there are four different authorities governing relationships between supplier and consumer. The competent authority is determined by the location and voltage at which the customer is connected to the electricity grid.

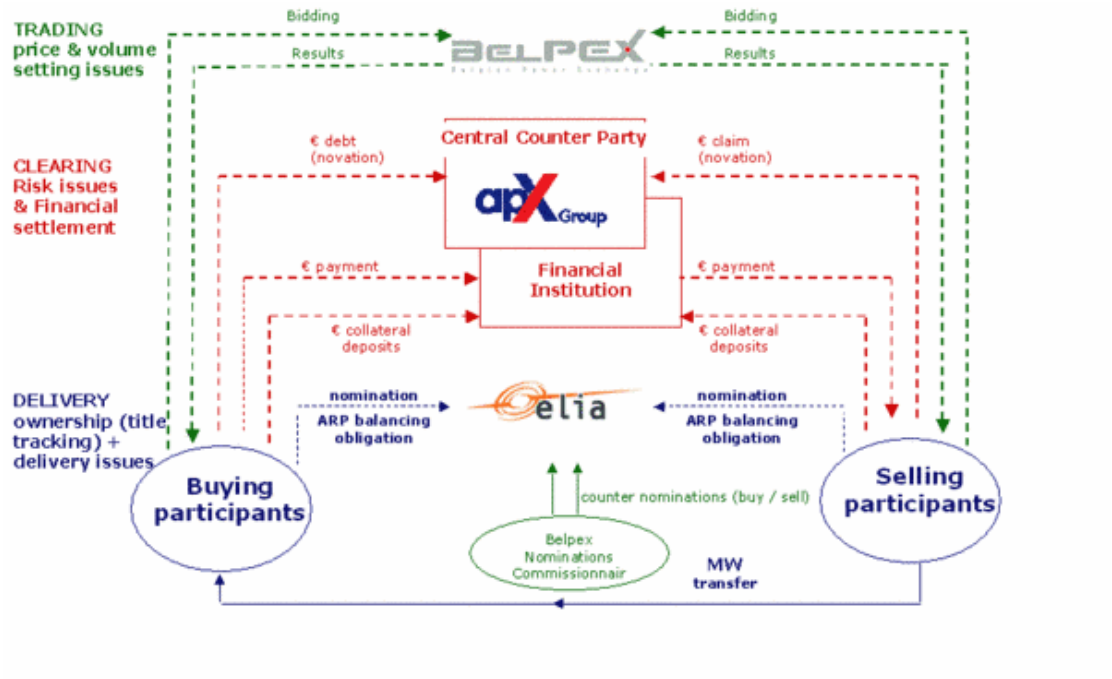
Belpex is the Belgian Power Exchange for anonymous, cleared trading in day-ahead electricity, providing the market with a transparent reference price. Belpex was established in July 2005. Its shareholders are Elia (has a 60% interest), along with APX, Powernext, TenneT and RTE, each of which holds 10%. Belpex is headquartered in Brussels and has obtained its license as power market operator on January 11th, 2006. On the same day the Minister of Energy also approved the Belpex Market Rules. Belpex expects to start its activities in September.

Belpex will provide a power-trading platform for the negotiation of day-ahead electricity trades. Power purchase/sale transactions are concluded directly, but anonymously, between the market participants. In practical terms, participants will submit sales and purchase bids (together with price and volume limits for each hour of the next day) before a predetermined gate-closure time, on the day before actual delivery.

At closing time, Belpex will perform the market "fixing": the intersection of the aggregated supply and demand curves determines the 24 values of the “market clearing price”, of the global traded volume and of the cleared volumes for each participant. The results are then forwarded to participants. Additional aggregated information (general information and key performance indicators on market events, such as average price for peak hours and for off peak hours) will be posted on the website.

The financial settlement of trading at Belpex will be secured by a central counterparty, which will offer its guarantee of payment (becoming the sole debtor vis-à-vis the selling participants) and will acquire all transaction payment rights (becoming the sole creditor vis-à-vis buying participants).

In order to deliver the energy, market participants will need to either qualify with Elia as “access responsible parties” (ARP), or designate an ARP that accepts the participant within its ARP perimeter. An ARP is contractually obliged vis-à-vis Elia to ensure that all the transactions in its perimeter are in balance. Elia continuously monitors the electricity flows on its network to ensure the balance between off-take and injection of electrical energy.



1.3 Czech Republic

The Czech electricity sector relies heavily on coal and, increasingly, nuclear energy. It trades power extensively with its neighbours with a net export of around 10TWh a year. The Czech Republic has made a transition from a command-and-control economic structure to one shaped largely by market forces. The energy sector is no exception to this as can be seen in the country's membership in the IEA and its compliance with EU directives on energy.

Generation, transmission and distribution in the Czech Republic are fully unbundled in ownership terms. The market has been reformed with gradual market opening, non-discriminatory open access to all networks, and elimination of subsidies for different customer classes and the establishment of an energy regulator although this is seen as lacking independence from the Government. with full market opening achieved in 2006.

The largest impediment to successful introduction of competition may be the market power of the incumbent utilities. On the electricity side, one company (CEZ) has a 70% wholesale market share and controls companies with a combined 66% share of the retail market. CEZ owns conventional coal-fired (mostly brown coal-fired) power plants, nuclear power plants and hydro power plants at total net capacity of about 10 GW in the end of 2002. In 2003 CEZ produced 73% of total electricity production. The remaining electricity is produced by independent producers generating electricity as their primary business and the other producers generating electricity in cogeneration where primary business is heat delivery (CHP). More than 50 IPPs (including CHP) operate within the Czech republic and preferential access to market for power produced by CHP plants has stimulated significant investment in the sector. CEZ also holds majority ownership of 5 of the 8 Czech distribution companies.

The Czech Transmission System Operator (CEPS, a.s) is majority-owned by the State. CEPS owns, operates and develops the transmission networks of 400 kV, 220 kV and several lines at 110 kV. It provides real-time load dispatching services matching supply and demand, is responsible for system services and controls the operation of cross-border interconnections. CEPS purchases electricity to cover transmission losses and buys

ancillary services on the market, cooperating with the electricity market operator in organising the intraday electricity market and the balancing market.

Czech Energy Law contains the following fundamental principles:

- full compatibility with the 96/92/EC Directive
- regulated third party access to the grids
- requirement for licencing of new generation capacity
- reliability of electricity delivery and operation of the system
- aspects of minimum negative environmental impacts

In 2001, the Energy Regulation Office (ERU) was established in compliance with the provisions of the Energy Law. The agency has the power to issue licences for electricity generation, transmission, distribution and trade. ERU is also the authority to set prices of electricity for non-eligible customers, system services, transmission and distribution grid services, feed-in tariffs for renewable electricity and CHP electricity. Furthermore, it resolves disputes between licence holders and other market participants.

The Electricity Market Operator (OTE) was established by the State as a joint stock company during the year 2001 and became active in 2002. Its primary responsibilities include resolving imbalances between contracted and consumed energy and settling the billing consequences among the market participants, organising the day-ahead electricity market and preparing reports on electricity system operation and long term electricity balances. The Czech market is predominantly based on contracts with the OTE responsible only for imbalance trading. The short term day ahead market operated by OTE since 2002 is very small with less than 1% of energy traded, in 2004 an intraday market was also established which trades even smaller volumes.

OTE activities include:

- Processing the electricity trading balances
- Organizing the short-term electricity market and the regulation energy market - in cooperation with TSO
- Evaluation of deviations (imbalances) of individual settlement entities i.e. differences between actual (metered) and contracted electricity volumes
- Settlement of deviations (imbalances) of individual settlement entities
- Processing and releasing monthly and annual assessment reports on the electricity market of the Czech Republic
- Processing long-term electricity balance
- Processing the background information for draft of electricity trading rules and submitting it to the Energy Regulatory Office
- Providing actual volumes of electricity supplies and consumption for market participants
- Processing the trading conditions of the electricity market operator and their releasing after approval by the Energy Regulatory Office
- Providing load profiles with DSO cooperation
- Settlement of regulation energy based on the data submitted by TSO

- Administration of the Czech registry for greenhouse gas allowances trading

1.4 Denmark, Norway, Finland & Sweden

In 1996 Norway and Sweden set up a common market for electricity in the Nordic region. Statnett Marked AS expanded its area of operations and was renamed **Nord Pool** ASA – the Nordic Power Exchange. Nord Pool was the first multinational power exchange in the world. Statnett and Svenska Kraftnät (national transmission companies) each own 50 percent of the Nord Pool.

Finland joined Nord Pool in 1997, followed by Denmark West (Jutland) in 1999 and Denmark East (Zealand) in 2000. On 2 January 2002 Nord Pool split off the physical spot operation into a separate company, **Nord Pool Spot** AS, which from 1 July 2002 is owned by Nord Pool ASA (20%), Statnett SF (20%), Svenska Kraftnät (20%), Fingrid (20%), Eltra amba (10%) and Elkraft system (10%). Norway, Sweden, Finland and Denmark now have access to a common Nordic wholesale power market.

The national transmission system operators (TSOs) of Sweden (Svenska Kraftnät), Norway (Statnett SF), Denmark West (Eltra), Denmark East (Elkraft) and Finland (Fingrid) are responsible for maintaining the balance between production and consumption. System balance is assured through national regulating (balancing) markets organised by the TSO's.

There are several grid companies in Norway. A grid company may own a local, regional or central grid. In all, 178 companies are engaged in grid management and operations on one or more levels. Of these, 42 are solely grid operators, whereas the remaining companies are also engaged in electricity generation and/or trading.

136 companies are vertically integrated in the sense that they are engaged both in operations that are exposed to competition (production and/or trading) and in grid management.

The state, through Statnett SF, owns about 87 per cent of the central transmission grid. Private companies, counties and municipalities own the remainder. Statnett is the operator of the entire central grid. Municipalities and counties own most of the regional and distribution grids.

Statnett is the Norwegian transmission system operator (TSO), and is therefore responsible for short and long term system co-ordination. This means that the enterprise co-ordinates the operation of the entire Norwegian power supply system. This includes ensuring that the amount of electricity generated is at all times exactly equal to the amount consumed. The balancing market is a market organised by Statnett to maintain a stable frequency and a continuous balance between production and consumption.

The balancing market opens after prices and quantities have been determined in the Elspot market. Statnett receives quotes from major producers or consumers that are willing to alter their power generation and/or consumption plans at short notice. This ensures that it is possible to adjust the amount of power in the grid either up or down right up to the hour of delivery.

In the wholesale electricity market, grid companies, large industrial enterprises and other large actors buy and sell electricity. Electricity is either traded bilaterally between market actors or on Nord Pool. A number of electricity transactions are standard bilateral contracts, which is still the main instrument for selling and buying electricity. But a

growing proportion of contracts are traded in the Nord Pool's physical and financial derivatives markets. Nord Pool operates the following marketplaces and market services:

- A spot market for physical contracts, Elspot
- A financial derivatives market – futures and option contracts
- Clearing services for contracts traded in OTC and bilateral markets.

In 2002 physical electric power trading at Nord Pool amounted to 124 TWh, which is 32 per cent of total consumption in the common Nordic market. About 280 participants from Norway, Sweden, Finland and Denmark, as well as some other European countries and the USA, trade through Nord Pool.

Participants are power producers, retailers, grid owners, brokers, market makers, traders and industrial companies.

Physical trade between the Nordic countries is based on Nord Pool's Elspot market, which is a market for physical delivery the next day. Hence, the market is referred to as a day-ahead market.

Prices for sales and purchases are determined hourly throughout the day. Each participant bids a price-quantity curve for each individual hour of the day. The price-quantity curve provides information on how much the participant wants to produce or consume at given price levels. These bids are not observable for any player except the Exchange.

After the noon deadline for participants to submit bids, the Nordic Power Exchange's spot market gathers all buy and sell orders into two curves for each power delivery hour: one aggregate demand curve and one aggregate supply curve.

The spot price for each hour is determined by the intersection of the aggregate supply and demand curves. The equilibrium price is also known as the system price. This is the spot price for physical delivery of electricity, equal in Norway, Sweden, Finland and Denmark. The system price is also used as a reference price for trade in the electricity derivatives market. The system price is determined by supply and demand in the Nordic region, without regard for physical capacity limits in the transmission grid.

However, the Nordic transmission grid has capacity limits, and trade on Elspot will in certain periods generate congestions in the transmission grid, so-called bottlenecks. Nord Pool handles bottlenecks by separating the market into different Elspot price areas.

The permanent price areas in the Nordic region are Sweden, Finland, Denmark West (DK1) and Denmark East (DK2), South Norway (NO1) and Middle/North Norway (NO2). Last winter Norway was divided further into four price areas.

The System Price is the reference price for handling potential grid congestions. Within Elspot price areas the system operators handle congestions by means of "counter-trade", based on bids from producers. In Sweden and Finland, Elbas, is used as a short term market operating after closing of the spot market. Due to the lengthy time span of up to 36 hours between the Elspot price fixing and delivery, participants need market access in the intervening hours to improve their balance of physical contracts.

Variations in precipitation and temperature can result in large variations in the spot price. This means that the economic risk associated with electricity trading is high. To reduce

the risk, producers, consumers and other actors in the market can enter into long-term physical and financial contracts.

Nord Pool's financial derivatives market covers the market for futures, forward and option contracts. Futures and forward markets are financial markets for price hedging and risk management. The system price in the spot market is the reference price for future and forward contracts traded on the Nordic power exchange.

Power derivatives enable market participants to hedge purchases and sales of power with a time horizon of several years. Such products can be traded on the Nordic power exchange, but there are also other markets that organize trade with these products. Through power derivatives trade actors can hedge purchases and sales of power with a time horizon of up to four years.

Financial electricity market contracts traded at the Nordic Power Exchange are standardized products that are financially settled; there is no physical delivery of electric power. Settlement is conducted between Nord Pool's clearing service and individual market participants.

In addition there are bilateral contracts, both long-term and forward contracts. The market players are free to agree on standardised or non-standardised, long-term or forward contracts, either on a bilateral level or through the commodity exchange, Nord Pool.

1.5 Estonia

Estonia's two large oil-shale-fired electric power plants, Eesti Elektrijaam and Balti Elektrijaam, were built during the Soviet era to supply Estonia and St. Petersburg with electricity. Currently, these two power stations, which are located in the city of Narva and together make up Narva Elektrijaamad (Narva Power Plants), supply more than 90% of Estonia's electricity. In 1999, Estonia's total electricity-generating capacity was 2.7 gigawatts and the country generated 7.8 billion kilowatt-hours (Bkwh) of electricity. Although this was more than enough power to supply the country's 7.4 Bkwh consumption in 1999, the country's net exports (mostly to Latvia, but also to northwest Russia) slipped to just 0.4 Bkwh. Eesti Energia's preliminary figures for 2000 show Estonia's electricity generation at nearly the same rate as 1999, but with an increase in exports of more than 25%.

As a condition of the privatization terms of Narva Power Plants, the Estonian government stipulated that NRG Energy must ensure that the Estonian energy market becomes part of the European energy market. Estonia's power grid is configured to the old Soviet power grid, and as Estonia reorients itself to the West and moves towards EU integration, one of the country's security-political priorities is to create an energy connection to the West European electricity grids. To that end, in 1998, the electric utilities of Estonia, Latvia, and Lithuania, as well as other utilities from the Baltic Sea states' power companies cooperation organization BALTREL, agreed to form the Baltijos Ziedas (Baltic Ring) system to connect the Baltic countries' grids with Western Europe.

In addition, Eesti Energia and Latvenergo, the state-owned Latvian power utility, have been in serious discussions about a merger that would ensure the long-term competitiveness of the utilities. Latvia has to import up to 30% of its domestic demand, while the Narva Power Plants can increase generating and export capacity. At the same time, Estonia could import inexpensive hydropower-generated electricity from Latvia from March till May. The proposed merger to form the "Baltic Power Group" would

reduce dependence on Russian and other foreign suppliers, as well as provide a long-term competitive electricity price level in Estonia and Latvia and enhance overall competitiveness on the Baltic electricity market.

Estonia's market operates on a "Net Pool" or bilateral basis on a 60 minute trading period. Gate closure is day ahead and balancing energy is shared with neighbouring Latvia.

1.6 France

The French system is highly interconnected with its neighbouring systems, exchanging power with every country with which it has a border. In February 2000, in order to comply with EU regulations, an Electricity Act had created an independent TSO in charge of operating the French grid. The Réseau de Transport d'Electricité (RTE) is responsible for the continuity and quality of transmission services and for providing equal access for all users to the power transmission network. All high and extra high voltage power lines, and transforming substations, in addition to all interconnectors in France became the operational responsibility of RTE.

In 2004, the TSO (RTE) was legally unbundled from state power utility EDF, while the managerial separation of DSOs was implemented. Additionally, EDF's status was changed from a 100% state-owned specialized entity to a limited liability company whilst the "principle of specialty" which prevented EDF from selling natural gas and Gaz de France from selling electricity was abolished. Even though the market organisation in France allows large customers to choose their supplier of electricity, EdF has maintained a dominant market share with 78% of energy sales to eligible customers2.

The French power market is based on the concept of Balance Responsible Entities (BR) which are responsible for engaging in commercial transactions, whilst minimising their exposure to the costs of settling imbalances between their supplies and deliveries. Each BR entity submits a declaration to RTE and DSOs, detailing the injection and off-take of power that make up his balance perimeter. He undertakes to compensate RTE financially for any negative imbalances (injection minus extraction) subsequently observed on his balance perimeter. RTE compensates the BR financially for any positive imbalances.

In November 2001, the Powernext electricity trading market was launched where the auctioning of standard hourly contracts for physical delivery of electricity to business customers under responsibility of the RTE and guaranteed by Clearnet (a subsidiary of the Euronext stock exchange) takes place. Powernext is a multilateral trading facility in charge of managing an optional and anonymous organised exchange offering:

- Day-ahead contracts for the management of volume risk on Powernext Day-Ahead (since 2001), and
- Medium term contracts for the management of price risk on Powernext Future (since 2004).

Between January 2002 and December 2004, the volumes traded on the French wholesale market increased fourfold (today they represent about 5% of the total market). Moreover, volumes traded in 2005 reached over 82 TWh, or 19.8TWh for Powernext Day-Ahead

[2] Source EdF Half Year Results 2004

and 62.4TWh on Powernext Futures, which represented a tripling of volumes in comparison with the 2004 figures.

1.7 Germany

When the EnWG (Energiewirtschaftsgesetz) came into effect in April 1998, the German electricity market became fully competitive. The EnWG governs grid operation and codifies the negotiated access to the grid. The market model is bilateral (net pool) with the European Energy Exchange (EEX) in Leipzig covering the spot market, the futures market and the clearing of OTC dealings.

The final Energy Industry Act (EnWG) passed in mid 2005 provides for an ex-ante tariff setting for third party access to the electricity and gas grid in the event of price increases. Germany's reliance to date on negotiated rather than regulated TPA was unique in Europe and contravened the provisions of the EU Directives[3]. The new EnWG and the two draft ordinances on network access introduce provisions for non-discriminatory, regulated TPA based on distance independent point of connection charges.

The Balancing Groups (BG) concept represents a central element in the German electricity market model. In general, all physical system users must be assigned to at least one BG, which combines a number of generators and consumers within the same control area. Each BG seeks to continuously balance its supply and production through the use of its own generation and by purchasing power from other areas. The BG manager is responsible for all operational issues within the BG, including the balancing of its BG, as well as for (financial) settlement of any imbalances with the TSO. Trading occurs exclusively between different BGs, and only the net exchanges are nominated to the TSOs. Each BG is limited to one specific control area. The four transmission system operators (TSO) in Germany are EnBW, E.ON, RWE and Vattenfall Europe, each of them responsible for one of the four German control areas.

EEX was founded in 2002 as the result of the merger of Leipzig Power Exchange (LPX) and European Power Exchange (EPX). Currently[4] some 138 trading participants from 17 countries are trading at the EEX whereof about one half is non-German. The members range from top investment banks to small, regional producers from all over Europe. The EEX is a regulated market subject to the German Exchange Act and it is supervised by three different institutions: the Exchange Council, the Ministry of Economic Affairs of the Free State of Saxony and the German Financial Supervisory Authority. The exchange's prices are the benchmark for the whole market including OTC, wholesale and retail business.

EEX operates a spot and a derivatives market for electricity and also EU emission allowances under the EU Emissions Trading Scheme. The auction market allows market participants to place purchase and sales bids for single hours and block trades. The resulting equilibrium price is a market price, which is defined by way of bilateral auction by suppliers as well as consumers. The market for continuous block trading allows placing purchase and sales bids for base load blocks and peak load blocks. On the derivatives market, futures contracts and options are tradable. The product range includes monthly, quarterly and yearly futures based on the Phelix (Physical Electricity Index) as underlying price[5]. In 2003, 391TWh were traded, whereof 49TWh (nearly 10% of the

[3] Until the end of 2003 the Association's Agreement ruled the negotiated TPA.
[4] April 2006
[5] The Phelix price index represents the arithmetic mean of the 24 single-hour prices for the respective next day on exchange's spot market.

German net electricity consumption) account for the spot market and 342TWh for the futures market.[6]

1.8 Greece

The trading arrangements are designed to ensure that the Hellenic Transmission System Operator (HTSO) can operate the system in an efficient and reliable manner and that generators have an incentive, through market prices (System Marginal Prices or SMPs), to follow its instructions.

The STA also gives generators market-based incentives for production and investment. It is designed to enable the efficient entry of private generators to meet the electricity needs of Eligible Customers without losing the benefits of the integration present in the existing system and without imposing large additional costs.

The principal characteristics of the design of the STA are:

- **An Independent System Operator and independent Market Operator** (ISO and PX): The HTSO is responsible for both system and market operations and is fully independent from PPC in accordance with the EU Directive.
- **An Offer-based Dispatch**: Scheduling and Dispatch of generating Units is based on Offers received by the HTSO for the full declared available capacity of those Units. The HTSO conducts a security-constrained least-cost Dispatch of all offered generating capacity and does not take into account any contract positions of generators in its Dispatch of the system. Contracts between market participants are therefore financial, rather than physical, in nature.
- **A single price for imbalance energy**: A unique price of energy (SMP) is set for the entire interconnected transmission system, in every hour, ie, prices are not locational. The SMP in each hour is determined, in principle, by the marginal Offer cost of supplying an additional MW of energy to the system.

1.8.1 Summary of the System Trading Arrangements

- SMPs are determined once for each hour: The STA consists of a single and separate "spot" market in each hour, in which prices and quantities are determined after the fact (ex-post) on the basis of actual generator availability and load conditions.
- Restrictions on Offer prices: The Regulatory Authority for Energy (RAE) requires that for all Generators located in Greece, regardless of ownership, the Offer prices for each offered Unit must reflect the true and auditable variable and start-up costs of that Unit.
- Gross settlement in respect of contracts, net settlement in respect of ownership: All electricity generated or consumed is sold by Generators, bought by Purchasers, and settled by the HTSO without any consideration of independent contractual arrangements between Participants when

[6] Sources: Statistics and prospects for the European electricity sector (1980-1990, 2000-2020), (EURPROG 2004) and www.eex.de

carrying out its settlement of STA transactions (contracts between participants are therefore financial in nature rather than for physical delivery of power). The HTSO does, however, consolidate invoices and remittances to Participants owned by the same parent entity – those which are both Purchasers and Generators in the STA are therefore invoiced or paid for their net financial imbalance. Each Supplier is treated as a separate Generator and Purchaser in the STA in order to allow the HTSO to conduct a least cost Dispatch for the entire system of the full available capacity of Suppliers and not just the capacity net of their final customer load.

- Cost-of-service regulation of the ISO/PX: The HTSO is a for-profit entity. It makes a regulated margin on the cost of the services it provides, and it passes all its costs through to Participants.

All electricity delivered to or taken from Greece's interconnected transmission system (including distribution connected generation) is bought and sold through the STA. Only "Participants" are entitled to buy and sell electricity in the STA. A Participant is an entity that has agreed to be bound by the Power Exchange Code. Participants include:

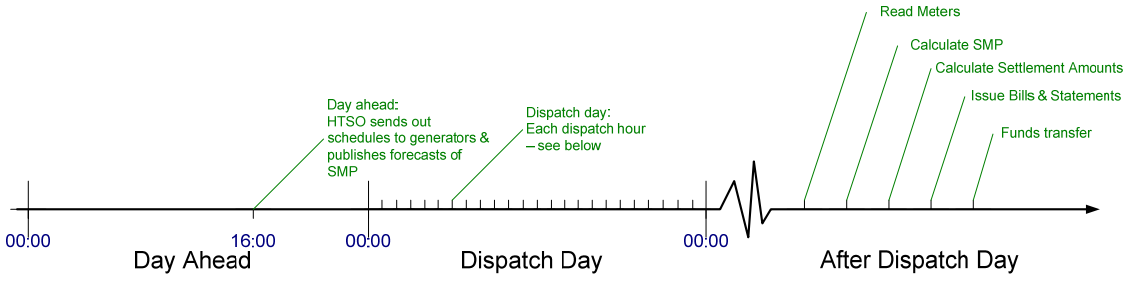
- Purchasers – Suppliers authorised to sell electricity to final customers in Greece and exporters who purchase power in the STA for export to third countries (exporters must also be generators and are subject to special rules).
- Generators - domestic generating entities owning power plants located in Greece, and holding an Electricity Generation Authorisation; and generating entities owning power plants located outside of Greece, where they hold a Greek Electricity Supply Authorisation.

There is no requirement that all domestic Generators must also be Suppliers. However, *all Suppliers must also be Generators* (in addition to being Purchasers): As in Cyprus, every authorised Supplier must own adequate generating capacity in accordance with the Greek Electricity Law; a Supplier must also provide long-term confirmation as to the necessary arrangements for reserve generating capacity in accordance with the Greek Electricity Law. In addition, a Supplier that provides energy from generating capacity located in another country must arrange the necessary transmission capacity for the transmission of electricity.

The STA consists of five steps. These steps are summarised in the remainder of this section.

- The first step is a day-ahead forecast. Generators make Offers, the HTSO makes a load forecast, and Exporting Purchasers request exports to be scheduled for the following day. From this data, forecast generation quantities, forecast SMPs and international interconnector schedules are calculated by the HTSO and advised to Participants. This process also determines the merit order for the real-time Dispatch.
- The second step is the real-time Dispatch of Generators by the HTSO to meet realtime load on the system. This occurs throughout every Dispatch Hour on the Dispatch Day and determines the actual quantities of energy traded.

- Metering quantities are then verified and finalised. The SMPs, at which the energy quantities in the Dispatch are traded, are then determined, using actual Unit availability and actual system load. Since this occurs after the Dispatch, these prices are known as "ex-post".
- The fourth step occurs after the SMPs are calculated. This consists of special provisions for making payments to Generators in the legitimate but infrequent instances in which the Dispatch quantities and SMPs might not be consistent - in principle, a circumstance in which a Generator would be better off to produce a different amount than that it was instructed to produce by the HTSO, given the SMP.
- The final step involves verification and finalisation of settlement amounts, determination of penalties and other charges, if any, and a monthly cycle of settlement and billing activities.



1.8.2 Day Ahead Process

The HTSO produces two forecast schedules for electricity production for the following day: an "unconstrained" schedule and a "constrained" schedule. Generators offer their energy, and in each of the schedules the HTSO accepts the cheapest Offers necessary to match its forecast of demand (including transmission losses plus scheduled exports) for the following day. Offers specify price and quantity parameters. The HTSO does not take into account the contract positions of Participants in determining the forecast schedules.

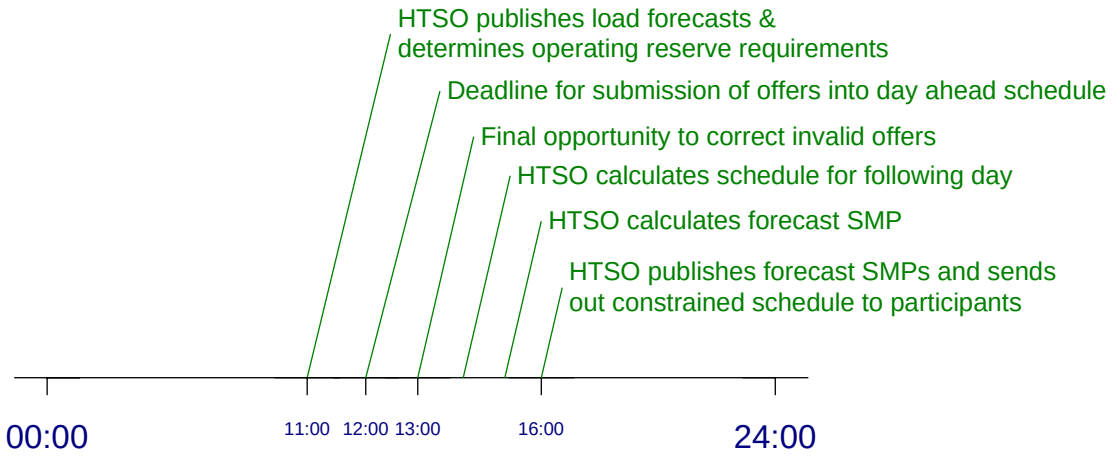
The first of the schedules also ignores the effect of transmission constraints and is known as "unconstrained" this determines a single forecast SMP for all of Greece, for each hour of the Dispatch Day. Forecast SMPs are set at the Offer prices of the most expensive accepted flexible Unit(s) in each hour - in principle no one was accepted in this schedule, is selected to run at a price below their Offer price. The second schedule includes the effect of transmission constraints and is known as a "constrained" schedule. It is produced so as to determine forecast production of energy and Operating Reserve by each Unit for each hour of the Dispatch Day.

The day-ahead forecasting process occurs once a day and within that day there are a number of deadlines:

- The HTSO publishes its load forecast at 11:00 to assist Generators plan their availability. It also determines its Operating Reserve requirements at this time.
- Next, all Offers from Generators and all export schedules from Exporting Purchasers must be received by the HTSO before 12:00. This deadline is

designed to allow the HTSO sufficient time to advise inflexible plants well in advance of the actual Dispatch.

- The HTSO notifies Generators by 12:30, indicating whether the data contained in their Offer was valid or invalid. Generators who have submitted invalid data follow procedures for re-submission and must re-submit by 13:00.
- Next, the HTSO calculates the forecast unconstrained and constrained schedules for the Dispatch Day. In the constrained schedule, the HTSO selects providers of Operating Reserve, while minimising total cost and utilising those sources available as declared by Generators with which it has pre-arranged Ancillary Services contracts.
- After the HTSO has calculated the forecast unconstrained schedule and before 16:00, the HTSO determines forecast SMPs based on the results of that schedule.
- At 16:00, the HTSO produces a list that details the forecast constrained schedule and forecast SMPs for each Dispatch Hour of the following day. Generators are sent a subset of the list, showing the schedule for their Units only. Schedules for the use of the interconnectors with foreign countries are produced at this time and the forecast SMP for each hour is published and made available to the public.



1.8.3 Dispatch Day

The HTSO may instruct available Units to start-up and synchronise at some point during or before the Dispatch Day to ensure adequate generation capacity is available for the real time Dispatch of the system. Generators are obliged to follow these instructions.

In real time, system load, generation availability and other constraints may change from those forecast day-ahead. A separate Dispatch in each Dispatch Hour is used to determine the real time dispatch to meet actual demand on the system. Dispatch is based on the merit order established day-ahead from the prices in the Offers. Units are obliged to obey Dispatch Instructions in real time so as to keep the transmission system stable.

Scheduled Generators are not allowed to change the quantity component of their Offers between the time the Offer was submitted and the Dispatch Hour unless they have a "legitimate" reason to do so. A legitimate reason is a prior approval by the HTSO, or an unexpected outage that renders some or all of the capacity of the Unit unusable or hazardous to use for reasons of safety or protection of physical equipment. The HTSO may only issue prior approvals for reasons relating to unpredictable external factors such as wind strength in the case of wind-powered Units. Offer revisions that are not demonstrably legitimate may result in penalties being assessed.

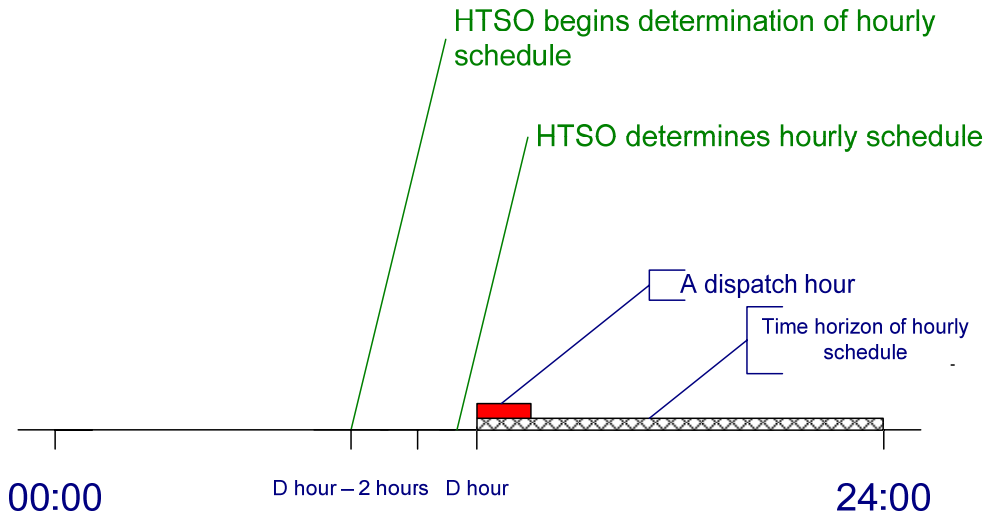
Under no circumstances may the price parameters of an Offer change between the time of submission into the day-ahead forecast and the actual Dispatch Hour.

Scheduled use of the interconnectors is locked-in from the day-ahead schedule.

Two hours before the Dispatch Hour, the HTSO begins to calculate the Dispatch. This time period is designed to allow the HTSO enough time to analyse Offers, prior to issuing Dispatch Instructions. Irrespective of this two-hour period, the HTSO always endeavours to use the latest availability and other system information to determine Dispatch Instructions so as to maximise system reliability and minimise the cost of Dispatch.

Just prior to the start of each Dispatch Hour, the HTSO finalises an updated schedule of expected generation for the remainder of the Dispatch Day. This schedule is used mainly for the HTSO's own planning purposes but any updates are advised to the Generators concerned.

Within the Dispatch Hour, the HTSO calculates the real-time (final) Dispatch.

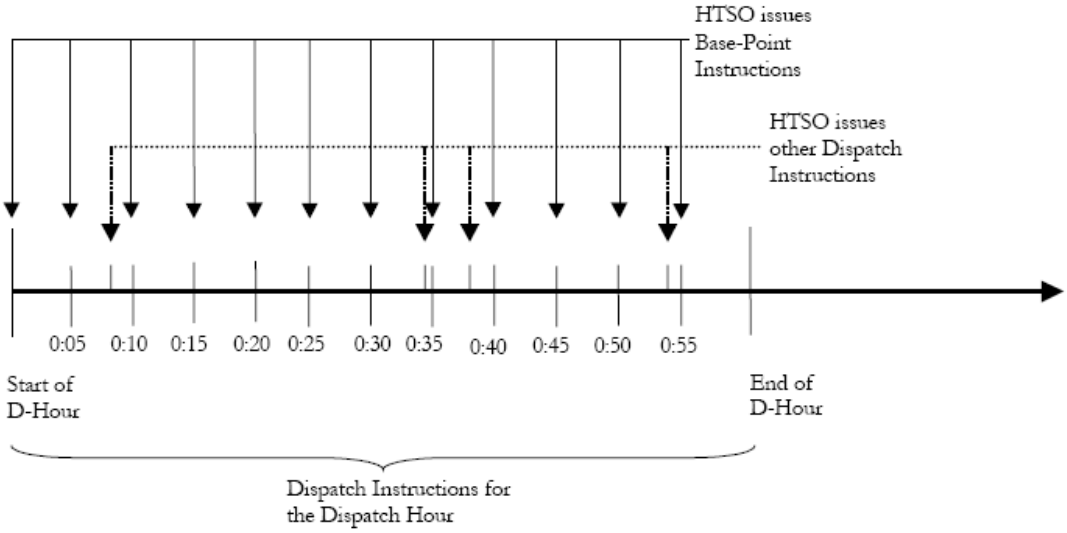


1.8.4 Dispatch Hour

In making the calculation of real-time Dispatch, the HTSO continues to use the merit order as determined day-ahead and it utilises real-time system status information, including measurements of actual system load and any re-declarations of Unit availability. Every 5 minutes, the HTSO recalculates Base Point Instructions for each Unit and notifies each Unit of their new level of instructed output. The objective of the Dispatch is to minimise cost (as

represented by the Offers) subject to system security and other constraints, ie, including all transmission system constraints.

Between the 5 minute Base Point Instructions, the HTSO issues other Dispatch Instructions, for example, regulation instructions to Units on automatic generation control (AGC), and instructions to activate Operating Reserve if system conditions suddenly change and Spinning Reserve or Standing Reserve is called upon.



1.9 Hungary

There are 18 licensed producers in the electricity sector - power stations with capacity of at least 50 MW require licences. Almost 40% of electricity is produced by the Paks Nuclear Power Station, the remaining 60% is shared approximately equally by power stations burning coal and hydrocarbons.

The transmission and distribution network licence holders are responsible for the "transportation" of electricity, its transmission and distribution from producers to consumers. These market players are obliged to provide access to the networks without discrimination.

The systems controller plans and controls the operations of the electricity system. It is independent of producers, traders and consumers. Its tasks comprise system level operative control, resource planning, preparation for network operations, the settlement of electricity and the provision of system-level services.

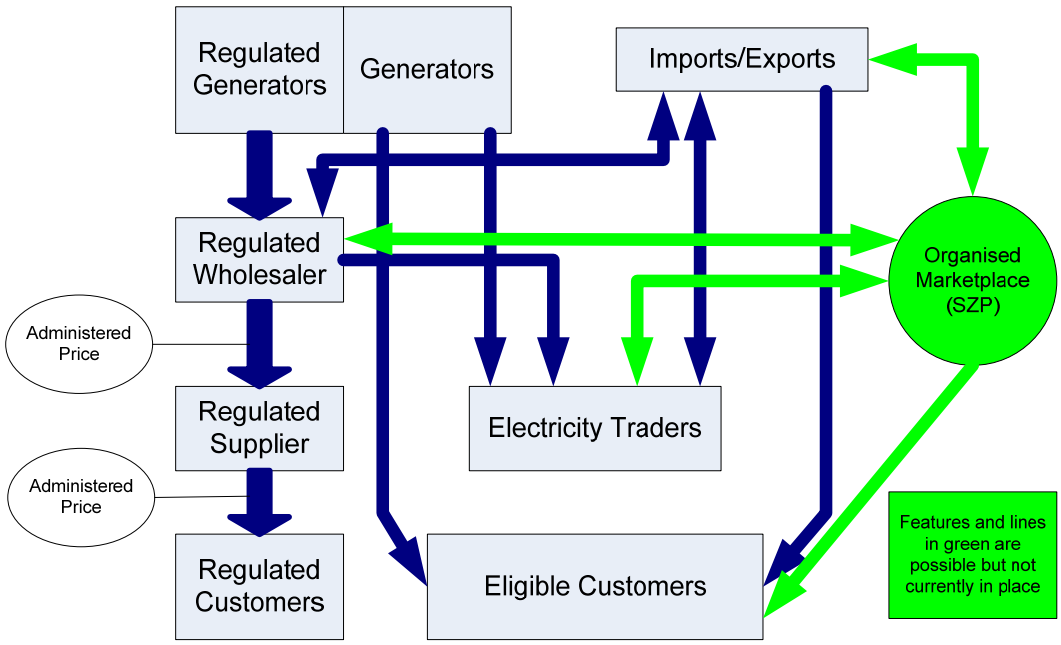
From the perspective of consumers, the electricity system may be divided into two parts. The first one is the public service segment supplying public service consumers. In that segment, a public service wholesaler purchases electricity from the producers, generally under long-term contracts, then sells it to the public service providers, who resell it to public service consumers at an officially set price. The public service wholesaler has excess capacity under long term contract, this has been sold in auctions to new entrant traders resulting in a significant accumulated deficit in the public service wholesaler.

Authorised users whose consumption in the previous 12 months reached 6,5 GWh are also entitled to leave the public service segment and to purchase electricity from traders or directly from power stations, from domestic or import sources in the competitive market.

As the first step towards the liberalisation of the market, the Government decided on a 30-35% authorisation level in order to facilitate partial liberalisation of the market (that corresponds to the above-mentioned 6.5 GWh/year limit). Thereafter, tracking the liberalisation of the market in the EU was the objective. In the meantime, the EU reviewed its Directive 96/92/EC (concerning common rules for the internal market in electricity) and adopted a policy of accelerating the opening of the market. This means that from 2004, all consumers other than household consumers shall be authorised consumers in the member states of the EU, while from 2007, households shall also be authorised, i.e. the market shall be 100% liberalised.

Hungary operates an "Net Pool" (bilateral) market based on a 15minute balancing period with gate closure day ahead. Each "balance circle" is responsible for balacing its own production and consumption. The eligible consumers may create their own balance circle or are obliged to affiliate to a trader's balance circle. The balance circle is a group of producers, marketers and consumers in which the planned value of all purchases and sales correspond. These volumes, defined for every quarter of an hour (schedule), are given by the balance circles to the transmission system operator. If the balance circle differs from its schedule – the actual consumption is higher or smaller than planned – the difference is balanced by the transmission system operator and this balancing energy is settled later with the balance circle. The public utility supply also creates a balance circle consisted of power plants, the public utility wholesaler Magyar Villamos Művek Rt. and the distribution companies. The household consumers purchase electricity in the frame of public utility supply.

Eligible customers do not need to involve a marketer in the supply chain and may directly agree supply terms with power plants (local and foreign).



Hybrid Hungarian Market

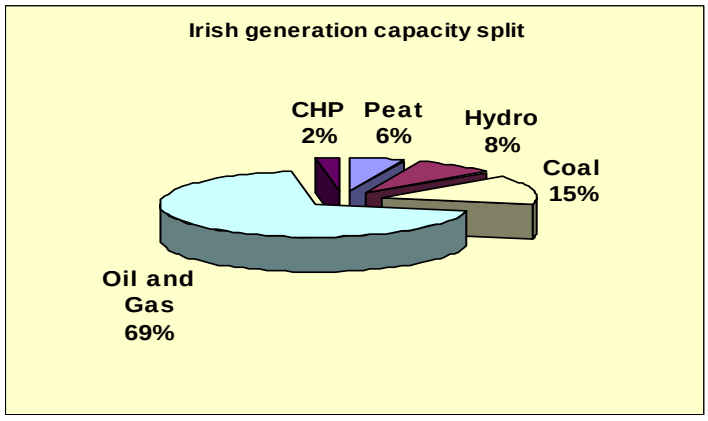
1.10 Ireland

European legislation created the framework for the opening of the Irish electricity market to competition. The current trading arrangements for the Irish Electricity market were established following a Policy Direction from the Minister for Public Enterprise to the Commission for Energy Regulation (CER) on 26th July 1999, leading to the Electricity Regulation Act 1999.

Deregulation of the Irish market in February 2000 allowed newly licensed generators and suppliers to compete with ESB, formerly a State monopoly. The market was fully opened to suppliers of renewable energy at this stage, with similar access to the market for Combined Heat and Power (CHP) traders implemented in 2001. The eligibility threshold for competitive supply was initially consumers using 4GWh per annum; this was reduced to 1GWh, effective on 19th February 2002, opening 40% of the market to retail competition. In February 2004, electricity users with annual energy consumption greater than 0.1GWh have been free to choose their own electricity supplier, effectively opening up 56% of the Irish retail electricity market to competition.

Full retail market opening in Ireland is fully completed now. ESB PES acts as the Public Electricity Supplier (PES) and is the largest supplier in the Republic of Ireland. ESB PES is subject to an Economic Purchase Obligation (EPO). Currently this obligation is met through a combination of pre-existing contracts with renewable generators under the Alternative Energy Requirement (AER) Programme, with Edenderry (a peat station), with two new Independent Power Producers (IPPs) and a residual requirements contract with ESB PG.

ESB Power Generation (PG) is the largest incumbent generator. It currently has a portfolio of 19 plants with a varied fuel mix (coal, peat, hydro, oil and gas) totalling close to 5GW of installed capacity. Over the last few years a number of generators independent of ESB PG have entered the market and reduced the market share of ESB PG. In 2002 Huntstown CCGT was the first independent generator in Ireland with a capacity of 345MW. In 2003 Dublin Bay Power opened a 400MW gas power station. New entrants also include Edenderry (120MW), Tynagh Energy's 400MW CCGT, and Aughinish Alumina's 150MW CHP plant. However, with close to 80% of the Irish generation capacity, ESB still has a dominant share.

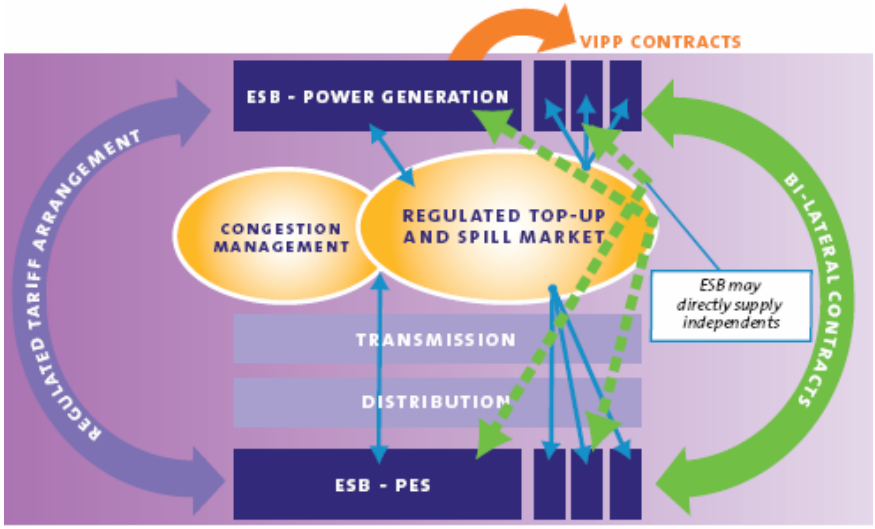


Ireland's electricity market is currently a bilateral contracts market with imbalance pricing. This provides for bilateral trades between generators and suppliers for the purchase of electricity. Generators nominate to the Transmission System Operator (TSO) the schedule of energy they want to produce (for trade a day ahead of real-time operation). They also submit the prices they require (i.e. incremental and decremental

prices or bids), if changes in output are needed. The TSO uses this schedule, making any adjustments necessary to reflect transmission system requirements, changes in generator availability and any difference between forecast and actual customer demand. Any resulting imbalances are settled ex-post at the top-up and spill prices.

As previously mentioned, energy prices are primarily set under the terms of bilateral contracts between suppliers and generators. Furthermore, top-up prices are set by the CER, based on a determination of the cost of the Best New Entrant (BNE), while spill prices in each half hour are determined by the decremental price offer (subject to a floor) of the marginal generating unit on the system in that half hour.

As the initial commercial positions are based on forecasts, imbalances are a normal occurrence (e.g. customer demand may be higher than expected or a generator may be unavailable etc). Under the Trading and Settlement Code, the SSA calculates the imbalances that participants may face. Participants have an opportunity to 'trade-out' imbalances and notify the SSA of these nominated volumes. The SSA then calculates the amount each participant owes, or is owed and also calculates the payments to be made by the TSO to compensate generators, if changes to their nominations are required for transmission system reasons. Finally, the SSA invoices for these charges and arranges the transfer of funds. Within ESBNG/EirGrid, the Market Operations department is responsible for managing the settlement activities and is the Settlement System Administrator for the market.



COMPARATIVE ANALYSIS OF MARKET STRUCTURES
CURRENT DECENTRALISED MARKET STRUCTURE

With a move towards an All-island Market planned for 1st July 2007, where the Republic of Ireland and Northern Ireland will constitute a single market, the current bilateral trading model will be replaced by a mandatory pool spot market.

Previously, the Irish transmission system was owned and run by ESB as a vertically integrated utility. ESB National Grid is now acting as TSO on a ring-fenced basis until 1 July when Eirgrid will be “vested” and take over the responsibility of operating the transmission system. In Ireland, the TSO also performs the role of Settlement System Administrator (SSA), to process and settle trade imbalances within the market.

1.11 Italy

Transmission networks have been legally unbundled and a TSO established - GRTN. To facilitate competition in the wholesale electricity market, a Market Operator has also been created. The Italian power market is still dominated by ENEL despite its divestment of 15GW of generation capacity. A significant amount of capacity is also subsidised either through the CIP6 off-take contracts, or through the receipt of payments to stranded assets - both of these subsidy mechanisms being recovered through a levy on consumers.

GRTN is responsible for managing the planning and operation of the transmission grid, sells electricity from renewable generation and from "assimilated" sources as well as managing cross border interchanges. GRTN owns the Italian power market GME (Gestore Mercato Elettrico) which consists of two energy markets:

- the Day-Ahead Market (MGP); and
- the Adjustment Market (MA).

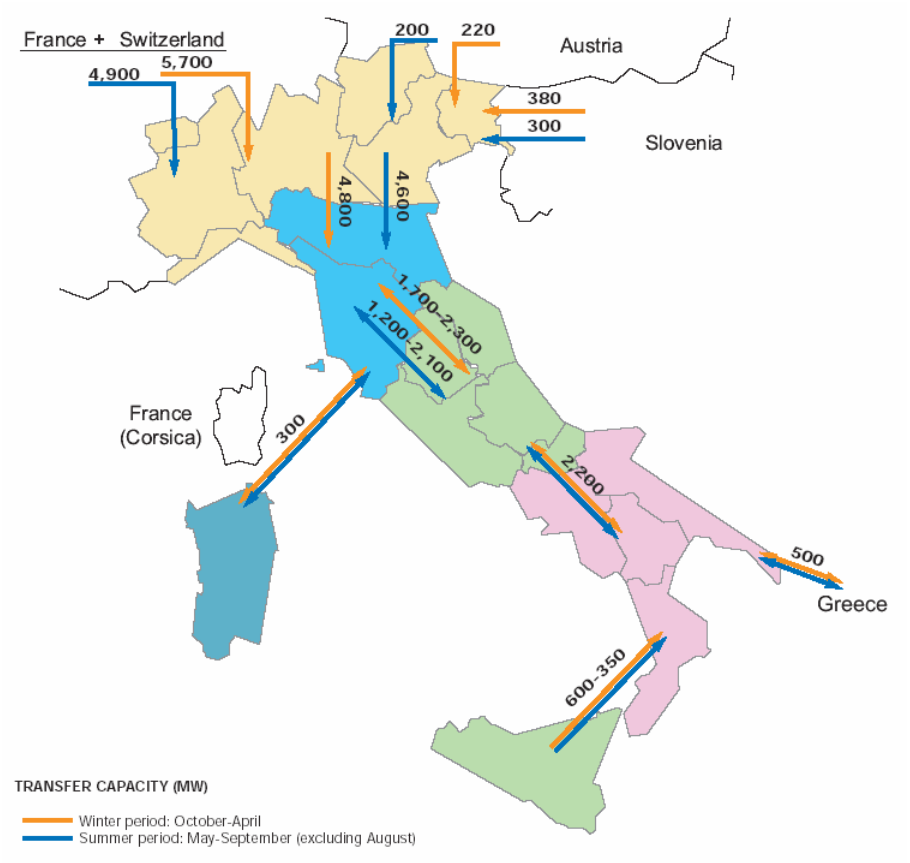
In these markets, producers, wholesale customers and final eligible customers sell and purchase electricity for the next day. The main market is highly liquid with over 65% of energy traded through it.[7]

In addition GME operates an Ancillary Services Market (MSD), where GRTN procures resources for dispatching, i.e. management, operation and control of the power system (planned grid congestion management, purchase of operating reserve for the next day, and electricity for realtime balancing of the system); a Green Certificates Market; and the Energy Efficiency Certificates Market.

GTRN also owns Aquirente Unico – a single buyer responsible for purchasing power for captive customers which it resells to distributors. This will cease to exist in 2007 when the final segment of the market is opened.

The Italian transmission system is relatively constrained, in part due to the significant imports from France and Switzerland, which alone account for around 15% of electricity on the Italian system and cause significant North-South flows. These constraints have been reflected in the zonal design of the power market, which result in a nodal price being set for power potentially in each of the 7 Italian market nodes (zones). The Italian transmission system has Interconnectors with France, Switzerland, Austria, Slovenia and Greece. The power flows over these interconnectors have a significant effect on the markets, with over 50TWh of power imported.

[7] Source GME

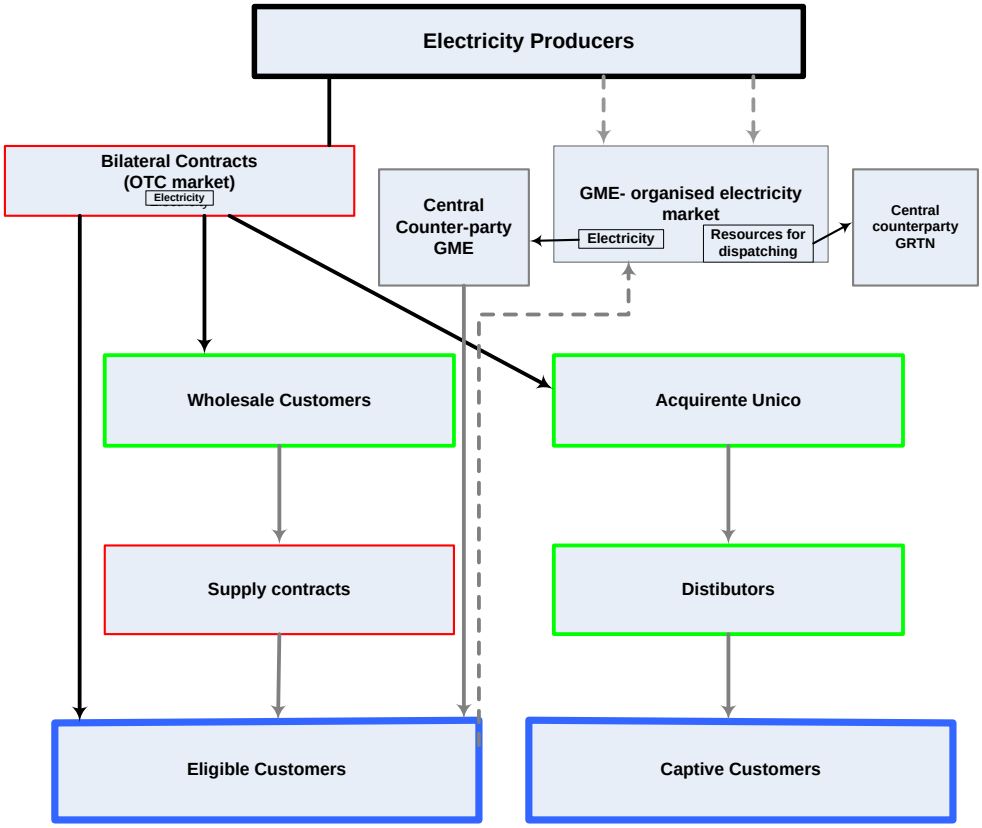


Source: Italian System Operator

The European directives on Sulphur and NOx emissions under the IPPC and LCPD (2008) restrict the running of oil and coal fired plant that still account for around 30% of generation in Italy. Italy has historically had a heavily oil-based generation fuel mix, but over recent years there has been significant growth in gas fired generation, through refiring and redeveloping existing plant as well as some new build. This growth in gas fired generation is likely to continue, driven both by the LCPD and the EU ETS which favour cleaner less carbon intense generation technologies.

The development of renewable energy within Italy is being supported by a tradeable Green Certificate scheme, which renewable generation eligible for certificates over the first eight years of operation. This significantly enhances the value of renewable generation and has lead to a significant growth in the numbers of schemes planned. The majority of these schemes are wind generation, with capacity capable of generating over 7TWh at various stages of development.

The Italian markets are designed to reward demand side flexibility, and the development of demand side energy efficiency is also being encouraged through a “white certificates” scheme.

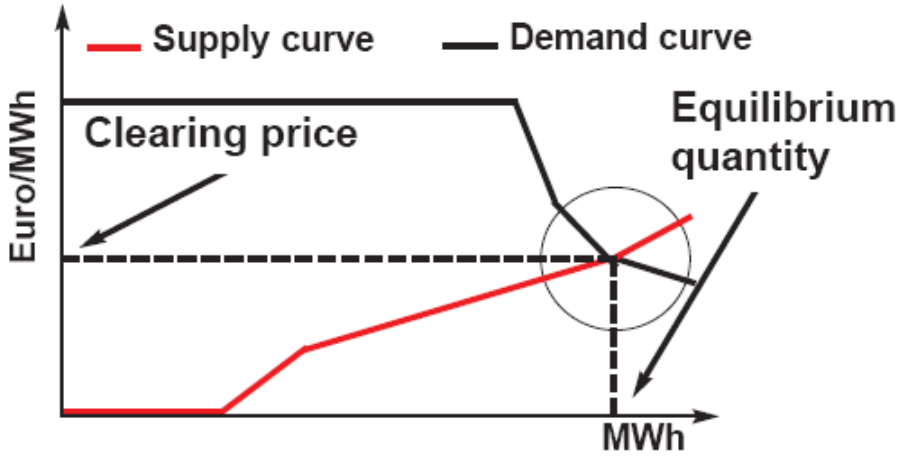


Italian Market Structure

The power exchange consists of three linked markets:

- A day-ahead market (MGP)
- An adjustment market (MA)
- An ancillary services market (MSD)

The day ahead market closes at 0900 the day before operations, at around 0800 the system operator publishes data on forecast demand etc. for the following day and bids and offers are forwarded electronically by participants who may provide either simple offers/bids (a single quantity price pair) or more complex multiple offers (up to four price-quantity pairs). GME collects all the bids and checks them for validity (whether they meet the requirements for bids) and technical feasibility (whether total quantities offered match the volumes that can be bought/sold at each supply point and whether the value of demand bids matched guarantee margins). GME then selects bids and offers in a non discriminatory price auction (economic merit order) while respecting transfer capability limits between the various zones and the market simply clears on an hourly basis setting prices and volumes for trades.

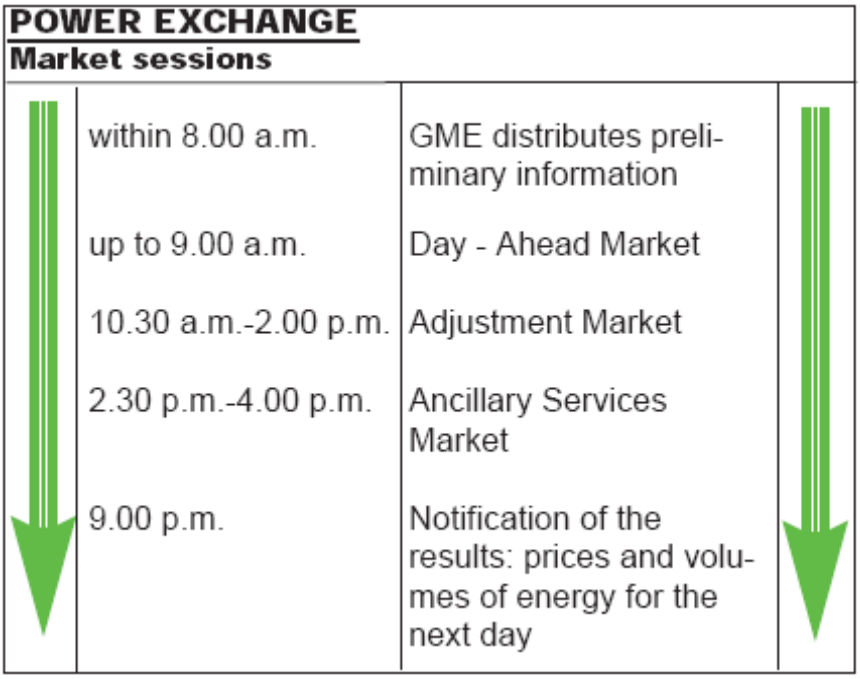


Accepted offers/bids pay or receive a clearing price, defined via an algorithm taking into account the selling prices differentiated by zone and the results of bilateral contracts (OTC market), the algorithm applies a single nation-wide purchasing price (PUN), equal to the average of the zonal selling prices, which are weighted to account for zonal consumption. Following this, market participants are notified of the results of their bids and offers and GTRN and the participants are notified of the schedule for the following day.

However, these schedules take no account of the physical nature of plant and may – for example – require plant to operate in an infeasible manner, shutting down for only an hour say. To rectify this participants use the Adjustment Market (MA) which operates between 1030 and 1400 allowing adjustments from the basic schedule to achieve a more economic (or feasible) outcome.

Three types of offers/bids may be submitted into the MA: simple offers/bids (quantity/ price pairs), multiple offers/bids (four quantity/price pairs) and balanced offers/bids (set of offers/bids submitted by one or more participants, refering to the same reference period and to offer points belonging to the same geographic or virtual zone, so that the respective quantities are balanced and identified as mutually balanced). Again, GME collects and verifies the bids for validity and technical adequacy and then selects them, under the economic merit order criterion, determining a clearing price. In the MA, the clearing price is a single nation-wide price applicable to all offers/bids, if there is no grid congestion, and a price geographically differentiated by zone, if there is grid congestion. Finally, GME notifies the results to each participant and to GRTN.

In the last stage from 1430-1600 the Ancillary Services Market (MSD) operates. In this market, GME collects offers/bids and notifies results, but the acceptance of offers/bids falls under the responsibility of GRTN, which acts as a central counterparty. In the MSD, GRTN selects power plants to create the reserve capacity required to cover off deviations from expected generation or unexpected requirements. GRTN may also increase or decrease the generation of appropriate generating stations to resolve grid constraints. In the MSD, GRTN selects offers/bids by merit order, taking into account physical constraints of power plants and of the power grid. GRTN also secures reserve capacity, which may be used in real time for balancing purposes.



Source: GRTN

1.12 Latvia

Latvia's power sector includes around 2100MW of generating capacity – 600MW of thermal power (from CHP plants), 1500MW of hydropower (4 large stations on the River Daugava and around 120 small units) and a small quantity of wind power.

The Baltic Dispatching Center (DC Baltija) was founded in 1991 by energy specialists from the Baltic countries. DC Baltija successfully manages the Baltic electricity union and its operations. The Latvian energy grid has been successfully integrated into a joint Russia – Baltic – Belarus energy grid, helping prevent system failures.

BALTREL (The Baltic Ring Electricity Co-operation Committee), funded in 1998, is an association formed by energy companies in the Baltic Sea region. It works as a discussion forum analyzing issues and problems of common interest to these countries. The aim is to undertake the "Baltic Ring" project.

In 1998 started the ESTLINK project, the aim of which is to build a sub sea electrical link between Estonia and Finland across the Bay of Finland. Latvenergo has been participating in ESTLINK as a partner since 2001.

Like Estonia and Lithuania, Latvia operates a Net Pool or Bilateral Market whereby only contractual imbalances flow through the central pool. Balancing periods are 60 minutes and gate closure in Latvia is 2 hours ahead of real time.

1.13 Lithuania

The market was restructured on 1st January 2002 and the state monopoly Lietuvos Energija (LE) was split into two distribution/supply businesses (one of which has since been privatised), two generation businesses and a transmission business. The Transmission business also became the TSO and is now part of LE performing the

national balancing functions. Lithuania's electricity market is based principally on bilateral agreements concluded either between electricity producers and suppliers or between the Market Operator and producers. Electricity trade may also be arranged through the auctions following the Auction Rules, prepared by the Market Operator and approved by the Minister of Economy.

According to the Law on Electricity, there are two types of electricity Suppliers – Public and Independent. The Public Supplier is a legal entity, the owner of a distribution network, who has the Public Supplier's license and who is obliged to supply energy to the customers connected to this distribution network if the customers have no right or are not willing to choose another supplier. The electricity is supplied at a price conciliated with the regulator, the National Control Commission for Prices and Energy (NCC). The distribution companies are Rytu Skirstomieji Tinklai AB and Vakaru Skirstomieji Tinklai AB. On the other hand, the Independent Supplier is a legal or physical entity with a respective license and supplies electricity to eligible customers on contractual prices. Since 2003 there were 14 Independent Suppliers in Lithuania.

The Eligible Customers are entitled to freely choose their electricity supplier and their status is granted by NCC through an established procedure. In July 2004, all non-residential customers were granted a right to choose their electricity supplier, and from July 2007 this right will be granted to all customers.

The market structure is based on bilateral contracts whilst transmission, distribution and public supply prices are regulated. Electricity trade in the wholesale electricity market is performed by signing direct bilateral purchasing-selling agreements between electricity producers and suppliers. The deficient or surplus electricity quantities may be bought or sold at auction and includes the additional power, balancing power and regulating power. Wholesale electricity market players are companies holding a license of public or independent supplier or a permit to produce, export or import electricity. All market players are registered by the market operator while their relations are set forth by the Rules of Electricity Trade. In 2004 the structure of the trade was as follows: bilateral contracts (70%), auctions (12%), and public service obligations (PSO) (18%).

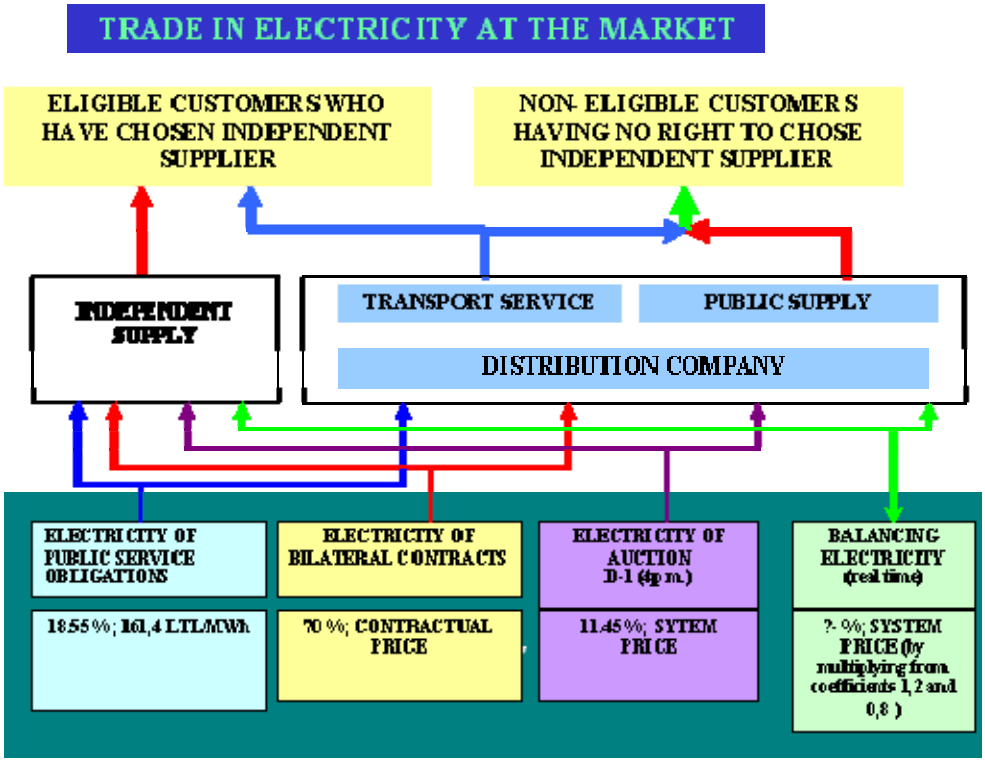
After NCC sets the price cap, the companies draft the tariff system in conformity with the established methodology, and thereupon the tariffs have to be approved by the regulator. NCC in a similar way sets the price cap for the predominant electricity producer – the Ignalina NPP covering more that 25% of the market. This price cap is meant to create a stable price and decrease the possibility of a dominant power producer using its market power. The prices of other producers, excluding the prices for electricity generated in accordance with the PSO, are not regulated. The PSO electricity prices are defined by NCC and consists of electricity produced:

- from renewable energy resources and waste incineration;
- in the CHP, when heat energy is supplied to the urban district heating systems;
- in power plants designated by the Government to provide reserve for power system reliability and to secure safe operation of the Ignalina NPP.

Under the Law on Electricity all Supplies are obliged to buy all the PSO electricity at an average price which LE, as Market Operator is in charge of designing. [8,9]

[8] J. Rymantas, P. Vladas (Lietuvos Energija). Pricing of Electricity in a Small Market: Experience of Lithuania

[9] Lithuanian National Energy Strategy 2002. Lithuanian Energy Institute, 2003.



1.14 Netherlands

The Electricity Act of 1998 implements the EU Electricity Directive in Dutch law and replaces the Electricity Act of 1989. The 1998 Act dismantled the umbrella organisation of the four generation companies in four separated companies and transferred the grid operations to TenneT B.V., the Dutch independent TSO. Suppliers and consumers may trade electricity through bilateral contracts or through the Amsterdam Power Exchange (APX).

Since October 2001 the State of the Netherlands has been the 100% shareholder of TenneT. Apart from tasks related to providing the high voltage transmission service, the allocation of interconnection capacities, programme responsibility and securing black-start capability, TenneT is also responsible for safeguarding the energy balance in the Dutch system and has overall responsibility for the safe and reliable transmission of electricity in the Netherlands. On the balancing market, the parties bid to give TenneT the right to adjust their imbalance, using a single-price auction format. The volume of electricity that is traded on the imbalance market is about 3.5% of consumption[10].

The energy sector is regulated by DTe, a part of the Dutch Competition Authority (NMa). According to the Act, DTe guarantees transparent grid access conditions and transmission pricing. It regulates TPA to the electricity network and ensures free and non-discriminatory access to the grid. DTe also determines rate structures in consultation with TenneT and grid users.

Electricity is traded on several wholesale markets. In addition to the informal, bilateral market for non-standardized contracts, there are several markets for standardized products, which help in making the market transparent. The APX, which was founded by

[10] www.dte.nl

energy companies and financial institutions, has offered a day-ahead spot market since the summer of 1999. The APX uses a single price two-sided auction format on which one can trade today, in hourly contracts, for delivery of electricity tomorrow. Although it is a voluntary market, regulations force electricity imported using capacity bought in TenneT's day-ahead interconnector auctions to be traded through the APX[11]. In the first year, the volume traded on the APX was about 2% of Dutch total net electricity consumption and it has increased to 15% (14.12TWh) in the record year 2002. In 2004, the traded volume was 13.4TWh.

The Dutch regulator has expressed concerns about the limited liquidity on Dutch wholesale markets as the number of active players is decreasing, the traded volume has not increased since 2002, and there is a strong price reaction to an additional order of a certain amount of MW. The regulator also link liquidity to the structure of markets and to market power of the incumbent generators. It has been discussed whether, to guarantee the public interest, some type of licensing of generation would be desirable, but at the moment, the wholesale market is still completely unregulated.

1.15 Poland

The installed capacity in Polish electricity system amounts to 34 672 MW with most constituted by thermal (predominantly coal) power plants. Total production amounted to approximately 157 TWh (1,8% increase compared to 2004).

In 1997 the Polish parliament passed the Energy Law, with the stated aim of providing energy security, rationalizing the use of fuels and energy, promoting competition, counteracting the negative effect of monopolies, protecting the environment and ensuring consumer choice. The Law unbundled ownership of the electricity sector from regulation and policymaking— placing responsibility for energy policy development with the Ministry of Economy (formerly MIT), ownership (including responsibility for privatisation) placed with the Ministry of Treasury, and the newly created Energy Regulatory Authority (URE) was given responsibility for regulation and ensuring competition develops. URE's main activities include licensing (electricity generation, transmission, distribution and supply are issued with separate licenses) as well as tariff setting.

The Energy Law and related regulations also established the legal framework for the opening of the market - phasing in of Third Party Access (TPA) to the grid and consumer choice in their electricity supplier, which began in 1998. As of Jan. 1 2000, all consumers with annual consumption above 40GWh were free to choose their supplier and by the end of December 2005 all 14 million customers were free to choose suppliers. However passage of the new Electricity Directive 54/2003/EC and Polish association with the EU structures meant change to this roadmap and all consumers will gain the right to choose suppliers starting from 1st July 2007. It's worth noting that the right to choose independent suppliers is poorly utilised by the industrial and commercial customers which have gained the right to choose third-party suppliers to date. In 2005 bilateral contracting covered only approximately 11% of final consumption.

The Law also enabled creation of the Polish Power Exchange (POLPX), a voluntary power pool and futures exchange and a few insignificant independent power exchanges. The market is decentralised and the volume of power traded through the exchange is minimal (around 2TWh or about 2% of total final electricity consumption as of 2005)

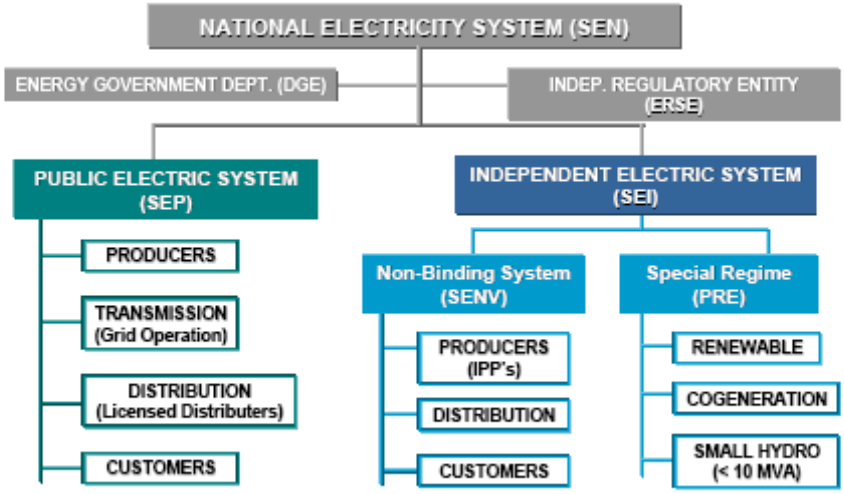
[11] The Dutch system is characterized by a large amount of imports.

with the contract market dominated by bilateral contracts (executed before the Law was passed) still cover approximately 35 % of generated electricity – many of which were long term PPA agreements put in place to pay for the modernisation of the Polish generation fleet and are now being revisited as they are now seen as barriers to competition..

The activities of the former state integrated companies were unbundled and the state company Polish Power Grid Corporation - PSE (Polskie Sieci Eelektroenergetyczne), is responsible for the transmission of electricity in the country. PSE uses a 'balancing' market to rectify the differences between contracted flows and actual demand/generation and is responsible for energy exchanges with its neighbours. Local distribution companies (of which there are 33) also organise "local" markets for generation connected at low voltage.

1.16 Portugal

In Portugal the national electricity system's organization is based on the coexistence of a Public-service Electricity System (SEP) and an Independent Electricity System (SEI), as shown on the figure below.



Within the SEP the principal participants are the National Transmission Grid (RNT), which is operated under a public-service concession regime by Rede Eléctrica Nacional, S.A. (REN), the Binding Producers (generators) and the Distributors of electric energy who are bound to the SEP by means of a contractual regime. There are three Generation Companies, one Distribution Company and one Grid Operator within the SEP where the grid operation and the public distribution are regulated activities. The Binding Producers have commercial relations with REN by way of exclusive long term supply contracts. Binding Distribution operators are obliged to supply SEP customers with the electricity these have contracted, subject to the tariffs and conditions laid down by the electricity regulator.

The SEI comprises the Non-Binding Electricity System (SENV) and the Special Generation Regime (PRE). The SENV is composed of Non-Binding Producers and Non-

Binding Customers[12]. The PRE is characterised by the generation of electricity using cogeneration and renewable energy sources including small hydro. The producers deliver electricity to the SEP's network within a specific legislation that contemplates both technical and tariff issues.

The expansion of SEP generation capacity is decided accordingly to expansion plans approved by the Minister of Economy and published by the Directorate-General for Energy (DGE). In accordance with current law, REN is responsible to carry out the Expansion Plan for the Public Service Electricity System. As a general rule, the construction of each new generation capacity of SEP is subject to tendering procedure and the generating units of SEP are subjected to central dispatching. A part of the electricity generated by auto producers is used to supply their own consumption (self-consumption). The remainder is sold to the grid company, which has the obligation of buying it accordingly to buy back tariffs.

It is the regulator (ERSE) duty to supervise compliance with the SEP's functioning rules and the relationship between the SEP and the SENV, to formulate the eligible criteria for customers to join the SENV and to regulate the activities conducted within the ambit of the SEP, namely to fix tariffs and prices for electricity as well for other services supplied by RNT concessionaire and by the holders of binding distribution licenses.

The previously described system is present on the mainland whilst for each island (Madeira and Azores) there is a local company that operates the electric system in the areas of generation and distribution.

Portugal now plans to merge its electricity market with that of the much bigger Spanish system into a single Iberian Electricity Market (MIBEL).

1.17 Slovakia

According to EU Energy legislation, the new Directive 2003/54/EC and the Regulation No. 1228/2003, were adopted in June 2003 and with respect to the energy market rules and access to the network, a new Slovak energy legal framework was implemented in 2003. The Energy Act and the Regulation Act were formulated under the leadership of Ministry of Economy and they have been valid as from May 2004. The work on updating an associated secondary legislation followed including the Slovak Grid Code and the Dispatch Order as well as formulation of a new Decree on electricity market rules. In terms of market opening, all non-household customers got the status of eligible customers as of July 2004, and from July 2007 the remaining customers will become eligible in accordance with the EU Directive.

The electricity grid network will remain in state hands. Slovenska elektrizacna prenosova sustava (Slovak Electricity Transmission System, Plc, SEPS) was registered as an independent state owned legal entity in 2002. It acts as TSO for the Slovak Republic and has been appointed by the Ministry of Economy as the temporary market operator. The Principal stockholder of SEPS is the National Property Fund.

In 2003 following the new legislation, SEPS signed new contracts with its partners, especially with regional distribution companies and direct eligible consumers according to the new liberalised energy market conditions. Contracts include transmission services,

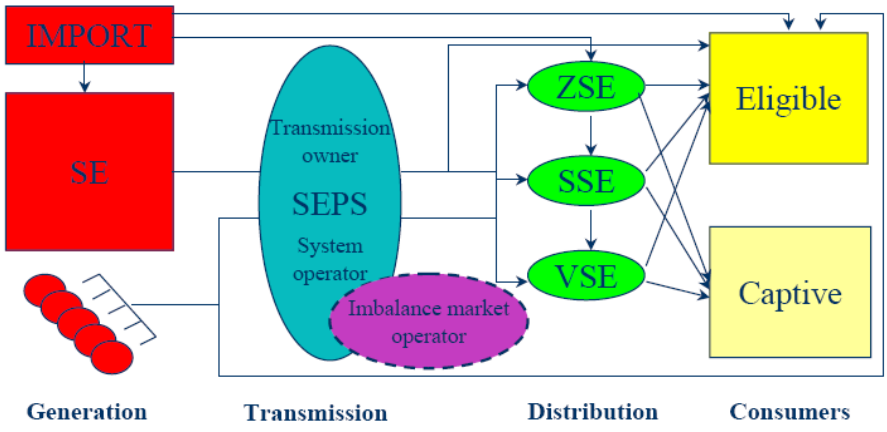
[12] These customers are entitled to use the SEP's networks provided that they pay the respective access tariffs

system services and accounting deviations. For the first time in its history, the company procured most of ancillary services from the dominant producer Slovenské elektrárne (SE).

There are three distribution companies that distribute electricity in three Slovak regions: Zapadoslovenska Energetika a.s. (Western Slovakia Power Company), Stredoslovenska energetika (Middle Slovakia Power Company) and Vychodoslovenska Energetika (Eastern Slovakia Power Company). The ownership is mixed where part is owned by the state.

The official regulatory body for the regulation of network monopolies was established in 2001. Urad pre regulaciu sietovych odvetvi (The Office for Regulation of Network Monopolies, URSO) regulates production, sale, transmission and distribution of electricity, gas and heat, regulates production and distribution of drinking water and also regulates price of sewage water. URSO is in charge of promoting competition in most areas.

All local and foreign companies that want either to sell locally produced electricity or export electricity to Slovakia have to meet criteria described in Slovak Transmission System Code, The Dispatch Order and The Commercial Code of Transmission Gird. These documents comprise rules and principles for providing both transmission and system services by SEPS to all its customers.



1.18 Slovenia

As a member of the EU from May 2004, Slovenia is following the principles of the EU energy policy. All the EC directives regarding the energy sector have been incorporated in Slovenia's legal system.

The basic legal organisation of the energy sector was set out in the new Energy Act of 1999 which incorporated the principles of EU energy policy principles. This included the opening of the energy market in conformance with the EU internal market. The Energy Act also defines the principles of energy policy, security of supply, efficient use of energy, use of renewable energy sources, and ways and means of undertakings in the field of energy to perform PSOs. The Energy Act also specifies the conditions for energy installations' operation, energy undertakings' operations, the issuing of licences and energy permits, and defines and creates necessary administrative bodies.

The Energy Act provided for market opening for competitive supply first for the internal market and later for the external market. From April 2001 the internal market was

opened to customers using more than 41kW and from January 2003 the external market was opened. The Energy Act also defined the requirements for separation of network ownership and operation, and creation of a regulatory body, overseeing the regulated TPA, general market oversight and settlement of disputes. The regulatory agency, Agencija za energijo RS (AGENRS) was established and started operation in 2001 and has issued over 800 licences for 21 different licenced activities. The regulator is formally separate from the Ministry of Energy with a government-nominated Director serving a term of 5 years.

The public service activities (management and operation of networks, supply to tariff (non-eligible) customers) were separated from competitive activities (generation and supply). This separation is institutional (legal) at the transmission level. At the distribution level, legal separation is not required by the law and was not adopted in practice. In general, separate accounts are required for each activity in the sector but the same legal entity is permitted to perform several public service obligations.

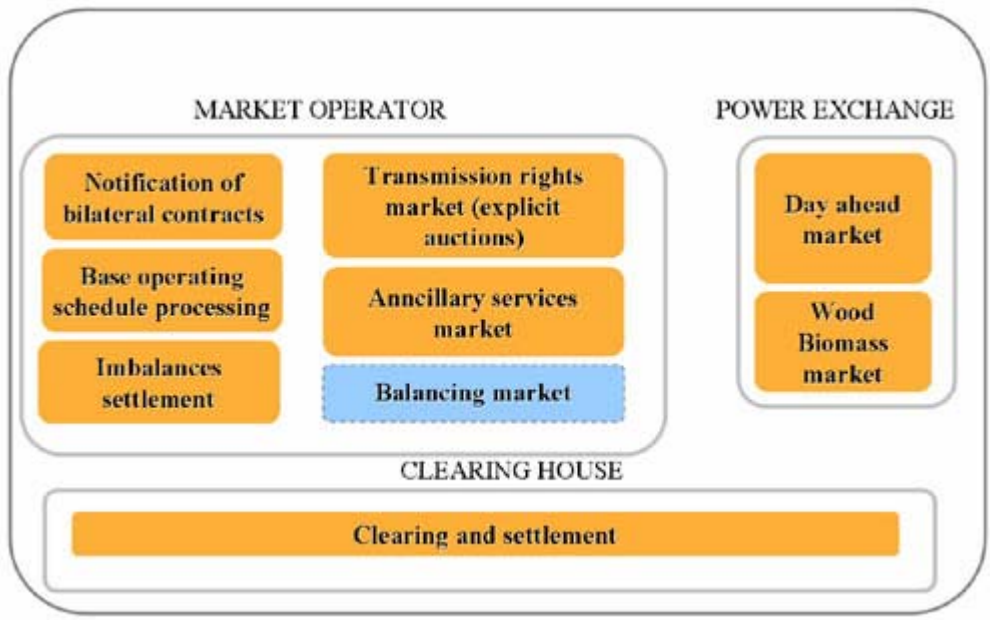
The five previous distribution companies (Elektro-Celje, Gorenjska, Ljubljana, and Primorska) perform public service activities, and also supply to eligible customers in functionally, but not legally separate departments. The companies therefore purchase electricity for both commercial and public service supply. The Energy Law allows the government to impose conditions on the public service supply, such as procurement of a defined share form secure (e.g. domestic) sources, which does not apply to commercial purchases.

The Government is still responsible for setting prices (tariffs) for non-eligible customers, as well as for energy policy and promotional activities, such as feed-in tariffs for electricity from renewable energy sources. The national government is also responsible for operation of public services, which consist of management and operation of the transmission and distribution networks and supply to non-eligible customers.

The TSO, Elektro Slovenija (ELES) also owns the transmission network and still owns several non-network subsidiary companies, including a large consumer (TALUM – a major consumer for aluminium production), generation-related unit (ELES-GEN, co-manages the sale of electricity from the nuclear power plant Krško), and electricity market operator BORZEN. It is expected that ELES will divest all activities not related to transmission network management and operation. ELES was a single buyer entity on the electricity system up to 2001.

In 2001 five electricity producers and a coal mine were merged into a single holding company (HSE) with the remaining supplies in the market from three private enterprises – the nuclear plant at Krsko (NPP), the combined heat and power plant at Ljubljana (CHP) and the coal-fired thermal plant at Trbovlje (TPP).

The Market Operator was one of the significant developments introduced by the Energy Act. It is responsible for ensuring transparency of the organized electricity market by publishing price information and indices and quantities based on electricity market trades in each time period. The formal marketplace BORZEN started trial operation in early 2001 and is the meeting point of supply and demand of electricity operating daily and hourly markets. It also manages a registry of all physical delivery contracts. Full details of the contractual energy flows are required and used for preparation of operational planning whilst no commercial information disclosure of bilateral (OTC) contracts is required.



1.19 Spain

Significant progress has been made in opening the market where all Spanish customers are eligible for competitive electricity supply. Consumers have the option of staying under regulated tariffs until 2007, at which point they will have to buy their electricity from the liberalized electricity market. The deregulated power sector accounts for about a third of Spain's total electricity market. The economic and technical management of the system, transmission and distribution are considered regulated activities and their economic arrangements and the way they work are determined by the 1997 Law while the retailing of electric power is considered as non-regulated activity. TPA to the networks is also guaranteed by the Law.

The Spanish electricity wholesale market or "pool" has been operated by Compañía Operadora del Mercado Español de Electricidad, SA (OMEL) since 1997. The market is organized as a sequence of markets: the day-ahead market, several intra-day markets that operate close to real time, and the ancillary services market. Participation in these markets is not compulsory, as market participants are allowed to enter into physical bilateral contracts.

The day-ahead market is composed of 24 hourly markets that clear once a day. On the supply side, the Spanish electricity producers and the external agents, if not tied to a bilateral contract, submit supply functions specifying the minimum price at which they are willing to produce a given amount of output from each of their production units. Supply functions have to be non-decreasing and can include up to 25 price-quantity pairs per production unit. The demand side is made of distributors who purchase the electricity demanded by the non-eligible consumers at regulated tariffs, the retailers who sell electricity to the eligible consumers at unregulated prices, the eligible consumers who choose to participate directly into the pool, and the external agents. They submit demand functions specifying the maximum price at which they are willing to purchase a given amount of electricity. The demand functions can include up to 25 price-quantity pairs.

Once the supply and demand bids have been submitted, the market operator OMEL constructs a merit order despatch by ordering the supply and demand bids in ascending and descending order, respectively. The despatch and the equilibrium prices are

determined through market clearing by computing the intersection between the industry supply and demand curves. Conditionally on being despatched, the price to be received or paid by the market participants is set according to a uniform-price auction and the price they receive/pay is set equal to the highest accepted supply bid (System Marginal Price, SMP).

Once the day ahead market closes, the System Operator (Red Eléctrica de España, REE) studies the feasibility of the despatch and, on the basis of the bids submitted by market participants in the day-ahead market, modifies it by adding or removing the energy required to solve the congestion. The production units used to solve the transmission constraints are paid their own bid, whereas the units which are displaced from the despatch do not receive any payment at all. The extra-costs for solving the constraints are recovered though a lump -sum, and thus do affect the value of the SMP. REE also runs several markets in which production units compete to commit their capacity to provide ancillary services when needed.

Following these procedures, market participants may adjust their positions in either direction (e.g. producers may submit purchase bids if they expect to be short, and distributors, retailers and eligible consumers may submit sale bids if they anticipate to be long) in a sequence of six intra-day markets. The bidding and market-clearing processes in these markets are similar to the ones in the day-ahead market. In particular, all units are bought or sold at the highest accepted bid. REE runs several markets that allow market participants to overturn any potential deviation with respect to their previously undertaken commitments.

The final price of electricity comprises the equilibrium prices in the previously described markets and per kWh costs of running the technical processes needed to balance the system. Furthermore, the final price includes a capacity payment. The Law passed in 1997 entitled the incumbent generators to some additional payments to compensate them from their stranded costs referred to as Competition Transition Costs (CTC)[13].

Spanish market is dominated by two largest companies (Endesa and Iberdrola). Combined with the described stranded cost regime, this tends to distort the wholesale market. At the other side, end user prices are regulated and this tends to constraint the degree of competition. It is believed that greater interconnection between Spain and Portugal may improve this situation. Agreement between Spain and Portugal in creating a single Iberian Electricity Market (MIBEL) has been effective from 20 April 2004 and the creation of a Single Iberian Market Operator was planned by April 2006. However, the election of the new Spanish government in 2004 slowed down the creation of MIBEL.

Spain's CNE energy commission issued a report last year confirming the existence of widespread price fixing and profiteering by utilities in the pool, in both supply and demand activities. At the same time, there have been indications that the government is looking at a new settlement system for power stations that would mean lower income for the majority and contemplating restricting entry to the wholesale pool to reduce the amount of capacity presently benefiting from the marginal cost of production. It is

[13] The difference (possibly negative) between the value of the standard costs and the expected payments that each of them would have in the market place. In a given year, the total amount paid to the whole industry in terms of CTCs is the residual amount left after deducting from the tariff revenues the costs of the regulated activities (distribution and transmission), the subsidies to the consumption of national coal, and the costs incurred by the distribution companies from purchasing the electricity in the pool. Each generator entitled to these payments receives a fixed proportion of the residual amount. Endesa's CTC share was set equal to 51.2%, Iberdrola's was 27.1%, Unión Fenosa's was 12.9% and Hidrocantábrico's was 5.7%.

believed that the government will propose taking older stranded cost-remunerated (CTC) plant out of the pool and place it under a regulated tariff regime. Under the current regime, CTC payments are suspended when the pool prices breach €36/MWh and the utilities[14] are in favour of the proposal knowing that their power stations have a better chance of recouping CTCs outside the pool.[15]

1.20 UK

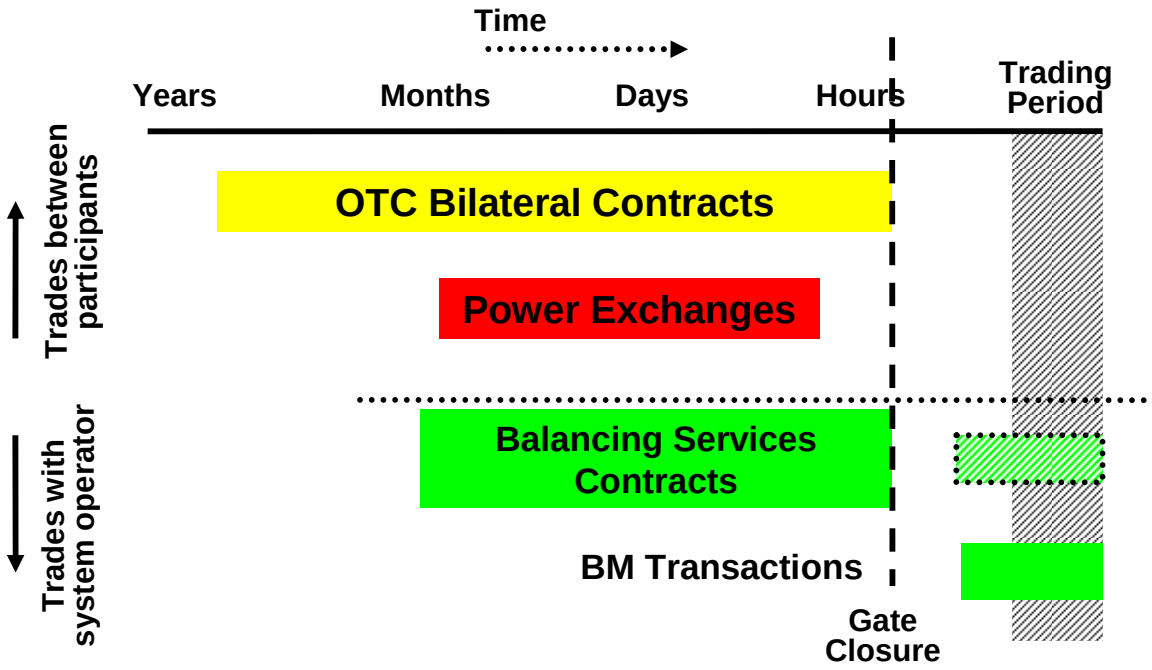
The UK electricity market is fully open (with the exception of Northern Ireland this was achieved in 1999) and supply competition is well established with 7 major national suppliers (all of which have significant generation activities) and a number of smaller specialised suppliers (concentrating on specific market segments or geographical areas). In Great Britain (England, Wales & Scotland), while the ownership of the transmission network remains in the hands of the three original companies (National Grid in England and Wales, Scottish Power and Scottish Hydro-Electric in Scotland) these are now operated by a single TSO (a separate subsidiary of National Grid) which is also responsible for network planning and development. Transmission is a price regulated activity with three separate price controls – one for each area – and there is a separate TSO price control regulating the costs of transmission operation which is recovered from all system users.

The market organisation in GB is a bilateral market where individual suppliers and generators are responsible for balancing through entering into contracts (either through bilateral OTC deals or else on an organised exchange UKPX). At gate closure (1 hour before the start of the half-hour trading period) these contracts are notified to the central systems and at the same time the intended operations (generation and demand) are notified to the system operator together with bids and offers for adjusting generation or consumption. At this point market participants may no longer trade with each other and are generally obliged to operate in line with nominations.

In real time, the TSO is responsible for balancing the system by buying and selling energy and securing ancillary services. A special "balancing mechanism" is available to the TSO to do this but it is also free to purchase energy or option contracts outside these arrangements if it wishes (under a general obligation to act economically and an incentive mechanism on the cost of balancing). After the event the meters are read and compared to actual generation and consumption and any imbalances "cashed out" at imbalance price.

[14] Endesa and Union Fenosa mainly, who receive the bulk of CTCs.

[15] Sources: Statistics and prospects for the European electricity sector (1980-1990, 2000-2020), (EURPROG 2004); C. Crampes, N.Fabra, "The Spanish Electricity Industry: Plus ça change …", Cambridge Working Papers in Economics, November 18, 2004



Imbalance prices are determined for each half hour and are different for participants that are "long" and "short". In each case where a participant is out of balance in the opposite direction to the system (that is it is short power – too little generation or too much demand – while the system is long or *vice versa*) pays or receives a "neutral" price based on the value of electricity in the traded market while those out of balance in the same direction as the system are charged (or receive) a penal imbalance price – System Buy Price or "SBP" (for short parties) or System Sell Price "SSP" (for those that are long).

SBP and SSP are determined based on sales and purchases made by the TSO in that half hour (plus an apportionment of the cost of option contracts etc.) and are now broadly "marginal" prices although trades for system reasons (resolving constraints, providing reserve etc.) are excluded.

The costs of operating the system (the costs of the TSO sales and purchases etc.) are recovered from all system users in a charge (Balancing Services Use of System or BSUoS) which is determined for each half hour trading period and levied on a per kWh basis. The aggregate cashflow from imbalance penalties (which can be either positive or negative) is paid to or recovered from all system users (again on a per kWh basis in each period).

In Northern Ireland a simpler system is in place with the System Operator (SONI) responsible for calling off power based on a contractual least cost despatch. There are currently plans to develop an All-Ireland market – aimed for operation from 2007 – which would bring both Northern Ireland and The Irish Republic into a single pool-based market although the full details of this are yet to emerge.