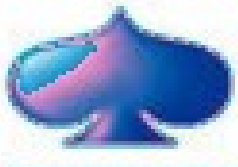

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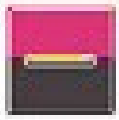

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Energy, Utilities and Chemicals | the way we see it

European Energy Markets Observatory

2006 and Winter 2006-2007 Data Set
Ninth Edition, November 2007

In collaboration with

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A Strategic Overview of the European Energy Markets

Editorial by Colette Lewiner

In 2006 and early 2007, energy issues have continued to be on the top of political, industrial, financial and companies' agendas. In this Editorial, we give our strategic analysis of the recent events in the light of our 9th European Energy Markets Observatory's results and share our thoughts on the path forward.

Oil market: the supply and demand balance will stay tight and prices trend should continue to be on the upward side

Supply and demand

The worldwide demand for oil was sustained in the last 12 months, boosted by Asian economies that are using more fuel to power their manufacturing industry. On a short term IEA forecasts a global oil product demand at 86.0 m barrels/day in 2007 (+1.8% over 2006) and on the longer term a 2.2% growth a year from 2007 to 2012, up from their last forecast at 2% growth. It seems that, behind the overall numbers the energy habits of the planet were moving in two distinct directions. In developed countries, and in particular in the European Union (EU), obligations to conserve energy and use renewable sources of energy – both to reduce carbon dioxide emissions and maintain energy security – are expected to ease pressure on oil supplies.

But that trend is being more than offset by rapidly developing nations. While they still consume far less energy per capita, they are also manufacturing goods for rich countries, and they are increasingly adopting western lifestyles that require heavy energy consumption. As a consequence, developing world and emerging industrialized economies will see their share of world oil consumption rise from 42% of global oil demand to 46% by 2012.

Despite an increase of 25% in year over year exploration and production expenses, the Major Oil Companies reserves fell 0.5% during 2006, with production down 1.7% from H1 2006 to H1 2007. The reserve replacement ratio was only 76% in 2006 (below the companies' objectives of 100%). However, as the oil companies start to see some pay-off from their large investments in recent years, the reserve replacement ratio is expected to improve in 2007. For these upstream projects the biggest constraints and challenges are access to human resources. In addition, as nearly all easy accessible oil has been developed, technical challenges and geopolitical problems make these exploration and production projects riskier. As a consequence, the growth in future upstream investments is expected to slow down in 2007. This overall situation is not rosy, and it is clear that unless the worldwide economy will experience a down turn, the supply and demand balance will be more and more difficult to reach with conventional oil. Unconventional oils (such as tar sands, heavy oil, oil shale, biofuels, and the conversion of coal or natural gas to liquid hydrocarbons) that are more expensive and/or riskier to produce, will have to be rapidly available on the market.

Oil prices

This situation of overall tight supply and demand for crude oil and refined products, coupled with unsafe conditions in certain countries (as in the Nigeria delta) and with nationalistic attitudes in countries like Venezuela, Bolivia and Russia, has kept the oil prices high. The oil price peaked in August 2006 at $80 and then descended to $50 in January 2007. Due to a mild winter and a humid summer in Europe, and a mild summer in North America with no major hurricanes hitting the oil industry in the Gulf of Mexico, the oil prices did not exceed significantly $80 per barrel. However, spikes are not precluded in the following months.

Trends in gas: Gas security of supply is threatened by the clashing Russian and European Union strategies

Moderate gas prices in Europe in 2006

Due to the mild winter in Europe in 2006/2007, the gas prices decreased, and natural gas inventories were full at all-time-high levels and significantly above the five-year average. In Europe the average gas prices have stabilized in general since April 2006 at around €20/MWh. These moderate prices are hiding real strategic issues.

While the EU is challenged by issues related to gas supply, Russia is fighting the challenges related to access to the market. This clash of agendas is threatening Europe's *security of supply*

Europe is highly dependant on imported gas. In 2006 the imports amounted to 54% with Russia

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0091-8_1,

providing, through Gazprom[1], around 25% of the total needs. According to the EU Green book[2], 50% of Europe's total supply will come from Russia in the year 2030. The dependency on Russian gas varies from one country to another, and the most dependant countries are the former CIS members. This vulnerable situation of the former CIS members explains why Russia is so powerful when engaging in stand-offs on their gas supplies (Ukraine – early 2006 – and Georgia and Belarus – end 2006). Because of Ukraine's transit position, this January 2006 cut-off triggered in turn cut-offs in many other European countries underlining Europe's global fragility. Gazprom is pursuing two main objectives towards the EU: increasing its control on gas transportation pipelines and entering the European retail gas markets.

The pipeline control battle

Contrary to the European unbundling tendency, Gazprom wants to increase its control of the Russian gas fields, and it wants to increase the transportation pipelines from these fields to Europe. Russia continues to refuse to ratify the Energy Charter treaty, and it continues to avoid any commitment to open the pipelines to other providers. In contrast to Europe this is a *super bundling policy!*

Many events in 2007 illustrate this policy:

- The December 2006 stand off between Belarus and Russia was ended by an agreement on a gas price increase and on options for Gazprom to acquire in total 50 % of Beltransgaz, the gas transportation company in Belarus;
- In May Gazprom and the Austrian Oil and Gas Company, OMV, committed to control together the Austrian gas distribution "hub";
- In June, Eni (from Italy) and Gazprom agreed to develop the "Southstream" gas pipeline linking Russia to Bulgaria through the Black Sea. This pipeline, that will be fed with Russian gas, seems today more credible than the "Nabucco" project (supported by the EU) that has not yet secured its sources of supply.

Control of the whole value chain

Again, many examples illustrate Gazprom's strategy to control the whole value chain (including retail) and to reap the associated margins:

- Their first deal was the creation of the Nord Stream AG joint venture in December 2005 (Gazprom 51%, BASF and E.ON 24.5% each) in order to build a pipeline and to transport gas from Russia to Germany through the Baltic Sea. Coupled with this deal, the companies entered into cross shareholding between Gazprom and E.ON-Ruhrgas: an additional gas supply contract to E.ON (until 2036) was signed, access to the gas retail market in Germany was agreed upon and recently a joint ownership agreement was concluded for Gazprom's Siberian gas field Yuzhno Russkoye;
- Gazprom entered into similar agreements in 2006 including an extension of the Russian gas supply to Eni until 2035, common development projects in midstream and upstream, and access to the Italian retail market as of 2007;
- In July 2007 Gazprom's UK subsidiary announced the acquisition of a second small distribution Company (Natural gas Shipping Services) following the purchase of PNG's in 2006.

The EU, has announced ownership unbundling measures on September 19, 2007. These measures include a "reciprocity" clause to prevent foreign investors, including Russian companies, from taking over European gas and electricity transportation assets, thus responding to fears that Gazprom might grow to dominate the networks, distribution and retail. *With divergent strategies, one can easily predict that the EU/Russia battle for gas supply and value chain control is only starting.*

[1] Gazprom is the largest vertically integrated natural gas company in terms of reserves (61% of all Russian natural gas reserves and around 17% of global reserves), production (85% of domestic production and one-fifth of global production) and transportation (it owns the world's largest high pressure pipeline system). It is controlled by the Russian Federation, which raised its stake in the company in June 2005 in its attempt to regain control over the country's natural resources, which are the backbone of Russia's economy.

[2] EU Green paper March 2006

***The Oil and Gas actors game* that we are witnessing, will have a mid-term impact on the output of oil and gas fields**

On the negative side:

Oil and gas producing countries as Venezuela, Bolivia and Russia tend to apply more and more nationalistic policies in order to reap a larger profit from the high oil prices.

This short sighted policy is illustrated by several events in Russia during 2007:

- After a long period of threats from the Russian government, Royal Dutch-Shell, Mitsui and Mitsubishi, signed in April 2007 the agreement by which they transfer their majority shares in the vast Sakhalin II gas field to Gazprom;
- Also in June 2007 Gazprom forced BP – through the TNK-BP – to cede its control of the giant Kovytkafield field.

This nationalistic attitude is short sighted as history has demonstrated that the resulting extra profits are used – at the best – to finance other sectors and are rarely returning to the oil and gas industry. At the same time, the Oil and Gas Major Companies, tend to leave the countries that implement such policies, thus depriving them from badly needed technical and financial resources. The end result is a decrease of the oil and gas output which is worrying as it predicts a tense future supply and demand situation.

On the positive side:

National Oil companies from non-producing countries (such as China and India) are significantly increasing their technical upstream competencies and expanding their global reach. Some major discoveries were made in China in 2007 at the CNPC offshore oil field in the Bohai Sea and at the gas onshore field in Sichuan province). Funds have also been made available to find hydrocarbons in politically riskier countries, as illustrated by CNPC and CNOOC recent agreements in Chad, Sudan and Somalia. This should result in higher oil and gas outputs.

The market is also expecting more hydrocarbon discoveries and production from the Statoil/Hydro merger. This merger creates a worldwide leader in offshore activities that is well-equipped to approach technically complex projects, including those located in arctic climates such as the Barents Sea.

The EU Climate change 2020 objectives: a good road map but very challenging to meet

The general awareness about the looming climate change threat increased following the assertive results by the Intergovernmental Panel on Climate Change (IPCC) on climate change

In March 2007, the EU Ministers asked Member States to commit to a 20% reduction in energy consumption and Green House Gases (GHG) emissions, as well as to reach a portion of 20% of renewable energies in their energy production. The horizon of this "three times 20% objective" is 2020. It is a short time frame for the building large carbon free plants, for the industrialization, at reasonable costs, of CO_2 sequestration equipments, for the renovation of a significant portion of the existing buildings and houses, and for the switch of the present car fleet to electrical cars.

While the situation differs between European countries, the EU's overall objective seems very ambitious to meet as a whole.

We estimate that[3]:

- The energy conservation is really THE key objective since it will automatically drive CO_2 reductions and the implementation of decentralized renewable energies;
- There is an urgent need to reform the Emission Trading scheme mechanisms by:
  - Allowing the certificates to be carried forward from one period to another,
  - Establishing clear and coherent rules for the NAP quotas allocations. Above a certain threshold these quotas could also be auctioned,
  - Better qualifying the projects entering into the Clean Development Mechanism to be sure that these projects would not have been done anyway,
  - Extending the Kyoto protocol obligations and mechanisms beyond 2012 to give a better visibility for Utilities investing in large and long term generation plants
- A strong political will, giving a clear priority to these objectives on national industrial interests, is needed;
- The cost of these policies should be evaluated in order to prevent an impact on Europe's competitiveness;
- These types of measures should also be applied in other regions of the world, especially in high energy consuming areas such as North America, China and India;

[3] Climate change Point of View by Colette Lewiner

- If these big CO_2 emitting countries would not commit to reduction, the EU efforts would represent just a drop of water in the ocean while jeopardizing Europe's development. In this case, the whole European scheme would have to be rethought.

In June at the G8 summit, Europe and in particular Germany's Chancellor (who was at the time chairing the EU) pushed the participants to commit on greenhouse gases reductions. The breakthrough was the declaration by G8 nations to aim to at least halve global CO_2 emissions by 2050. While failing to set mandatory cuts in emissions, the agreement could lay the groundwork for a unified world response to climate change. Following this G8 gathering, the end August Vienna meeting was set to prepare for the UN Climate Change Conference in Indonesia (Bali) in December 2007, which is aimed at achieving a comprehensive post-2012 agreement (post-Kyoto agreement) that should include all major emitters. At that meeting, the US representative said it will contribute to the next round of emissions cuts, a first step to setting limits since rejecting the Kyoto Protocol six years ago. However, he did not say by how much the US would reduce its emissions.

Following its March declaration, the EU Commission announced that by December 2007, it should set bidding objectives at the 2020 horizon for each of its Member States. In the meanwhile all NAP (National Allocation Plans) have been re-negotiated for the 2008/2012 period with a reduced number of free certificates for generators and with further significant reduction expected post-2012.

Electricity security of supply in Europe has improved but the planned constructions will deteriorate Europe's CO_2 emissions situation

In our 8th EEMO edition[4] we alerted that the electricity security of supply was threatened and that €700 billion needed to be invested in new power plants during the next 25 years.

These investments are needed to:

- *Meet the electricity consumption increase:* The electricity consumption increase in Europe was on an average of 2 to 3% per annum at the end of the 1990s, and the annual growth of the present decade is expected to be lower than 2%. In 2006 the need for electricity has increased by 1.4% in UCTE countries. This covers contrasted situations: an increase of 2.5% in Spain and a decrease of 0.8% in France (mainly due to the large nuclear enrichment plant – Eurodif lower consumption) and of 0.1% in the UK. Of course if the European Climate change objectives would be met, electricity consumption would decrease (instead of increase) well below the 1990 level;
- *Replace ageing plants:* Programs for the replacement of ageing plants have to be launched. The situation is particularly urgent for nuclear plants with long approval and construction lead time (8 years in average) and which require very large investments (more than €3 bn for the 3rd generation reactor – EPR – 1,600 MW plant). In the UK, several nuclear plants with old technology have to be closed between 2009 and 2023, and there is a need to build between 30 and 35 GW of new electricity plants in the next two decades, equivalent to about one-third of the existing capacity[5]. This challenge, coupled with the British North Sea gas fields depletion, explains why the British government is seriously considering launching the construction of new nuclear plants;
- *Match the "peak load" demand:* In 2006 the European peak load capacity increase was 1.7%[6]. This modest increase linked to the mild winter has lead to an improvement of the real generation margins (7.6% instead of less than 5% the year before). *This is good news that needs to be highlighted.* However during the previous colder winters, the peak electricity demand has sky rocketed, threatening the electricity supply and demand balance. To match these exceptional events, which some scientists are predicting will occur at a higher frequency in the future, one needs to invest in peak load gas-fired plants that deteriorate the CO_2 emissions levels and increase Europe's dependency toward imported gas from Russia. A good alternative solution is to "shave the peak" by making compulsory the installation of smart meters (and by giving the right incentives to customers to refrain from consuming during peak hours) or, as in the US, by allowing Utilities to remotely control certain of their clients' equipments;
- *Increase the carbon free generation capacity.* Capgemini studies show that to reach the 20% decrease in CO_2 emission, the

[4] European Energy Markets Observatory 8th edition, a Capgemini study

[5] British Government 2007 "white paper"

[6] For UCTE countries covered in this 9th EEMO edition, please refer to the Countries' Abbreviations page at the end of the document

European countries need to not only implement energy demand side management bold measures but also to push their utilities to modify their energy mix in order to decrease their dependency on (imported) fossil fuels. This could be tough for countries like Germany that exploit coal and peat domestic mines and have decided to phase out their nuclear plants. Renewable energy (hydropower, wind power, solar and biomass) are carbon free sources. In 2006 their share of the primary energy has reached 6.5% (still far from the 20% objective). They will continue to grow – especially hydro and wind power – with the help of public subsidies. Nuclear energy is the only carbon free source of energy that can generate significant amounts of schedulable energy. Countries such as Finland and France have made the decision to build a third generation nuclear plant (EPR) and construction has started. Many others – such as the UK, Slovakia, Lithuania, Latvia and Estonia – are seriously considering the construction of new plants. Worldwide, many nuclear plant constructions are flourishing. 30 plants are under construction and 290 are planned. Carbon sequestration needs "lighthouse" projects to demonstrate its economic and technical viability and then it has to be deployed. In our opinion, no new construction of gas or coal plants should be accepted without a financial provision for future carbon sequestration installations.

- *Do the planned investments match the security of supply and climate change objectives?* Our Observatory shows that investments in infrastructures started to grow again in 2005.

This growth continued in 2006. Planned projects for generation plants amount to a total capacity of 190,000 MW, while the total capacity of projects with applied permits equals 165,000 MW. UCTE[7] studies show that for the period 2007-2010, the generation capacity adequacy does not seem at risk. From 2015 to 2020, the electricity consumption growth is expected to slow down but not sufficiently enough to stabilize the level of load. In the UCTE conservative scenario, the generation adequacy will be at risk by 2014-2015. Yet in the "best estimate scenario", global adequacy would be ensured until 2020, provided that further investments than those already decided and known by TSOs[8] are made.

In this respect, one needs to be very attentive as some factors could slow down or stop these investments. Let us mention:

- Supply constraints for power plant components;
- Scarcity of consented sites;
- Tight European engineering and construction of human capacity;
- Increasing costs driven by this scarcity -as an example costs to build new coal power stations would increase by 30%;
- Earlier plant decommissioning;
- Last but not least: political risks and lengthy procedures impeding investment plans.

This analysis shows that the security of the supply situation is evolving positively. However the situation is much less rosy when comparing these projections to the EU Climate change 2020 objectives:

- The European TSOs do not predict an electricity consumption decrease at the 2020 horizon, nor even a stabilization! Electricity is of course not the only energy consumption mode. However this illustrates how difficult it will be to reach at that horizon the 20% consumption reduction objective!
- 81% of the planned generation plants will be fossil fuelled, using coal or gas, which are CO_2 emitters. This will worsen Europe's CO_2 emissions situation. Again the 20% CO_2 emission reduction objective seems far away!

This short analysis shows that the investments planned today are not consistent with the European climate change objectives. To be credible, the EU and national governments need to realign their policies.

Are we moving towards fluid electricity and gas markets? Do we need a third European Directive?

Power exchanges continued to grow in terms of volumes traded and "product" diversification

Still further development is needed to reach the target of a fully converged (fully integrated) European wholesale market – with a harmonized price. The introduction of two new exchanges, Belpex (Belgium) and OMIP (Portugal/Spain) is a step in the right direction. The trilateral market coupling of Belpex optimizes cross-border inter-connector capacity by allocating day-ahead border capacities using three countries' power exchanges at the same time, leading to somewhat harmonized prices. This is expected to be extended to the Nordic regions, Germany and the UK as reinforcement of interconnections is made.

[7] UCTE Union for the Coordination of Transmission of Electricity

[8] TSO: Transmission System Operators

After years of low investment levels, European TSOs have engaged in increased investments, albeit with a focus on domestic markets

That said, there are no noticeable improvements of interconnections or in the removal of bottlenecks at priority interconnections. The list of prioritised projects has remained roughly the same since 2002 despite a financial encouragement from the EU. EU funded projects were worth roughly €11 million in 2006, but these were all feasibility studies, and as such they did very little to lower the actual current congestion challenge.

Unbundling: the "third Directive" consequences

The above established facts show that progress towards a truly liberalized European energy market is very slow. In order to accelerate the pace, the EU Commission announced on September 19, 2007 a new legislative framework draft aimed at ensuring that all generators and retailers have fair access to the transportation networks. In other words they proposed and want to impose new schemes for ownership unbundling; either full unbundling (ITSO) or an Independent System Operator model (ISO). They also announced an increase in the National Regulators power, the creation of a European regulating agency (as for Telecommunication sector) and reinforced cooperation between transmission System Operators.

Capgemini analysis concludes that[9]:

- Unbundling alone is not enough, other measures would also need to be implemented to achieve the objectives;
- There are only two sustained models that are applicable for this market and both need research and consideration: ITSO (Independent Transmission System Operators) or deep ISO (Independent System Operators);
- There are no 'off the shelf' solutions to this issue and each model has benefits and challenges that need to be adapted to local specifics;
- There are key differences between the gas and electricity markets in Europe. Gas security of supply remains paramount. In this respect, the "reciprocity" rule requested should prevent non-EU companies to take control of strategic pipelines;
- The success of any of these new models requires clear market rules and new interrelated systems as well as efficient and low cost data exchanges mechanisms.

On July 1st 2007, the residential markets' liberalization "did not create the expected breakthrough"; however it is too early to judge

On July 1st 2007, residential customers of nearly all EU countries became eligible to choose their supplier. This event that has been prepared for many months by the Utilities was well managed technically as the new processes and IT systems were in place. Furthermore, there were no significant supply disruptions. However, it did not create the expected breakthrough, which was for the change to give birth to fully fluid and competitive retail markets. Our experience at Capgemini on markets which have been fully deregulated for some years already (United Kingdom, Sweden, Norway and the Netherlands) shows that the market transformation takes time and that the customer churn rate increases very slowly. We shall measure in the following months the real impact of this deregulation milestone.

In 2006 it is estimated that less than 10% of electricity eligible customers have used their freedom, which is the same percentage as 18 months ago. There are much contrasted situations in different countries: the most active electricity markets are the UK (over 15% of customers switching), and Sweden and Norway (more than 5% of customers switching). In the Netherlands, Belgium and Denmark there is some switching activity. The other markets are dormant. *The gas markets, which have lower switching rates, are even less dynamic!*

Key barriers to switching include the lack of powerful and competitive oriented regulators, the lack of intensive direct marketing, customer unawareness, the privileged access of the incumbent Utilities to cheap generation and below market price regulated tariffs.

Retail *electricity* prices vary widely among EU Member States

In 2006, the yearly wholesale average year over year electricity prices grew by 12.6%. This average growth combined with market dynamics pushed the prices up in all retail markets. In many EU countries the residential prices increased year over year between 5 and 12% with very contrasted situations: a 12 to 20% increase in countries such as the UK, Norway, Sweden and the Netherlands and a flat – or nearly flat – evolution in countries such as France, where regulated tariffs are sill broadly used.

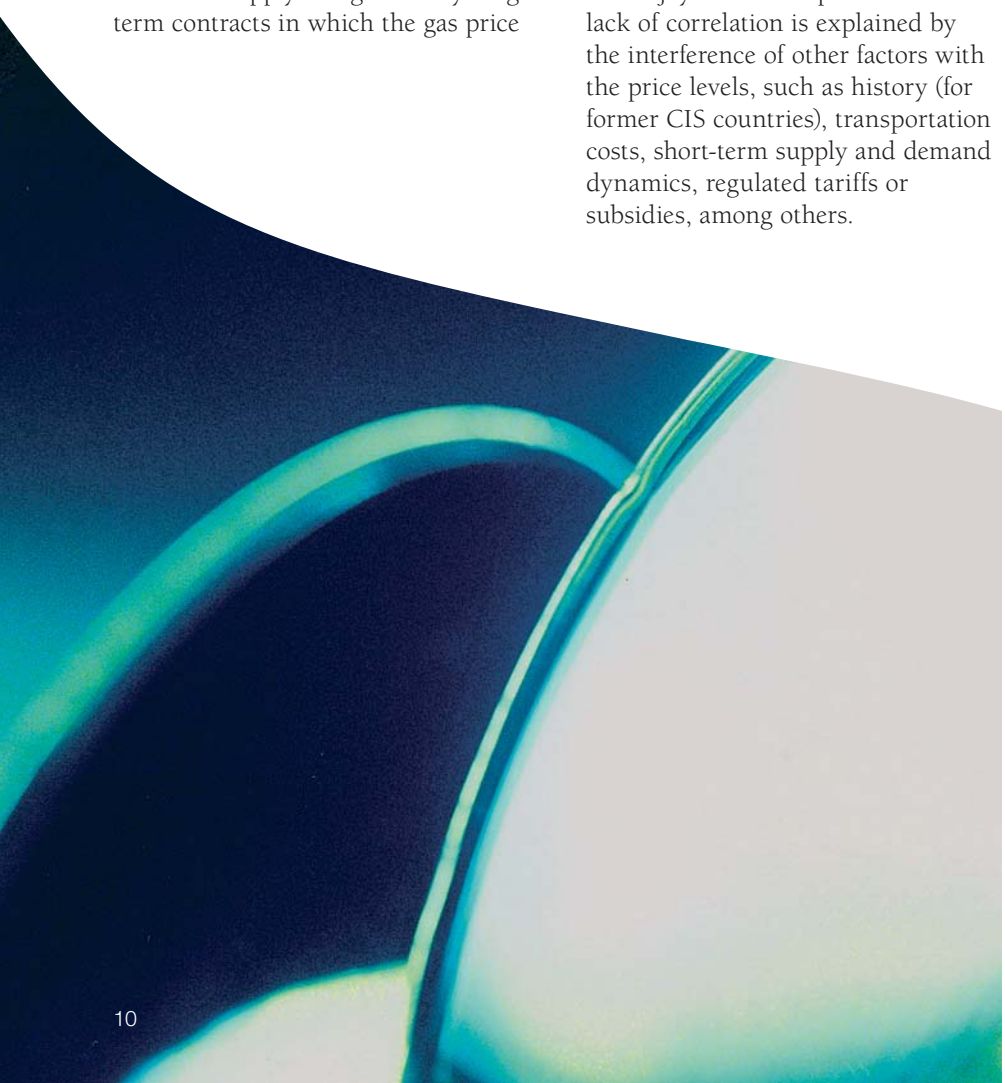
[9] Unbundling Point of View by Colette Lewiner and Oskar Almen

Our research show a staggering range of retail prices, for the residential segment, from €0.06 to almost €0.20/kWh with the cheapest prices in Poland, France, Finland and Spain. The most expensive electricity is in Norway, Ireland, the Netherlands and Germany. These four countries were already those with highest average residential prices in our previous report.

Despite a stabilization in wholesale prices, retail gas prices have increased, and are very variable across the EU

The increase of oil prices has driven the rise: the average oil price has gone from $54/barrel in 2005 to $65/barrel in 2006. This 20% hike has been passed on, (to various degrees) to retail gas prices, on the basis that supply is regulated by long term contracts in which the gas price is linked to the oil one. Within the residential segment, the greatest hike happened in the UK (30%), while Czechs enjoyed a decrease of 5%. As was observed last year, Germany, together with Denmark, Ireland and the Netherlands, have the highest prices for their residential clients. Irish households paid gas at €80/MWh. The Baltic States enjoyed the lowest price also for household gas, priced at €20-25/MWh.

One could try to correlate price levels with the degree of market openness, but consistency is difficult to find. Prices in the UK are high although the market has been open since 1996 (and it has also one of the lowest concentration levels in Europe). Instead, the Baltic regions that are opening their markets now still enjoy the lowest prices. This lack of correlation is explained by the interference of other factors with the price levels, such as history (for former CIS countries), transportation costs, short-term supply and demand dynamics, regulated tariffs or subsidies, among others.



As a conclusion, we can say that while the wholesale electricity and gas prices tend to converge in Europe, that is not at all the case for retail prices. In addition, there are no clear correlations between market opening and price level. ***Market deregulations are by far not the only factor accountable for the price trends in electricity and in gas.***

Mergers and Acquisitions: why is the market consolidation slow?

Incumbent Utilities that are losing market share in their historical geographies started, more than a decade ago, cross border acquisitions (e.g. EDF in the UK, Germany, Italy, Switzerland and Eastern Europe; E.ON in Nordics, Benelux, Spain, Italy, France and Eastern Europe) and we expect that this consolidation should continue. However despite war chests being at record levels, and despite the big mergers announcement which was made in early 2006, no mega deals were closed in H1 2007. There were two mega mergers announced in late 2005 and in early 2006: Endesa's supposed takeover by Gas Natural and then by E.ON; and the Suez/Gaz de France merger. They were real sagas, and it is only now, after more than 18 months, that we can figure out the end of these stories. Under the Spanish Government's push, a so called Spanish solution was adopted. The E.ON/Endesa deal did not happen and Enel from Italy and Acciona from Spain have become Endesa's owners. Following the French President's will, Suez and Gaz de France finally agreed on September 3, 2007 on their merger's conditions. This merger will give birth, probably in H1 2008, to one of the three top Utilities in Europe. Even friendly mergers such as Essent-Nuon were stopped during the lengthy merger process. These cases illustrate the complexity of the situation as different European

players have divergent strategies. Utilities are aiming at becoming larger pan-European companies that are able to invest in the needed infrastructures. Some countries are considering energy questions as strategic and are favouring the emergence of national champions. The EU Commission wants to create more fluidity and competitiveness in the market with smaller actors.

New actors such as Equity funds and Banks have entered the game. They are investing in Utilities such as network infrastructures and water assets that have recurrent low risk revenues. Further unbundling will create more opportunities for them.

The battle is not over!

Utilities confronted by these many changes have to implement new management models

Utilities will have to adapt to new regulations. For example if Transmission Network Unbundling is prescribed by the EU Commission, they will have to establish new Companies based on ITSO or ISO models. This will oblige them to radically change their operating models and systems in order to ensure a seamless operational data flow between these newly created spin-off Companies and the incumbents. This is critical for the security of electricity and gas supplies. In addition, incumbent Utilities that have lost recurrent revenue from their networks will need to lower their "cost-to-serve" to their retail customers in order to survive in a competitive world.

They have, over time, often accumulated different layers of managerial and IT systems. To gain in efficiency they will have to streamline and simplify their organisation, processes and IT. This will also require them to launch a change management program in order to have their employees adhere to these changes and to act differently. They can also achieve a lot of savings by outsourcing their Information Systems management and some Business Processes to specialized service firms. The savings are tangible, and the quality of service improves, for example, when Utilities would outsource their "meter to cash" processes.

These companies are generally facing the issues of an ageing workforce as the "baby boom" generation is retiring. At EDF, for example, 23,000 employees are retiring between 2008 and 2012. Moreover, in many Western countries the young generation is less and less interested by technical training. The output of engineers from the Western Universities is decreasing. Talent gap is thus a real challenge and even more so in certain areas such as nuclear energy, where investment in new plants had nearly stopped in the last few decades. Companies have to launch special recruitment campaigns and also have to take advantage of the high quality engineers educated in Asia's Universities (India and China, for example) by having them travel to the West and by off-shoring certain activities.

New technologies will impact all of the Utilities value chain segments: generation (third generation nuclear plants, geological CO_2 sequestration), networks (new sensors enabled smart grid operations) and retail (Smart Metering, new internet tools such as Web 2.0. for changing the behaviour of customers). Combinations of these technologies with Information System innovations (such as Service Oriented Architecture) are reshaping the sector. Implementing these new technologies will have a great impact on the management of people: on one side it will trigger new recruitments and enhanced training; on the other side it will help mitigate the employee retirement effects (for example, automated meter reading decreases significantly the need for field work forces).

Now it is my pleasure to introduce the 9th edition of the European Energy Markets Observatory (EEMO), in which we continue to monitor the main indicators within the electricity and gas markets. For this edition, our partners continue to enrich our analysis by providing us with their sound expertise on regulations and legal questions at the European level (Bird & Bird), on customers' behaviours in retail markets (VaasaETT) and on financial performance and strategy (Société Générale Equity Research). Again, all throughout the report, the main energy issues for key European markets (Belgium, Denmark, Eastern Europe, France, Germany, Italy, the Netherlands, Slovakia, Switzerland, Sweden and the UK) are embedded in the chapters.

I hope that you will enjoy reading this new edition of the European Energy Markets Observatory and that the information and analysis it provides will be useful for you.

Colette Lewiner
Global Leader of Energy, Utilities and Chemicals practice at Capgemini

Paris, October 8, 2007.

Towards a European energy policy*

Since the Summit of Hampton Court, on October 25, 2005, the heads of State or Government of the EU have never stopped discussing energy matters. Energy issues have also been on the top of the agenda at the G8 meetings, with the President of Russia. For the first time, during the winter 2006-2007, the EU Commission set up a global strategy that encompasses several dimensions and tried to elaborate coherent mid-term and long-term objectives, both internal and external, with a hierarchy between the various priorities.

The European Union is on the way to establishing an ambitious integrated Energy Policy for Europe (EPE)

Since January 10, 2007, when the EU Commission published its Energy and Climate Change Package, the EU Energy Policy has been summarized by the **"triangle Kyoto-Lisbon-Moscow"**, i.e. sustainability, competitiveness and security of supply. It is interesting to point out that, in the speeches of the Energy Commissioner (for instance at the VDEW Congress, on May 24, 2007), *"the two key energy challenges we face are therefore climate change and security of energy supply"*; the fulfilment of the Internal Energy Market now comes third, whereas it was still first in January (see press release IP/07/29).

As validated by the European Council of March 8 and 9, 2007, in Brussels and as reported in its two-year Action Plan, this policy aims at reaching the best possible compromise between sustainable development in the context of climate change, competitiveness of the EU economy at the beginning of the 21st century and security of supply for countries that become more and more dependent upon a few outside oil and gas producers. The conclusions of the European Council insist on the solidarity between the Member States, through the impact of national decisions upon the situation elsewhere in Europe and upon the achievement of the common objectives.

Climate change issues: the "Kyoto angle"

Further to the publication of the Stern report (October 30, 2006) and to the greater concern of "the man in the street" all over Europe (partially due to Al Gore's blockbuster documentary film), the consciousness of the environmental emergency has been progressing in Brussels. At the Summit of Brussels in March 2007, the European Council has adopted the ambitious "3x20" objectives (explained in the Sustainable Development Chapter).

Naturally, the EU authorities wish to develop an International Climate Agreement to succeed the Kyoto Protocol. The European Council dedicated to Environment on February 20, 2007 defined the objectives that the Commission will pursue at the UN International Climate Conference, designed around the idea that all countries should contribute in relation with their different responsibilities in the current situation and with their respective capabilities. However, contrary to the time of the Kyoto Conference, the starting point is now the limitation of purely European efforts to face the global climate change challenges, since the EU is only responsible for 13% of the overall emissions. Should the other parties at the Conference refuse toshare the burden, such constraints would be in contradiction with the competitiveness of the EU, at least in a short- and mid-term vision.

Single energy market: the "Lisbon angle"

Here the viewpoint of the EU authorities is twofold: it is related to the industrial opportunities offered by the fight against climate change, but it also encompasses the full achievement of the internal energy market, since this incompleteness is supposed to increase the cost of capital and therefore hamper the competitiveness of European undertakings.

A novelty in the Commission's approach is the idea that the fight against climate change and the threat on energy supply may *"turn into opportunities for Europe"*, since *"like all industrial revolutions, success in combating climate change will be technology driven"* (A. Piebalgs, May 24, 2007). The translation of such general ambition lies in:

- The increase of the financial means dedicated to Energy R&D for the next seven years through the 7th Framework Programme by hundreds of millions of euros, with the objective of helping future *"Microsofts"* to emerge in the energy sector, which will set worldwide standard products to tackle climate change;
- Additional obligations regarding energy efficiency, especially in building and transportation, where there is still large scope for improvements
- The preparation of an *"umbrella renewables Directive"*, aiming *inter alia* at imposing binding national targets to the Member States, in relation with the EU objective of a 20% share of the energy mix in 2020;

* This Chapter was written in collaboration with Bird & Bird

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- The definition of a European Strategic Energy Technology Initiative that will be presented by the Commission to the Council at the end of 2007.

More specifically, the hopes are related to breakthroughs in the field of energy efficiency equipment, carbon capture and sequestration (CCS) technologies and new materials that can bring down the cost of renewable sources of electricity. More detailed, concrete and immediate are the ideas of the Commission related to the Energy Internal Market.

Security of supply: the "Moscow angle"

Following the limited results of the attempts to jointly negotiate with Russia at the G8 level and with non-European partners, the European countries have let their national operators negotiate new long-term contracts with Gazprom (E.ON-Ruhrgas, Eni, Gaz de France, etc.). These new agreements freed the way for Gazprom to directly address the Western energy markets and position themselves closer to the end customers. Furthermore, the EU has been unable to achieve its objective to force Gazprom to give up some of its control of the gas pipeline networks. Once completed, the North Stream (formerly the *"North European Gas Pipeline"*) will be one of the vehicles to increase Gazprom market power. On the contrary, the pressures on the Ukraine and Belarus have resulted in a more complete control of the whole network than during the time of the Soviet Union.

Regarding the International Energy Policy, from a bilateral standpoint, the objective is to finally *"speak with one voice"* with third countries, in order to develop balanced partnerships based upon transparency, predictability and reciprocity. However, this remains an uncertain objective, as evidenced by national and/or industrial initiatives and by the failure of all the attempts to make Russia ratify the Energy Charter Treaty and its Protocol regarding transmission. So far, security of supply is the weakest angle of the "triangle" and the least developed in the Commission's papers and proposals.

Key issues in Eastern Europe

Opening of the market causes challenges for Utilities in Eastern Europe

In its 1998 Europe and Central Asia (ECA) strategy for Energy Sector Reform, the World Bank described a variety of objectives for the region, including **de-monopolization and regulation**. Since then, Eastern European countries (EEC) (as with Western European countries in the past) have begun to **restructure vertically integrated monopolies in order to increase competition amongst energy producers and suppliers**. Further pressure has come from integration with the EU, including harmonization with the rest of Europe.

Privatization of former state monopolies has been preceded by the restructuring and by the operational optimization programs aimed at increasing profitability. This has made **parts of the region attractive for foreign investors** (RWE and E.ON have already created strong positions in the important Czech market). Additional restructuring and optimization is still needed and will be facilitated by additional privatization through unbundling.

These ongoing structural changes in the EEC are particularly challenging for the affected companies' management. But compared with their Western counterparts' experiences 10-15 years ago, the management of Eastern European Utilities has had to deal with an additional set of challenges including:

- Exploding global demand for energy, mostly driven by the booming economies of China and India, leading to an increasing competition for primary sources of energy;
- Energy and companies in the energy industry are increasingly considered politically as a strategic (national) resource.

The objectives of increased competition through an open market and of security of supply have, to some extent, had a reversed effect on the consumers (I&C and Residential). For retail customers who were used to consuming (seemingly unlimited) energy at state-subsidized low prices, it is quite a dramatic (and unsatisfying) change. In the Czech Republic, only five of the customers that were eligible to switch gas suppliers (all but households) did so during the first year of unbundling (2006), indicating that lower prices were not widely offered despite market opening. Moreover, the EEC are vital transit points for gas transmission from east to west and as such play an important role in the overall EU strategic energy game. At the same time, the dependence on Russia for supply has proven to be a political challenge for the EEC, as exemplified by last year's incidents in the Ukraine and Belarus. This type of political uncertainty of supply is further inflating already high prices.

Debate related to the increased competition of the European internal market is focused on restructuring the model for transmission of electricity and gas and the creation of a quasi-federal regulatory body

As the enlargement of the European market is continuing, the complex debate of how to increase competition and efficiency on the common energy market continues. Despite years of debates, rules and assessments, it is still unclear whether the priority in this sector should be on competition, or on the ability of markets to finance and realize the necessary programs of investments (in networks and power plants) through coherent, steady and bankable long-term industrial decisions. Competition is limited notably by legal issues, the reluctance of incumbents, and the lack of coordination between TSOs, national networks (because of insufficient physical interconnections), national technical rules and the national regulators.

Some of the major points of dissatisfaction include the high level of market prices, the lack of transparency about the price-making mechanism and accusations of abusive behaviour by incumbents. Outcomes of the Commission's Energy Sector Enquiry[10], show that customers cannot yet fully benefit from the single market because of shortcomings in the current transmission structure of electricity and gas (both national and cross-border).

As the EU Commission is pursuing fair competition[11], continued proceedings continue against Member States for formal breaches of the Directives. So far, Luxemburg has been convicted by the European Court of Justice (ECJ). Spain and France could also be brought before the ECJ due to regulated tariffs that favour incumbents and that are maintained at levels lower than market prices.

Due to the complexity of a common European Energy market, the Commission has long been hesitating, but has finally prepared a package of two *"Third Directives"* (gas and electricity) and two Regulations, based upon the findings of the Sector Enquiry and the 2006 Green Paper[12]. This package released in September 2007 is not only focused on the question of the *"effective unbundling"* of the transmission network operators [13] of electricity and gas, but this is also a very contested proposal (namely with Germany and France), since the vertical integration remains in the Commission's view the major obstacle to the complete achievement of the full opening of the internal market (and hence to fully open competition). Taking into account the strong resistance of nine Member States, but in connection with the proposed strengthening of powers and independence of national regulators, the proposal opens an option: either *"clear ownership separation"*, or the designation of an *"Independent System Operator"* (*ISO*) by the national regulator upon proposal from the network owner and under the tight control of the EU Commission, with detailed regulation and permanent regulatory monitoring. It is interesting to point out that, in contrast to the EU Parliament, the Commission refuses to deal differently with gas networks, notwithstanding the growing threat of the integrated Gazprom and the huge part of regulated activities in the business model of EU incumbents.

Furthermore, related to the cross-national black-out in November 2006, the Commission insists on transparency and a more efficient cooperation between TSOs and national regulators, but also proposes a quasi-federal *"Agency for the Cooperation of Energy Regulators"*, that could settle disputes between regulators and even review some of their individual decisions, both for gas and electricity. Lack of coordination is undoubtedly one of the major issues, even though the strength of local oppositions against new cross-border HV lines and the consequences of uncertainty about the legal framework on long-term investments remain underestimated.

This new energy package was presented to the Council of Ministers on September 19, 2007 and the decision is likely to be made by the Energy Council at the beginning of December 2007. The outcome of such a political debate will take time, as related to TSO unbundling, the creation and powers of such a quasi-federal Agency, or the equal treatment of gas and electricity players.

[10] The Energy Sector Enquiry, the final results of which were officially unveiled on January 10, 2007

[11] Based upon the Energy Sector Enquiry of 2005-2006, and full implementation of the Directives 2003/54/EC and 2003/55/EC as of July 26, 2003

[12] "A European Strategy for Sustainable, Competitive and Secure Energy" – COM(2006) 105, 8.3.2006

[13] And not the "Distribution System Operators" (DSOs)

The second wave of national nuclear programs is one of the key drivers of the European energy sector's future developments

One of the main characteristics of the last 12 months is the number of national decisions in favour of nuclear power, all over the world. If the decision to build an EPR in France is no surprise, a great number of countries have opened the door to or confirmed national programs, starting from the British White Paper (dated May 2007): the USA, Brazil, Russia, India, China (the so-called "BRICs"), but also Algeria, Argentina, Finland, Bulgaria, Iran, North Korea, South Africa, Thailand, maybe Kazakhstan, some Emirate of the Arabic-Persian Gulf and recently Libya.

The EU remains strongly divided on this subject. Ireland, Germany and Austria are probably the most reluctant countries, although perhaps Spain is as well; Sweden and Belgium are wondering whether their moratorium is realistic and Italy is seriously thinking about coming back in the group of "nuclear" countries. However, the Commission and the heads of State and Government are undoubtedly aware that the internal objectives they have set in the field of sustainable development and especially the limitation of the global average temperature to 2° C above the pre-industrial figure are not realistic without a substantial proportion of nuclear electricity. They formally keep a low profile on this subject, and argue that the principle

Key Issues in the Netherlands
"Unbundling: The Dutch Squeeze"

The unbundling law has kept companies and politicians very busy. After putting a tough unbundling law into the Second and First Chambers, the Minister of Economic Affairs saw the new law softened by the First chamber. **The unbundling law became the law for independent grid management and full unbundling was shifted from the agenda.**

However, in mid-2007 a new Minister of Economic Affairs entered office and some "incidents" at utility companies (the acquisition by Delta of a Belgian waste company and the announcement by Essent and Nuon of their merger and European expansion plans – which then failed in September 2007) occurred that were not aligned with the intention of the "unbundling" law. In fact ownership unbundling was still there to serve as "the sword of Damocles" in case energy utilities "did not behave". **The new Minister of Economic Affairs directly took control and launched full ownership unbundling as a punishment over the energy utilities.**

The impact of full ownership unbundling can be huge for the Dutch Utilities. Revenue and cost streams will become transparent in the unbundled new companies. For the regulated grid companies this could mean a few tougher regulatory periods, as it will become clear that grid revenue is driving consolidated results.

The new commercial unbundled part will see production and trading integrating with the financially result-burdened retail business. Retail net results are under pressure across Europe. However, in an unbundled market it will become clear that **tough restructuring will be needed** to show results according to shareholder and market expectations.

While retail net churn in the Netherlands has vaporized to a marginal level, it has become clear that **true market liberalization has failed**. From a customer and political point of view, unbundling is the way forward to drive prices down, increase customer service and increase the launch of new products and energy concepts.

An interesting occurrence in 2006 was the voluntary unbundling by shareholders of smaller integrated energy companies. Shareholders and management decided to take a proactive approach to the unbundling discussions and to sell the customer base and go forward as a grid company. Companies like Electrabel, Essent and Eneco bought the customer base. This trend was seen earlier with transactions of E.ON and Dong Energy, who bought the customer base of the former companies NRE and Intergas.

of subsidiarity should apply to the energy mix. The main environmental rules will probably not change soon: not only is nuclear energy not deemed a renewable source of energy (directive 2001/77/EC of 27 September 2001), but nuclear plants are not considered yet as clean sources of energy under the ETS.

The Commission's Package as of January 2007 recommended that decommissioning be offset by the introduction of *"other low-carbon energy sources"*; the Action Plan attached to the conclusions of the Brussels Summit insisted on efforts regarding waste management and nuclear safety that must accompany the potential development of nuclear energy, which could contribute to safety of energy supply and CO_2 emissions reductions; the Commission has begun implementing its Nuclear Illustrative Program by setting up a High Level Group on Nuclear Safety and Waste Management on July 17, 2007, which is in charge of safety and decommissioning of nuclear installations, the management of spent nuclear fuel and radioactive waste, and the transparency and coordination with a Nuclear Forum, to be further created on the model of the Madrid (gas) and Florence (electricity) Forums; the 7th Framework Research Programme will contain efforts regarding nuclear waste management.

Notwithstanding the policy debate, to win tenders for building and operating or, at least, to become a shareholder and the industrial operator of nuclear plants anywhere in the world, European operators will need to prove that they are able to build and/or operate such equipment in Europe. The prize is therefore external as well as internal, and the relaunch of nuclear programs is fully consistent with the other pillars of the EPE, together with environmentally safe CCS technologies or techniques that improve energy performance in building or transportation and renewable technologies.

Competitive Power

Generation

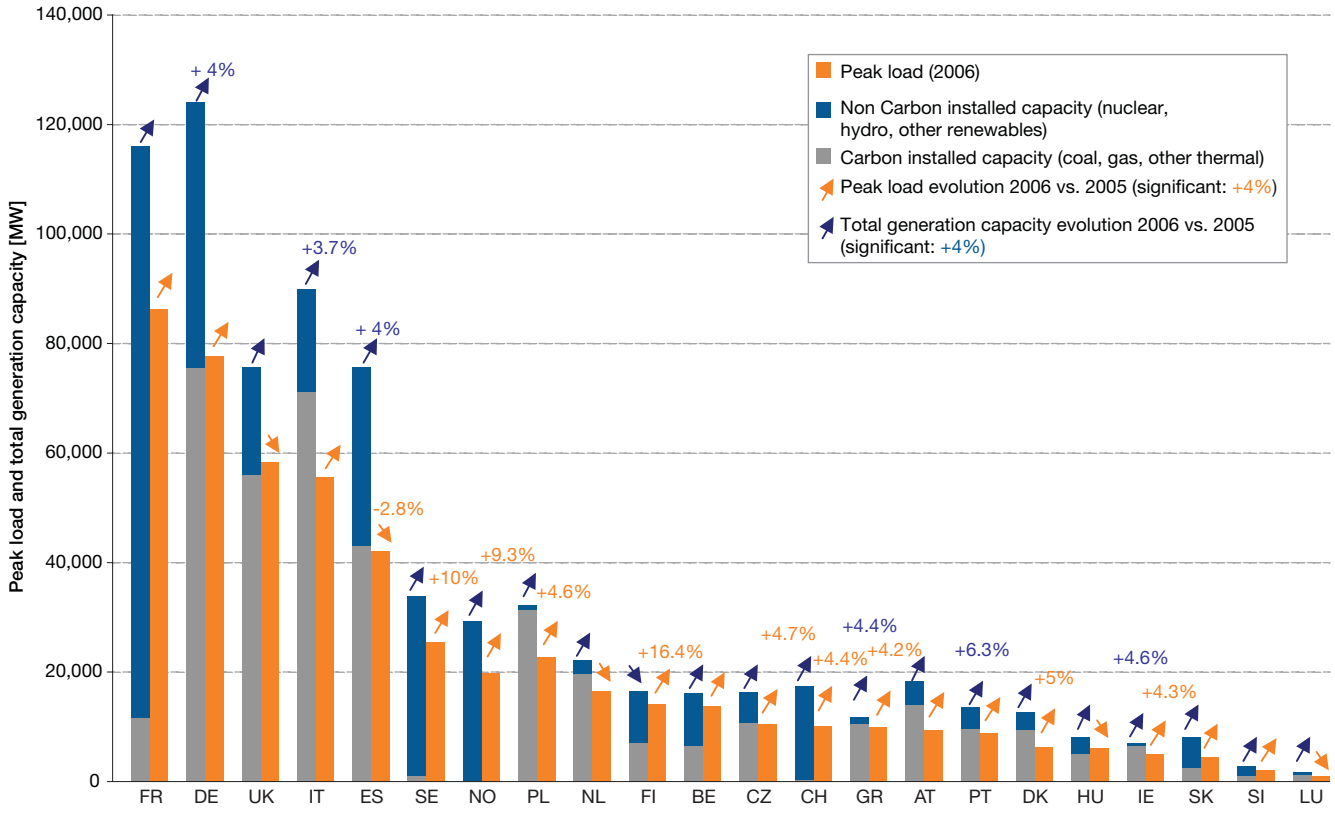
- The weather has been lenient over the period analysed. Summer 2006 was rainy (with the exception of Eastern Europe, especially Poland). Winter 2006-2007 was mild. Thus weather conditions allowed a fairly good level of security of supply. The worst "real margin" recorded on the UCTE system came at 7.6% in January 2006 and stayed above 9% during almost the rest of 2006;
- In 2006 ageing plants have closed and few plants have been put online. As a consequence, overall capacity growth has slowed down in 2006. Only +15.8 GW have been added as compared with +18.1 GW in 2005 and with +24.1 GW in 2004;
- Despite numerous announcements made for new plant constructions, players seem to have delayed their investment mainly because of regulatory and market uncertainties (as illustrated by the gap between projects planned versus projects approved in Table 2.4);
- There is a growing concern about the massive renewal need of ageing European plants. The first steps have been made towards replacement policies.

On the short-term, current capacity situations remain problematic, both on offer and on demand sides

On the offer side, slowdown in capacity growth and construction can be observed in 2006

Overall European generation capacity has increased by 15.8 GW in 2006 (see Table 2.1). This represents an increase of 2.2% in 2006, which has followed an increase of 3.9% in 2005. The annual capacity growth rate has thus declined due to numerous plant shutdowns and a slowdown in construction, despite significant increases in Renewable Energy Sources (RES) and in gas-fired generation units.

Table 2.1 Peak load, generation capacity and electricity mix (2006)



Source: UCTE, Nordel, EirGrid, National Grid – Capgemini EEMO9

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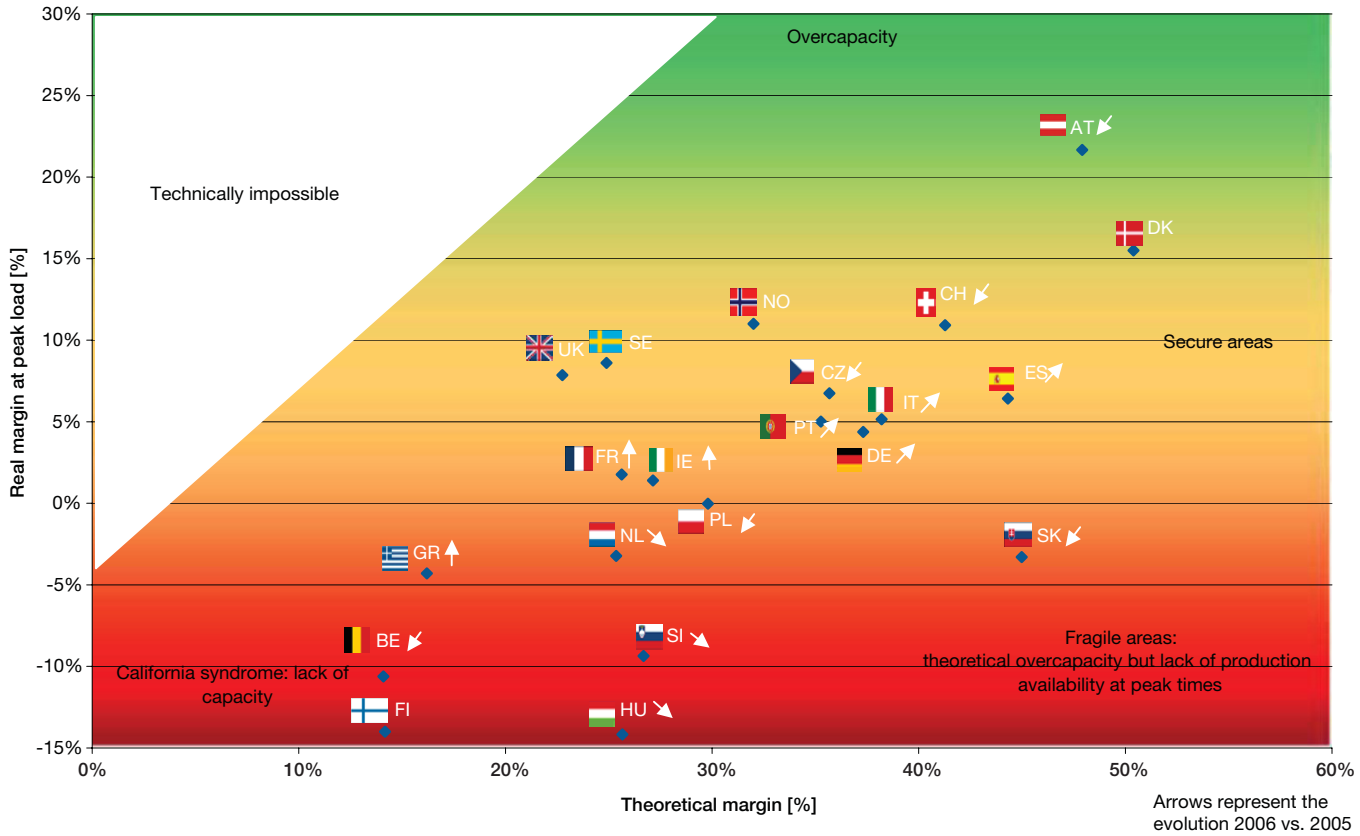
Plants across Europe are ageing, which has led many to close down. These have primarily been nuclear reactors located in the UK (in Dungeness and Sizewell), Spain (the Jose Cabrera plant) and Eastern Europe (Bulgaria and Slovakia). However, some fossil fuel plants have also closed, such as the 480 MW Vaires-sur-Marne 1 and 2, which are hard coal stations in France.

The trend towards more coal constructions (observed in 2005) faded: 2006 was marked by gas and wind constructions, with large differences between countries:

- Germany, Ireland and the Mediterranean countries (Portugal, Spain, Italy and Greece), which have favoured gas and wind, have all recorded beyond +4% in generation capacity and have driven up the overall capacity growth;
- Other countries have experienced severe slowdowns: Slovakia's generating capacity is down by 5.4% after the closing down of the first Bohunice's nuclear reactor (440 MW) in December.

With 8.6 GW additions, gas now contributes to 20.5% of the total generation capacity. Mediterranean countries have had a leading role: Italy added 2.8 GW, mainly made of a 760 MW Torviscosa plant and a 740 MW Energia Termoli. Gas has even become the main generation source in Spain (+3 GW in 2006). RES, notably wind, steadily have supported the generation increase: with +23.6% in 2006, RES have reached 17.5% of European generation capacity. Wind power generation now amounts to as much as 20 GW in Germany. As with gas, wind has been developing fast in Mediterranean countries (+2.8 GW in Italy, +3 GW in Spain in 2006). Portugal has recorded an astonishing 6.4% increase in overall capacity generation, attributable to no fewer than 40 new wind farms (notably the 108 MW Pinhal Interior wind farm). However, if the RES generating capacity has indeed increased, the estimated usage rate has remained stable below 30%, since new RES capacity is mostly made of wind power.

Table 2.2 Real margin vs. theoretical margin (2006)



Source: UCTE, Nordel, EirGrid, National Grid – Capgemini EEMO9

Despite shutdowns and the boost in RES and gas, the European generation mix has been stable in 2006 with fossil fuel (54%) and nuclear (28.5%) still accounting for more than 80% of the 730 GW total generation capacity in 2006.

On the demand side: the summer consumption is growing

The consumption growth has been following the same path for two years, with a slight increase of approximately 1.5%. Nevertheless countries across Europe have experienced highly disparate situations in 2006: Finland (+6.5%) and Eastern Europe countries (up to +4.5% in Poland) have experienced steady consumption growth whereas many others have faced smaller increases or even decreases as in France with -1% in 2006 (from 483.2 to 478.4 TWh). It is the first time in nine years that power consumption fell in France, mainly due to a drop in industrial demand. The trend for high power consumption in the summer period was confirmed in 2006. The majority of European countries recorded a higher consumption growth in the summer (+3.6% in Spain) than in the winter. Without reaching the heat spikes of 2005, the hot summer of 2006 indeed saw a wider use of air conditioning, which drove higher energy consumption.

The same trend has been observed for peak loads, with confirmed shifts observed from winter to summer. As in 2005, Italy and Greece recorded their peak load records in the summer (75,619 MW for Italy, June 27, 2006). In 2006, most European countries still registered their peak loads in the winter, generally grouped in January; while Europe experienced a mild 2006-2007 winter. In Spain, although the highest peak load was registered in winter at 43,253 MW, the country also neared this record on July 10, 11 and 17, 2006 (each over 40 GW). During these dates in the summer, local blackouts were even experienced.

A stable demand-offer equilibrium and fair real margins at peak load on the background of a mild weather

With comparable evolutions of the generating capacities and of the peak load, the theoretical margin (the division of generating capacity by peak load) remained fairly stable in 2006 at 32% (described on the X axis in Table 2.2). However, there were some notable exceptions:

- As in 2005, in 2006 Finland still experienced a negative theoretical margin. The negative theoretical margin was even larger in 2006 (-14%) than in 2005 (-8.4%), primarily attributable to an important increase of the peak load (+16.4%);
- In Spain, the theoretical margin increased from +40% in 2005 to +44% in 2006. Thus Spain has benefited from high increases in its theoretical margin due to a high pace of construction in 2006 (+4% in generation capacity);
- The other countries have recorded high and stable theoretical margins: France (+26%), Italy (+38%), Germany (+37%), and the UK (+23%).

The real margin at peak load, as given by the UCTE[14] (Y axis in Table 2.2), takes into account the real generation capacity available at peak load instead of the theoretical generation capacity. Outages, overhauls and also non-usable capacity are thus also taken into account. Globally, there was less stress in 2006 on the demand-offer balance than in 2005, with a minimum real margin for the UCTE system of 7.6% in January 2006 compared to the alarming 4.6% in March 2005.

- France, which suffered from a cold wave in February 2005 (-9.3% real margin) recorded a better +1.8% real margin in February 2006 (+11% compared to 2005) not due to any real evolution on maximum peak loads (approximately 86 GW) and instead due to better plant availability. As winter 2006-2007 was mild, real margins did not experience stress due to cold weather (+7.6% in December 2006);
- Poland experienced extraordinarily difficult conditions in July, when the highest temperatures ever on record were attained. In addition, a dry spell (only 25% of normal average rainfall) led to low water levels and caused multiple outages. Still, Poland managed to maintain a 0% margin, partly by reducing its exports;
- Finland, while continuing to be a net importer, experienced in January 2006 a new peak load record at 14,860 MW. Therefore, Finland achieved a 14% negative margin;
- The situation was worrisome for Slovenia (-9.4%) and Hungary (-14.2%) because these negative real margins were achieved on a background of strong peak loads, a lack of investment and many overhauls in Hungary;

[14] A: Remaining capacity at peak load is based on: (i) for the UCTE countries, on the "Remaining Capacity without exchanges minus Margin Against Monthly Peak Load as a percentage of the net generating capacity" data of the UCTE system adequacy retrospect 2006 (ii) for the Nordic countries, on the "Comparison of capacity and maximum system load" published by Nordel (iii) for the UK and Ireland, on the ratio of National Surplus divided by the total generation at peak load.

B: Country figures are based on the 2006 monthly minimums of the margins, illustrating nearly the worst situations of capacity, country by country. At a European level, the local situations might not happen during the same months.

C: Countries without arrows were not in the graph in the previous edition, and hence are not available for comparison with 2006 data.

- Real margins remained high for Austria (+21.7%), Denmark and Switzerland (+10.9%);
- Spain, Portugal and Italy increased their real margins by about 3.5% when at peak load in 2006, mainly due to growth in generation capacity. Belgium registered a -10.6% real margin in November 2006, mainly due to a high load and due to plant shutdowns in Belgium.

During the summer 2006, power balance was less challenged than in summer 2005, due to the milder summer temperatures of 2006. However, hot and dry weather led to shortages and a burden on power supply in July 2006 throughout Europe:

- Hydro conditions were poor in Italy and Scandinavia;
- Spain was faced with 40°C and rising temperatures in rivers that are used to cool nuclear reactors. Therefore, Spain had to close its Santa Maria de Garona reactor and suffered local blackouts;
- Temporarily, France and Germany had to give several reactors special permits to dump hot water into rivers.

In addition, unexpected events tightened the pressure in July: Sweden's 1.0 GW Forsmark reactor went offline, Poland suffered from numerous outages and network constraints (notably at its Zarnowice major hydro plant), and in the UK the Ratcliff coal-fired station closed for a fire. Not surprisingly, day-ahead prices skyrocketed in July and then dropped in August. For instance, in the Netherlands they decreased from €165/MWh on July 27, 2006 to €38/MWh on August 10, 2006. Greece did not experience the same problem since hydro power covered the high demand. Overall, operators better anticipated the effects of the air conditioning burst.

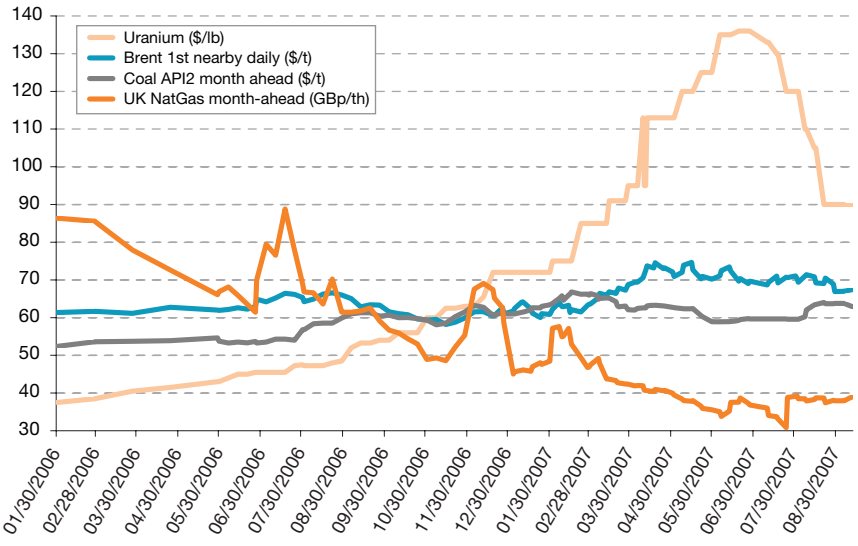
Winter 2006-2007 was mild in many countries, such as those of Central Europe (e.g. Germany, France). Despite a cold spell in November, temperatures remained warmer than usual, especially in October and in December. As in the previous year, major maintenances were not scheduled in the winter. No tension on supply was recorded. Winter energy prices reflected these temperatures: although day-ahead prices peaked notably on November 6. 2006 (up to €276/MWh in Germany), they otherwise remained low throughout the winter, ranging from approximately -10% to -50% compared with the similar period in 2005. For instance, in France prices were €42.35/MWh in the first week of December 2006 compared to €108/MWh in the same week of the previous year. However, a report released by RTE mentioned fears of winter shortages, had temperatures actually been lower. Similar fears were shared by Germany with the worrying impact of a potential closure of Biblis' nuclear reactors, due to maintenance at several plants (Grundremmingen, Philippsburg and Brokdorf). These shortages were finally compensated by gas and coal.

On the longer term, the energy mix derived forms from a complex decision making process

There is a need for renewal of ageing plants

European countries are increasingly aware of the ageing of the plants across Europe. Since the last boom of construction occurred in the 1980s, 40% of thermal and nuclear power plants are older than 25 years. In addition, laws and political decisions imply shutdowns. For example, in Germany a nuclear phase out is anticipated by 2023 (20 GW of capacities). Some plants have already been closed down, and many others are due to come offline: the UK closed Dungeness A and Sizewell A nuclear plants (totalling 860 MW), and it is going to close additional nuclear reactors by 2010: the 460 MW Oldbury and 980 MW Wylfa.

Table 2.3 Commodity prices



Source: SG Commodity Research – Capgemini EEMO9

By 2016 up to a quarter of the UK's capacity will have to be replaced. Eastern Europe also experienced a first wave of major shutdowns this year, such as mixed oil/gas stations in Romania, nuclear reactors in Bulgaria and Slovakia, and more.

Currently short on peak capacity, Europe will then face base capacity issues. These ageing plants and capacity are to be replaced to cope with increasing demand after 2010. The need for further investments has been acknowledged by a study published in June by the UCTE System Adequacy between 2007 and 2020. While generation adequacy is secured until 2010, 175 to 200 GW of commissioning are needed by 2020 to secure energy supply.

Fear and uncertainty threatens investment

Replacing and developing base load requires large investments and long waits for construction. For instance, nuclear plants can cost on average more than €1 billion compared to, on average, €300 million for gas plants and €600 million for coal plants. Governments (when public players) have to make important decisions to commit both in time and in money. Furthermore, many governments have not yet defined their policies. Though they detain large capacities of investment, market players also face long-term risk investments, regulatory and political uncertainties and increasing constraints that as a consequence deter them from investments.

Changing regulatory frameworks can disrupt the return rates of investment:

- Planning delays for energy projects are long: constructions of plants and also even of HV transmission lines are submitted to tedious and slow administrative processes. Lack of standardisation at the European level forces players to re-qualify their technology in each country;
- Important uncertainties complicate the financial case for construction: volatile electricity and raw material market prices, as well as an increase in plant construction prices. For instance, the cost of construction of coal-fired plants has increased up to 30% since 2005, since demand for these plants is booming. Furthermore, some tenders remain without answers as constructors approach the limit of their capacity (lack of material and qualified engineers to respond to the demand). In 2006, gas prices decreased significantly, whereas coal prices steadily increased. Uranium prices have peaked at more than $130/lb (see Table 2.3);
- Uncertainty remains about carbon emission legislation and particularly about the EU phase II (2008-2012). The EU Emission Trading Schemes (ETS) phase II is indeed expected to put greater pressure on emissions. In addition, countries are voting for laws and National Allocation Plans (NAP) that can sometimes differ from EU standards;
- The EU Commission and local governments encourage the development of RES. This weighs heavily on the investment climate. EU leaders have encouraged investments in RES that are often directly competing with investments in other energy generation sources.

Key issues in Slovakia

Slovakia believes in nuclear power generation to cover for capacity deficit.

The dynamics of the Slovakian electricity market has changed dramatically since Slovakia's integration with the EU in 2004. Recent reforms have led to **market opening and increased competition**. After completing the privatisation of Slovenske Elektrarne (80% of power generation) in mid-2006, **Enel confirmed its intention to invest into the construction of two new blocks of the nuclear power plant at Mochovce** (Western Slovakia), and to build up new generation sites in Slovakia (e.g. hydro plants, wind energy sites, etc.). This should cover for some of the generation capacity deficit in the forthcoming period after the phase-out of V1 blocks of NPP in Bohunice in 2006 and 2008. **Additional players like E.ON, EDF or CEZ expressed their interests to build up new production plants across Slovakia.**

Several companies from the Czech Republic (including CEZ) have entered the Slovakian market as traders\suppliers of electricity. The target is mainly the I&C market, but residential customers might benefit as well eventually. Due to the history of the two countries initially being one, there is no congestion in transmission between them. Distribution/retail companies can hence easily source electricity from the Czech power exchange. **Despite these actions, customer switching is still low.**

Slovakia is still heavily dependant on Russia for supply of gas and oil, which causes challenges for the security of supply. As a result of an ongoing legal process related to the Yukos Group, the destiny of its subsidiary Transpetrol (the main oil transit company that has control over the Druzba pipeline) is still unclear. Both the Slovak Republic (as the majority shareholder) and the Russian Federation have shown a persistent interest to take over control of this strategic enterprise in Slovakia.

The gas market is still not sufficiently open to new players since the incumbent dominates by owning both transmission and distribution networks. **Despite legal unbundling, no new entrants for gas have yet emerged.**

Investors favour gas and wind instead of base load assets

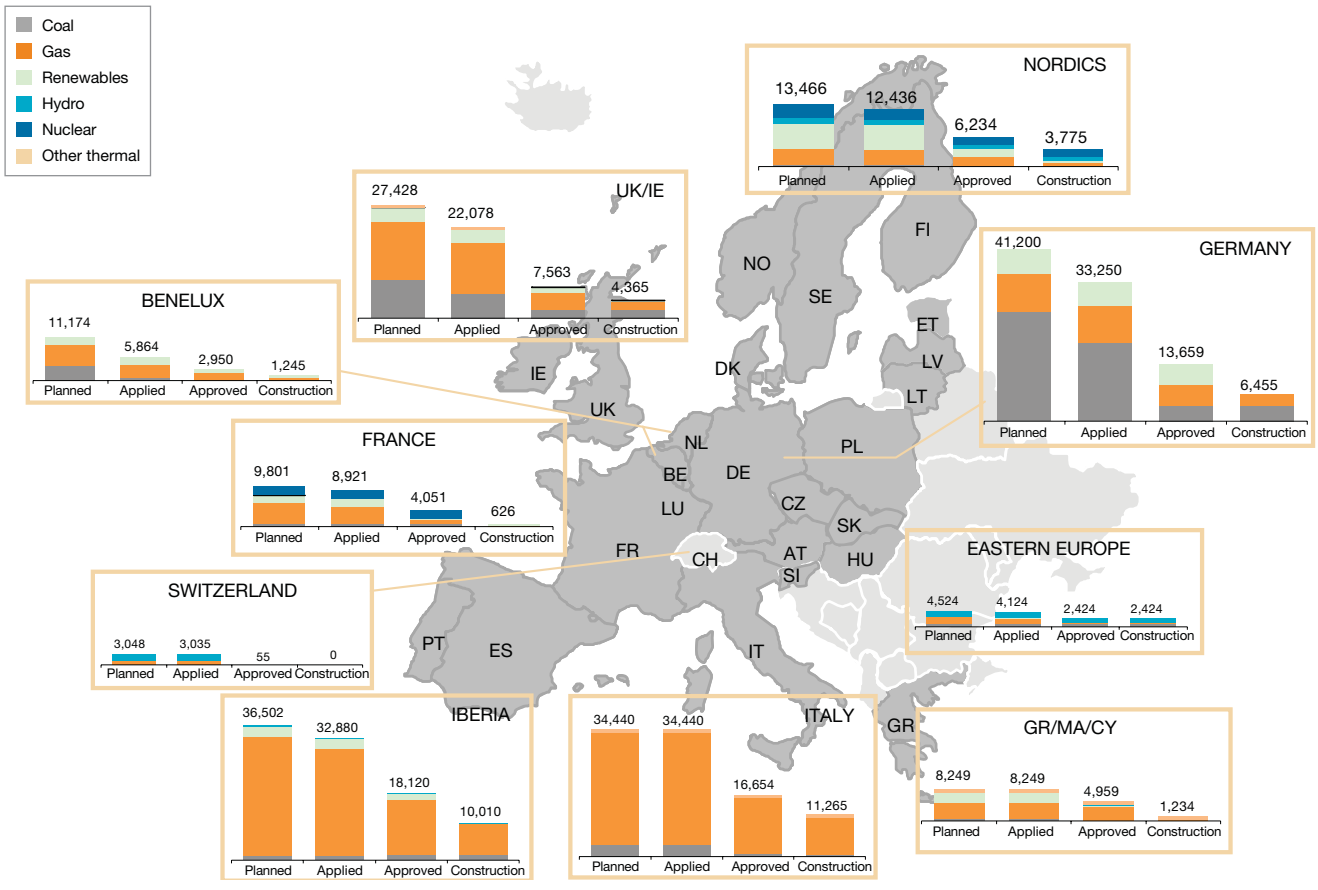
Investments have been close to the 2005 level, although major investment plans have been announced in 2006-2007 by Enel (€4 billion) and Union Fenosa (€5.4 billion). Spain has approved 37 power projects totalling 31 GW and Germany has approved 53 projects for 31 GW by 2020.

Except for in Germany, where players continue to favour coal, the vast majority of European players have been focusing on gas and wind projects. Indeed, despite the renewal of interest in coal-fired plants in 2005, 2006 was marked by investments in gas and wind. In a climate of uncertainties, investors have thus favoured the development of peak load capacity rather than base load.

Wind drove the high growth of renewables in 2006. Across Europe, 80 projects are planned related to renewable sources, representing 25 GW. They consist mostly of wind, but also of biomass, as recently commissioned in Sellesen (Germany) or Claye Souille (France). With most of its planned projects related to wind and biomass, Germany should reach the EU standard of 20% of generated electricity being produced by renewable sources in 2012, which is eight years before the EU request. Spain is expected to produce more than 20 GW from wind by 2010.

However, many other projects (especially for gas plants) have been cancelled or suspended either by investors or local authorities because of exploding costs, environmental concerns (above all carbon emission restrictions) or long administrative processes. In Spain, as many as 43 planned plant projects (e.g. the 1.7 GW plant by Endesa at Colmenor de Oja), for a total of 17 GW, were repealed by the environment minister in July because the 2% deposit had

Table 2.4 Projects of new generation capacities, in MW (2006)



Source: Platt's – Capgemini EEMO9

not been paid by promoters. In Germany, the Krefeld city council cancelled an 800 MW coal-fired plant. These difficulties yield doubt regarding how many of the planned projects will actually be built, and they highlight again the issue of insufficient levels of investment.

Difficult and engaging political decisions are to be taken

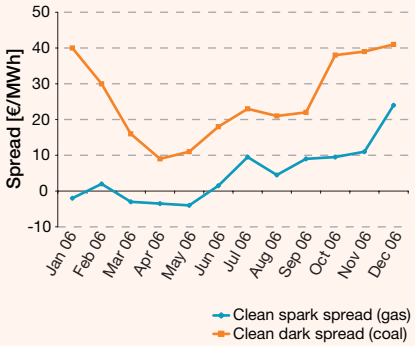
Numerous studies, either by UCTE or by national agencies (like the White Paper on Energy in the UK), have been pointing out the imbalance between the need for the renewal of ageing base load plants and the investors' focus on renewable and peak load assets. Warned by these studies, European leaders are acknowledging the need for intervention in favour of further investment and are now seeking solutions to ensure generation adequacy in the mid- and long-term and particularly to expand base load. These concerns have put nuclear on the front stage, as it is generally a conventional base load source in Europe.

However, positions across countries are difficult to harmonize: no global position has been found at the level of the EU to encompass all national reactions and policies. Governments are influenced by the current energy mix, by EU policies, local pressure and by national opinions and lobbies (e.g. green, suppliers, etc.). Different governments have different policies that are mainly defined around their position toward nuclear energy. Under these conditions, governments tend to delay their decisions until a political consensus is reached.

Coal versus gas: what is the trend?

At a time when significant investment is necessary, many countries have to make a trade-off between coal and gas in order to expand their generation capacity (especially those that are reluctant to use nuclear sources). The development of gas and coal deeply depends on the volatile price of raw materials. After a year that was favourable to coal due to rising gas prices, 2006 was conversely a good year for gas prices so that spark spread (difference between electricity's spot market price and the cost of electricity produced with gas) neared dark spread (difference between electricity's spot market price and the cost of electricity produced with coal). Projects to construct gas plants are also widespread due to the rising price of coal-fired plants and due to constraints and penalties coming from carbon emissions. Thus, most countries chose gas for economic reasons. Still trying to exit from fuel and to increase its generation capacity, Italy has launched major CCGT plans for a total of 37 GW. Some of these plants are due in the coming months at Simeri Crichi (800 MW) and Ferrara (760 MW, early 2008). In the UK and in Spain, the move towards gas is also evident: 14 GW are planned by 2012 in the UK and almost all of the 31 GW which are in the approval process in Spain are CCGT plants.

Clean spark and dark spreads (2006)



Source: Tendances Carbone – CDC, Powernext – Capgemini EEMO9

The construction of coal plants is still greatest in Germany, where there are as many as 25 coal plant projects underway (notably a 2.2 GW lignite plant at Neurath due by 2009), which amounts to a total of 26 GW. But the resurgence of coal is also favoured by:

- The development of clean coal and carbon capture and storage (CCS) systems: CCS systems allow coal technology to better comply with carbon emission legislation. Thus important coal plants with CCS have been proposed in the UK. The proposed plants would be developed by E.ON UK at Killingholme (450 MW plant) and RWE nPower at Tillbury (1.6 GW plant);
- Conversions: Italy has plans to convert old oil plants into coal plants, such as in Porto Tolle and Civitavecchia (both are projects of 2,600 MW).

European countries are still debating on nuclear, with the notable exception of Spain, which has chosen to exit nuclear and replace it with hydro, other renewables and gas. The positions of the countries other than Spain are described below:

- Countries currently conducting projects: so far only France and Northern Europe, with the construction of 1.6 GW nuclear reactors at Flamanville in France and Olkiluoto in Finland (though the latter is faced with delays and cost issues);
- Countries having issued official engagements: Belgium, the UK and most of the east European countries. Two different solutions have been put forward regarding issues with administrative processes. First, the solution proposed by the UK consists of creating standardised models for nuclear reactors. If these models are chosen by an investor then no request for further authorisation in the approval process would be needed. Second, in the Netherlands, officials are thinking of simply accelerating the time to complete the necessary procedures from 7-10 years to 5 years. Questions still remain regarding financing, as the amounts are so substantial that combined private and public funds are needed;
- Countries that have not yet decided on their policies towards nuclear: the Netherlands, Germany, Italy and Switzerland.
  - In the Netherlands, where the government has been favourable to nuclear, it has now been decided to postpone any decision until after the 2008 elections;
  - In Germany, some parties are calling for the re-opening of the debate. Yet as no replacement decision has been made, the government is postponing plants, and players are building coal-fired plants;
  - Even in Italy, where nuclear has been banned due to the Chernobyl incident, some officials now talk about a possible return to nuclear;
  - The following Swiss example highlights an interesting issue that other countries may have to cope with in the replacement process if decisions are not made soon. In Switzerland, after the government issued a law in favour of nuclear, players pointed out that even with a faster administration process, the construction of nuclear plants takes a long time, approximately between 10 and 15 years. Thus, given the forecasted consumption and shutdowns of plants, the country will face severe electricity shortages on the medium term. Investors are now proposing gas plant construction to meet the generation needs until the new nuclear assets come on-line, while the local authorities, who largely prefer nuclear to gas, are trying to find ways to speed up the construction process for nuclear.

Key issues in Switzerland

While Switzerland's electricity market is fragmented at the distribution level, **the 'big five' Uberlandwerke Utilities (Atel, Axpo, BKW, EOS and EWZ) form a strong core in asset ownership at the generation and transmission level**. Atel and EOS will merge in 2008 to establish a west Swiss 'champion' that will balance the Axpo Group's power in the east.

The Swiss electricity market represents 60 TWh. **Electricity demand is mainly covered by hydro (57%) and nuclear power (38%)**. Due to Switzerland's central location within Europe, annual electricity transits total up to approximately 33 TWh.

Market experts anticipate **a gap in the Swiss electricity supply of approximately 25 TWh in 2025** due to the arrival of nuclear power plants at the end of their lifecycles, the expiration of key import contracts, and limited possibilities to extend hydro generation capacity. Switzerland has tried to address the issue by launching initiatives on renewable energy sources and by investments in new nuclear plants.

The main topic in Switzerland is the deregulation of the Swiss electricity market. Their parliament recently approved a new electricity supply act which is scheduled to take effect in 2008. As a result, customers with a consumption exceeding 100,000 MWh/y (53% of market volume) will be eligible to select their suppliers. Complete liberalisation is planned for 2013 following a referendum.

The seven TSO companies have voluntarily established **a national grid company: Swissgrid.**

Players' market shares in generation demonstrate a high degree of concentration in most markets

A commonly held view in concentration ratio analysis is that *"An undertaking is presumed to be dominant if it has a market share of at least one-third. A number of undertakings is presumed to be*

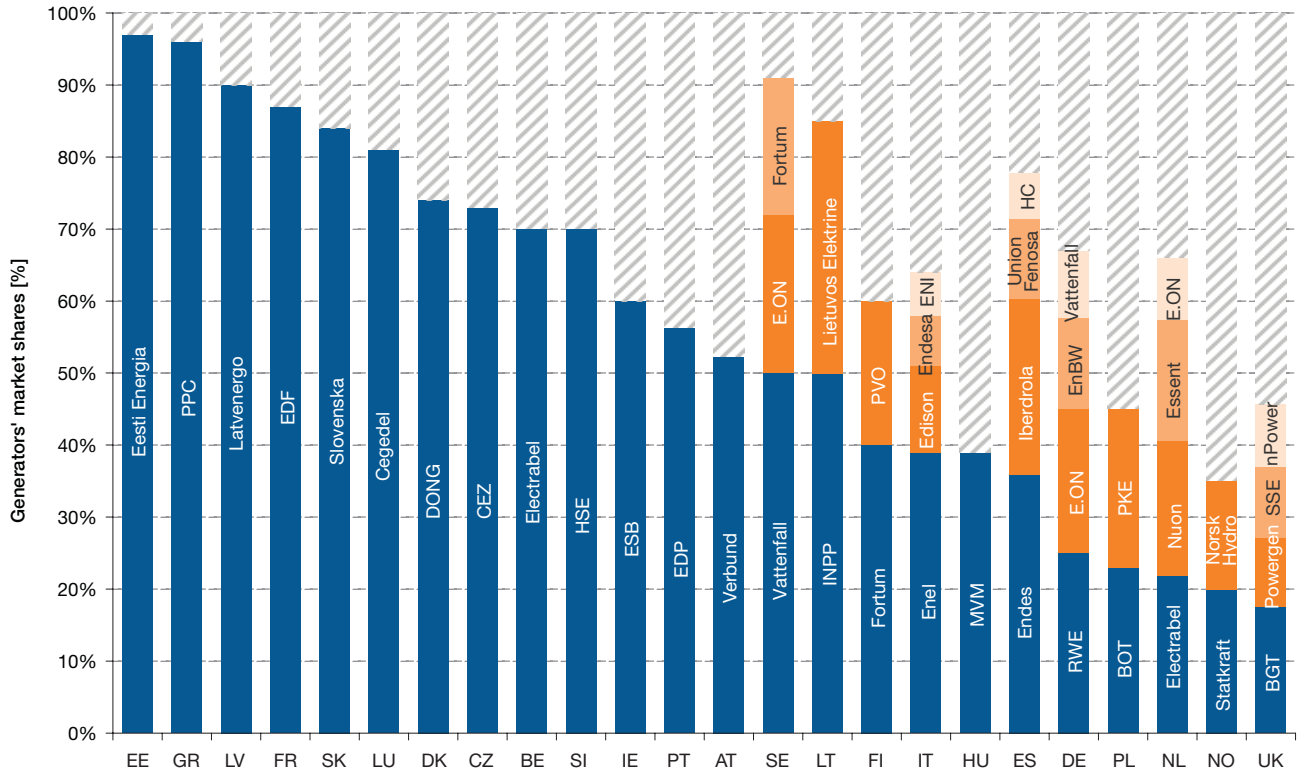
dominant if it: (i) consists of three or fewer undertakings reaching a combined market share of 50%, or (ii) consists of five or fewer undertakings reaching a combined market share of two-thirds". As we can see, few markets in Europe can be qualified as competitive, except the UK, Poland and the Nordics (Sweden, Finland, Denmark and Norway), and most countries still have the majority of their capacities owned by only one player, mainly due to former centralised state monopolies.

Two conflicting trends appear:

- Regulators or competition authorities continue their efforts to enhance competition either by the forced transfer of capacities in the context of Mergers & Acquisitions or by auctions (Virtual Power Plant – VPP). In Sweden for example, high electricity market prices and profits of players have focused even more pressure on generation (see country box), reviving the debate on corrective measures on players and co-ownership of nuclear generation in the future;
- The continued consolidation at the national level, and the continued merger and acquisition activity, such as by mega-operations such as Enel-Endesa-E.ON or Suez-Gaz de France at the European level, clearly threatens competition by reducing the number of players.

Regarding new capacities, the top five players ranked by the amount of new capacity builds are: Endesa, RWE, Iberdrola, E.ON and Enel (before the Enel-Endesa-E.ON operation). New entrants in the new generation markets are still not numerous. They are mainly established players investing outside of their original country, e.g. Electrabel in Germany (2,400 MW of coal plants forecasted) or in Spain. However, "pure" new entrants can be noticed, such as Poweo in France (no generation plants online but 2,800 MW forecasted) and also Sorgenia in Italy (3,100 MW forecasted).

Table 2.5 Generation market concentration (2006)



Source: European Commission, Utilities web sites – Capgemini EEMO9

Electricity Wholesale Markets

- Wholesale prices have decreased since spring 2006;
- National Allocation Plans have driven carbon valuation and then impacted power price;
- Power exchanges continued to grow fast in terms of traded volume and product diversification. Sometimes they have looked abroad to strengthen their development;
- Market integration has continued towards a European unique wholesale market.

Wholesale prices have decreased since spring 2006

Apart from a price spike in July 2006, European wholesale prices have decreased since the beginning of 2006, when they had reached the highest levels since the beginning of the 2000 decade (see Table 2.6). European power exchange statistics reflect this overall trend well, if we consider spot prices on the main exchanges excluding Nordpool (EEX, Powernext, APX Netherlands) that:

- Increased by 15 to 25% in Summer 2006 (from July to September) compared to Summer 2005;
- Decreased by 40 to 45% in Winter 2006-2007 (from October to March) compared to Winter 2005-2006.

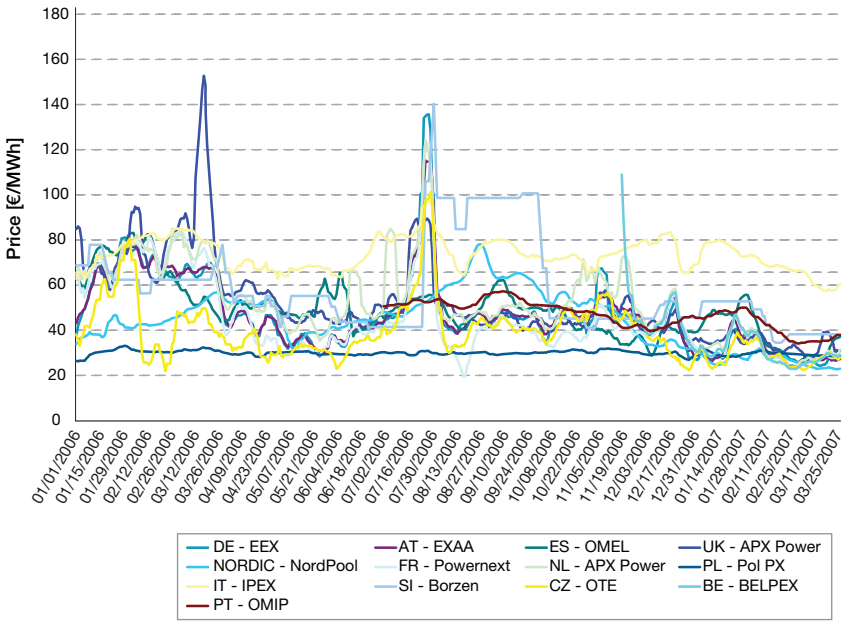
Five main structural parameters impact power prices:

- *Oil prices:* Oil constitutes a price reference for many gas supply contracts in Europe and has an important role in power market psychology. In 2006, oil prices significantly decreased from a peak which neared $80/barrel in August down to a mere $50/barrel in January 2007. From that point prices increased and again almost reached $80/barrel;
- *Gas prices:* Gas prices rely more on local security of supply issues, and the rise of an ever-more powerful Russia as Europe's main supplier impacted wholesale prices in early 2006. Yet, gas prices on Europe's three main hubs (NBP, Zeebrugge and TTF) decreased since April 2006, stabilising at under €20/MWh;
- *Coal prices:* Imported coal delivery prices increased by 31% over the year 2006 (measured by the global COAL ARA index), due to increasing freight rates and continued global competition against countries which have a fast-growing demand, such as China. Compared to 2005, this growth in the price of coal has slowed down and the market has adapted itself to Chinese demand;
- *Carbon allowance prices:* 2007 EU emissions Allowance prices plummeted from a record high of €31.55/ton in April 2006 to prices nearing €1.00/ton in the beginning of 2007. 2008 EU emissions Allowances prices, covering the first period in Phase 2 of the EU ETS, were quoted at around the €15/ton mark in February 2007;
- *Margins and forecasts of an increasing need for capacity* have not had very much impact on wholesale prices this year, considering they already have been included in the markets' anticipations in futures trading.

Weather conditions were the main factor that pulled down power prices:

- *Hydro conditions:* In France, throughout spring and summer 2006, hydro levels remained at a higher level than in 2005. In Spain and in the Nordic region, hydro conditions were very poor until the last quarter of 2006, when Spanish conditions started improving. Concerning the Nordic area, hydro conditions improved greatly in the beginning of 2007, to a better than average level;

Table 2.6 Electricity spot market prices



Source: Power Exchanges web sites – Capgemini EEMO9

- *Mild weather:* Regarding temperatures, Europe benefited on the whole from very mild conditions during the winter 2006-2007.

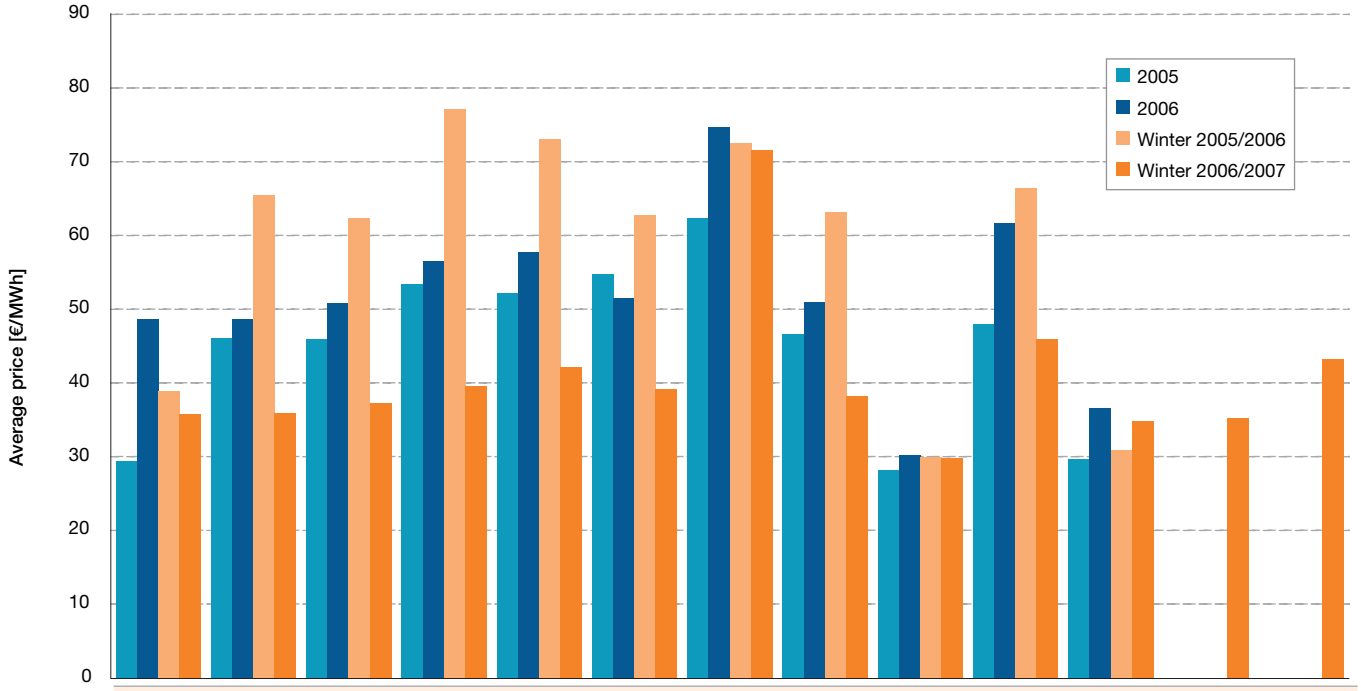
2006 versus 2005

Overall, with the exceptions of Nordpool and Omel, 2006 spot prices have decreased to 2005 levels as of the March to June period, recovering from the price increases that led to historic price peaks through the end of March 2006. In addition, 2006 has been very different from 2005, as it met a summer price spike in mid-July, with many exchanges exceeding €100/MWh levels for base load, sometimes up to €200/MWh (APX UK and NL, Powernext) or even €300/MWh (EEX, EXAA).

There were two significant exceptions:

- Although Nordpool still benefited from the lowest average of spot trading prices, the Nordic market has closed the price gap it has usually had with the rest of Europe, during most of the year. The Nordic region suffered from poor hydro conditions, the impact of emissions and a general overreaction of market players and speculators. Furthermore, there were unscheduled central plant outages in Sweden that added pressure on near-term wholesale prices;
- The Spanish market did not suffer from the summer price spikes because of their government's decision to fix exchange prices of vertically integrated groups in February 2006.

Table 2.7 Average electricity spot prices



	NORDIC-NordPool	FR-Powernext	DE-EEX	UK-APX Power	NL- APX Power	ES-OMEL	IT- IPEX	AT-EXAA	PL-Pol PX	SI-Borzen	CZ- OTE base	BE-BELPEX	PT-OMIP
2005	29.36	46.04	45.92	53.43	52.12	54.78	62.36	46.57	28.18	47.93	29.58	–	–
2006	48.61	48.58	50.79	56.52	57.67	51.53	74.75	50.97	30.11	61.70	36.53	–	–
Winter 2005/2006	38.85	65.39	62.31	77.12	73.12	62.76	72.53	63.20	29.95	66.44	30.90	–	–
Winter 2006/2007	35.73	35.84	37.29	39.56	42.17	39.15	71.55	38.18	29.85	45.97	34.85	35.28	43.18

Source: Power Exchanges web sites – Capgemini EEMO9

Winter 2006-2007 versus Winter 2005-2006

Following the price explosion between the winters 2004-2005 and 2005-2006, most power exchanges have seen their spot prices decrease by 30% to 50% (see Table 2.7 on previous page). These decreases were mainly due to mild winter temperatures and weaker fuel and declining EUA prices, along with other local factors, such as high wind output in Germany or high levels of gas storage in the UK.

National Allocation Plans drive carbon valuation

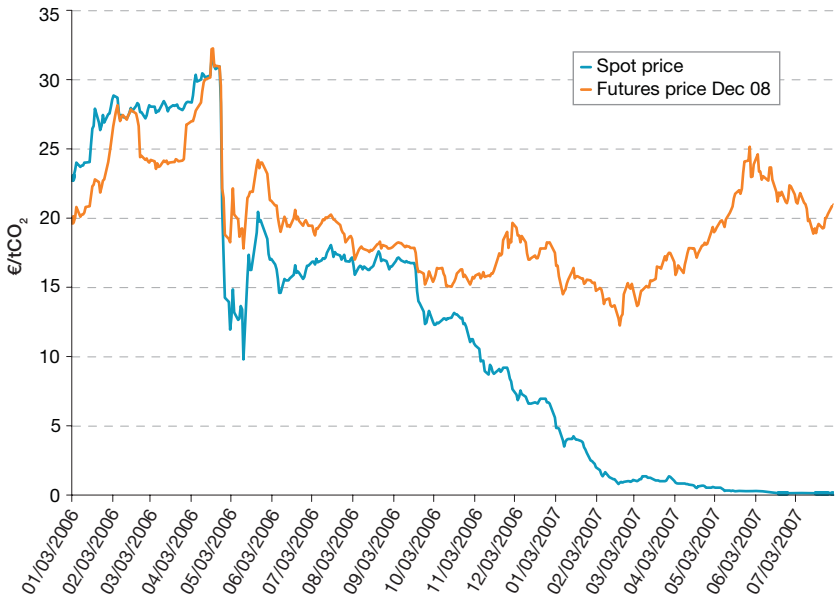
Carbon trading in Europe has grown fast in terms of volumes, product diversity and trading platforms (Powernext, EEX, Nordpool, Climex, EXAA, IPEX, ECX, Gielda Energii). In 2006, spot trading of European emissions amounted to 49.2 Mt, and 498 Mt in OTC transactions were cleared across the exchanges.

For implementation of the European Trading Scheme (ETS), EU Member States have been given the responsibility to affect carbon allowances to their installations targeted by the ETS and to present as a whole their NAP to the European commission for approval. This process has been far from easy to implement as the European Commission has been playing a game of "cat and mouse" with Member States, to determine an adequate target of allowances. As a result, emissions trading for the 2005-2007 period started even before all NAP were approved by the EU Commission, which spurred volatility in the markets, as players scrutinised the outcome of the remaining NAPs to be approved.

The end of NAP 1 trading

In the end, it turned out in April 2006 that allocations for the 2005-2007 period had been too generous,

Table 2.8 CO_2 prices on ETS



Source: SG Commodity Research – Capgemini EEMO9

Key issues in Belgium

Full market opening in Belgium took place on January 1, 2007 when the Brussels and Walloon regions implemented the model for their complete regional market (the market opening started in Belgium on January 1, 2003 for the complete market in Flanders and for some customer categories in the Brussels and Walloon regions). **Very limited churn activity was recorded** in the first months after the opening (between 1 and 10% depending on the inter-municipality). Now that the opening process has been achieved for all Belgian regions, the Utilities sector could experience significant changes in the coming years. Nevertheless, the Belgian market will require time and structural changes will take place at the regional and federal level, before results will be observed.

The debate on nuclear has been re-opened, and the current plan to stop nuclear generation in Belgium in 2030 could be reconsidered. The effects that the termination of nuclear generation may have on the electricity price, coupled with the Kyoto protocol requirements, have repositioned nuclear as one of the electricity production means for the future.

The expected merger between Suez and Gaz de France will make a visible impact on the Belgian energy market. The EU Commission and the government of Belgium have requested that the merging entities review their positions in Belgium, and that they put some of their assets and organisations on the market in order to safe-guard a high level of competition.

The Belpex day-ahead market and the market coupling with APX and Powernext both commenced in November 2006. APX, Belpex, Elia, Powernext, RTE and Tennet were partners for the implementation of this project, which had the objectives of achieving better price definition and a higher liquidity between the coupled markets.

that the market was overall long on emissions allowances and that the "banking" of allowances was forbidden (shift of the NAP1 allowances to the next NAP period). As a result, the 2007 carbon market price crashed close to €0 in June 2007 (see Table 2.8).

Price evolution of NAP 2 trading
Carbon allowances for 2008 suffered from the same downturn, as market players feared that the market would be overall long, since the first announcements of Phase 2 NAPs were less ambitious than expected. However, the carbon price started to shoot up as of March 2007 because the EU Commission requested countries to decrease emissions allowances in their Phase 2 NAPs (by an average of 7%), in order to reach the European Kyoto target.

Power exchanges continue to attract trades, whilst expanding their services

Power exchanges continued to grow fast in terms of traded volume and product diversification, and they sometimes looked abroad to strengthen their developments.

There are 11 power exchange operators that serve the West European market, with two new exchanges in 2006: Belpex (Belgium) and OMIP (Portugal/Spain). The main products that are traded on these exchanges are spot and prompts contracts for short-term positions (up to one day-ahead of delivery) and futures contracts for physical and financial long-term positions. In addition, some exchanges offer other products such as intraday trading or clearing services for OTC forward contracts. In addition, some exchanges have diversified their activities by additionally offering trading of EU emissions allowances or coal; or by expanding their activities out of their borders.

2006 versus 2005
In 2006, the traded volume of European power increased by 19%, which set a new record of 4,509 TWh, and represented 147% of the 2005 European power consumption:

- Spot volumes in major West European power exchanges reached 714 TWh, which was a small decrease of 3% compared to 2005;
- Total futures volume jumped 36% to 1,930 TWh in 2006. The majority of traded contracts were concentrated on maturities under one year.

Many financial players have entered the European power market for the price volatility that it offers. In 2006, they have become significant players in terms of volume and market expertise.

Nordpool
Nordpool remained Europe's biggest exchange (and also became the leading spot exchange in 2006), with a total exchange contract volume of 1,017 TWh (51% of total volume of all European exchanges combined), split between 250 TWh spot transactions (+43% compared to 2005) and 766 TWh futures transactions. In addition, Nordpool cleared OTC clearing volumes for a total of 1,394.3 TWh (+1.8%).

Nordpool has created a spot bidding platform in north-eastern Germany, the "Kontek" zone. In 2006, 3.0 TWh were traded, which is insignificant for the scale of the country: EEX booked spot volumes of 88.7 TWh in 2006.

EEX
In terms of volume, German EEX comes in second place in 2006, with a total of 477 TWh, split between 89 TWh spot transactions (+4% compared to 2005) and 388 TWh futures transactions. In addition, EEX's 2006 OTC clearing activity boomed by a staggering 156%, and options trading amounted to 16.7 TWh (+18%). However, traded volumes in futures collapsed in favour of the OTC market in the spring 2007, after media hype about RWE's alleged market power made the Utility switch some volumes to bilateral trading.

On September 25, 2006, the exchange added intraday trading to its short-term market offers. In July 2007, EEX offered gas trading, in addition to serving German power, emissions and coal markets.

In addition, EEX is present on the Austrian and Swiss spot markets, as well as on the French futures market. In France, EEX entered the futures and the clearing of OTC forwards markets to challenge Powernext. Yet, EEX's French futures volumes accounted for a mere 2.5% of Powernext's in 2006.

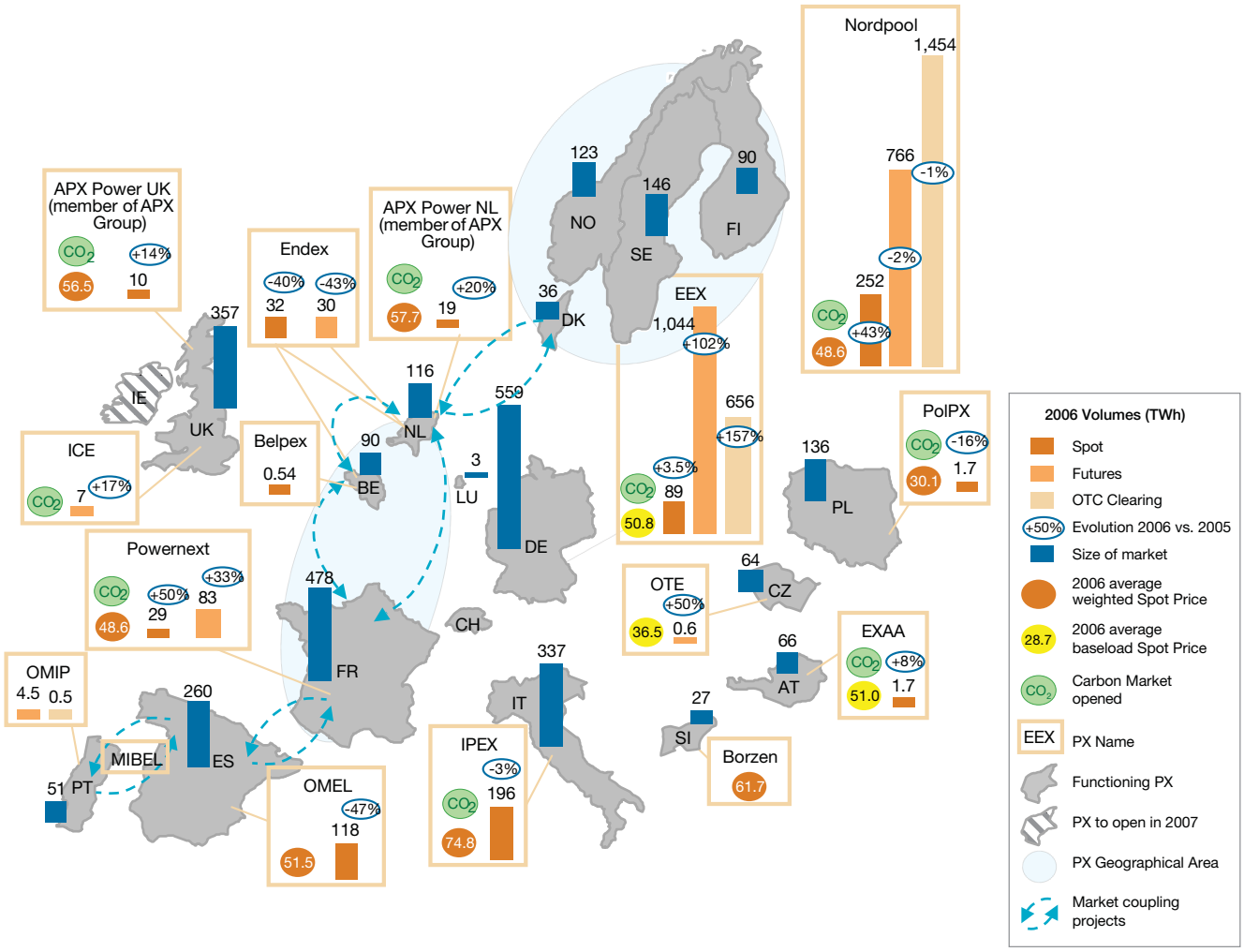
IPEX
In its third year of trading, the Italian exchange booked transactions for a total of 197 TWh, becoming Europe's third largest power exchange in front of Omel, despite a declining activity (volumes 3% down compared to 2005). A majority of the exchange's activity relied on State-regulated entities and IPEX reached Europe's most expensive wholesale spot prices.

In April 2007, IPEX launched an emissions allowance spot market.

Powernext
Powernext became Europe's fourth exchange in 2006, with a 38% increase of traded volume, split between spot volumes of 29.6 TWh (approximately +50%) and futures volumes of 83.1 TWh (approximately + 33%).

Powernext offered power spot and futures contracts, emissions allowance spot trading (of which Powernext is Europe's leading

Table 2.9 Map of electricity trading (2006)



Source: Power Exchanges web sites – Capgemini EEMO9

exchange) and OTC clearing services for both power and emissions. The exchange plans on launching intraday trading by mid-2007.

APX Power and Endex in the Netherlands

2006 spot market volumes on APX reached 19 TWh (+18%). In September 2006, Dutch APX Power added an intraday market to its historical spot market.

Endex offered power futures contracts and clearing services for OTC transactions. In 2006, Endex booked a 39% drop in its futures volumes (32 TWh), while OTC clearing volumes almost doubled up to 99 TWh. This phenomenon can be explained by considering that market volatility made traders switch from exchange trading to negotiations with brokers, in order to benefit from their insights. In addition, this drop in transactions should be compared to the 150% increase of traded power between 2004 and 2005.

Omel

The spot volumes of Spain's Omel crashed by nearly 50% (down to 117.8 TWh). After that the Spanish government decided on fighting against surging prices by fixing exchange prices of vertically integrated groups in February 2006.

Consequently, the weighted average of day-ahead market price was €55.69/MWh, making many players move their transactions to bilateral trading.

A ministerial decree, signed on February 27, 2007, allowed companies to obtain power for distribution on the regulated market by signing bilateral contracts, at prices determined by auctions. This new way of obtaining power for regulated clients became available on July 1, 2007.

APX and ICE Futures in the UK
APX UK offered spot, prompt and futures contracts as well as clearing services for spot, prompt and emissions products. The exchange benefited from an increase of its spot and prompt volumes (+14%) up to 10 TWh. This represented a mere 3% of the UK's power consumption.

ICE Futures is primarily an exchange for the oil market. Yet, it offers power futures contracts for delivery in the UK and OTC clearing services. In 2006, ICE Futures' volumes declined by 33%. In addition, ICE Futures entered the coal market in 2006, but trading has started slowly.

Omip
Portuguese OMIP started dealing derivatives for Spain and Portugal in July 2006. Within the framework of the Iberian Electricity market initiative (MIBEL), the exchange is due to merge with OMEL, the Spanish spot exchange, to create "OMI". The OMIP offered physical and financial futures contracts, as well as clearing services for OTC forward trades. During its first six months of activity, OMIP registered volumes of 5.4 TWh.

Belpex
Belpex launched its spot market on November 21, 2006, offering hourly products on the Belgian network. In addition, the exchange started offering block products in February 2007, and it is planning to implement an intraday trading platform in the future.

During its first four months of operation, Belpex recorded total volumes of 1.9 TWh.

As a result of Belpex launching its day-ahead market, a trilateral market coupling between Belgium, France and the Netherlands was created. Due

Key issues in Sweden

The spot prices at Nordpool during 2006 have been the highest seen so far. This has changed the strategic landscape for all Nordic Utilities, and many generation companies are now extremely profitable. At the same time, risk has increased in the retail business. Forward contracts for 2008-2012 were traded at prices around €45/MWh during August (spot average during 1996-2005 was approximately €23/MWh). The question within the industry is whether these price levels are temporary or if they are here to stay.

Even though the high wholesale prices have resulted in very high profits for the generators, there are still limited investments in new generation. The focus for the investments in new generation is in wind power, where there has been an investment rally that seems to continue. Large-scale investments are still in more traditional generation capacity, and the nuclear debate is picking up again. While Finland is investing in a new nuclear power plant, Sweden is bound by the old referendum on nuclear power. At the same time, new rules regarding CO2 limits other major investments.

In the retail market there is a very high pressure on margins in the competitive segments. The end customer's price only differs by a marginal amount between key top players. It is very hard to gain new customers with a positive net margin, and many retailers will have to reduce their cost-to-serve. Retailers are also seeking new ways to differentiate, since electricity supply is now viewed as a standard commodity by customers. This is illustrated by significantly increased churn during 2006.

All distribution companies in Sweden are in the process of deploying Automatic Meter Reading (AMR), which must be fully implemented by 2009. The new rules for metering and invoicing combined with EMIX (see EMIX box) as the new information hub will drastically change the way customer and metering information is exchanged across the industry.

Recent storms and the resulting black-outs have increased customer demand for a secure supply of electricity. This has resulted in large investments to rebuild distribution networks in order to reduce the risk of disturbances. At the same time regulatory authorities have taken their first decision regarding distribution tariff levels, and they claim that several distributors should pay refunds to customers. Those claims are now disputed by the distributors, yet they are resulting in uncertainty regarding to what extent distribution networks can be profitable in the future.

to market coupling, Belpex prices approximately aligned with those of Powernext and APX.

EXAA and Eastern European Power exchanges

In Austria, spot market volumes increased by 10% to 1.7 TWh.

In Eastern Europe, the existing four power exchanges (located in Poland, the Czech Republic, Romania and Slovenia) allow spot transactions only. In 2006, the combined volume of power traded on these exchanges amounted to 6.4 TWh, which accounted for a mere 2% of the electricity consumption of these four countries.

Initiatives toward regional integration are slowly underway, mostly at the initiative of market players and also from ERGEG regional initiatives

Many steps remain between today's beginning market integration and the idea of a unique European wholesale market.

There are three main initiatives of market integration in Europe today:

- On November 21, 2006, Europe's first market coupling was launched between Belgium, France and the Netherlands. This tri-lateral market coupling optimizes cross-border interconnector capacity, by allocating day-ahead border capacities using all the power exchanges of the three countries at the same time. As a result, power prices tended to harmonize and price volatility tended to diminish on the three markets. This initiative is expected to spread progressively according to the reinforcement of interconnections with Norway (once the NorNed cable is completed in autumn 2007), and maybe with the UK or Germany;
- Spain and Portugal agreed in March 2007 on how to implement their Iberian power market, which includes merging Spain's OMEL day-ahead market with Portugal's OMIP futures market to create a single OMI market before the end of 2007;
- Nordpool and EEX are planning to implement market coupling between Denmark and Germany, with a target of Q4 2007.

The EU Commission strives to speed up the process by implementing and proposing laws, after having studied and discussed closely practical issues, using reports of the ERGEG on regional initiatives and compliance with regulations. Discussed topics included:

- Improving data transparency: the EU Commission adopted on November 9, 2006 revised and legally binding congestion management guidelines, part of the EU cross-border power trading regulation and some data disclosure became mandatory for TSOs and generators in 2007 (EUE 145/4). Generators are required to publish ex-ante information on planned outages and ex-post information for the previous day on planned and unplanned outages of units larger than 100 MW;
- Increasing the capacity of Virtual Power Plants (VPP) and improving the mechanism of VPP by making the process totally anonymous.

Success in reaching a unique European wholesale power market remains quite a long way ahead, considering the extensive collaboration that is needed between TSOs and power exchanges and the interconnector capacities that need to be developed.

The goal is likely to be reached slowly, via the progressive extension of market couplings.

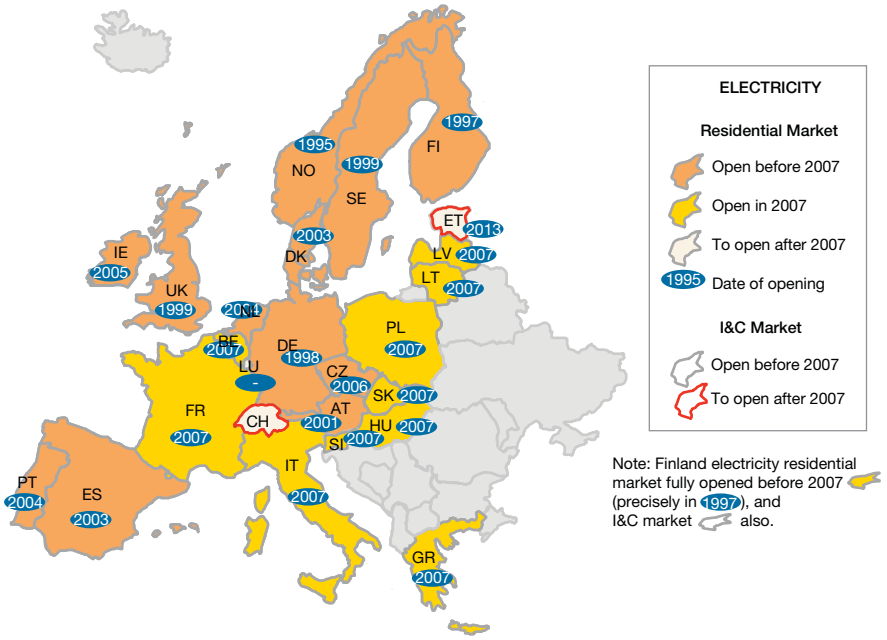
Electricity Retail Markets*

- Overall electricity consumption has increased again in 2006 by 1.3% over 2005, despite EU energy conservation messages;
- Large incumbents have massively dominated the retail markets;
- Although new entrants have tried to differentiate with innovative offers, price has definitely remained the "name of the game";
- Severe barriers to switching - such as the persistence of low regulated tariffs or the absence of effective unbundling – have prevented customer churn from increasing over the past 12-18 months in all but a few EU countries;
- Statistical price trends have confirmed the continuation of a substantial rise in general retail prices. They have also continued to confirm the high discrepancies in price levels between EU Member States in all market segments.

2007: A key milestone in the EU deregulation process

Most of the EU-25 countries are now fully opened to retail competition, at least for electricity (see Table 2.10). Some countries have already completed eight years of full retail market opening, such as Sweden and the UK, whereas others have only completed a few months, such as France, Italy, Poland, Greece, etc.

Table 2.10 Electricity market opening milestones (as of July 2007)



Source: European Commission – Capgemini EEMO9

Overall electricity consumption has increased again in 2006 by 1.3% over 2005, despite EU energy conservation messages

Overall consumption across EU Member States has again increased by 1.3% in 2006 compared to 2005 (the growth was 1.6% in 2005 compared to 2004). This occurred despite energy conservation becoming a key objective for the EU Commission and for many EU states, and despite rising fuel costs that were coupled with a very mild winter across Europe. 2006 demand figures have shown that in many countries, overall electricity consumption was still increasing and sometimes at a high pace: Finland +5.7%, Austria +5.0%, Ireland +4.7%, Spain +4.5%, Poland +4.3% (see Table 2.11 on the following page).

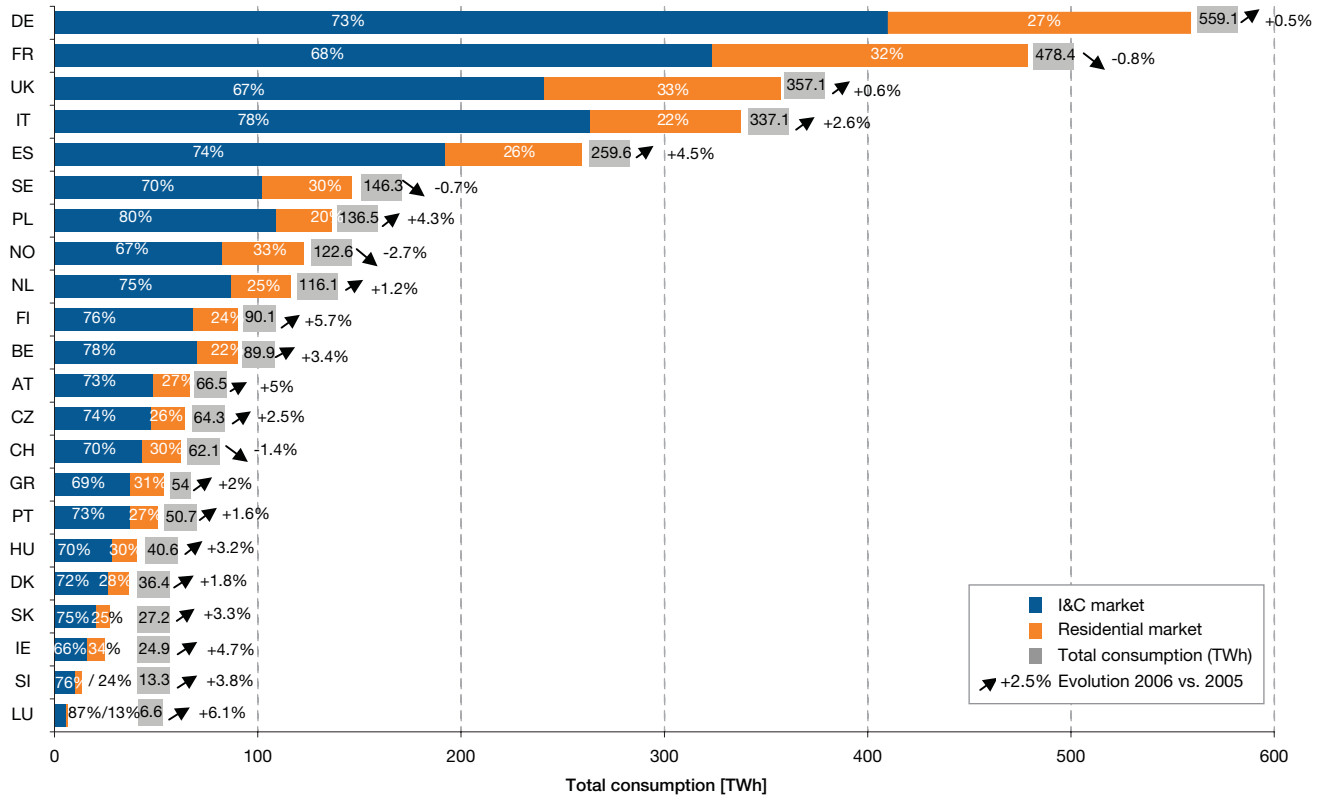
Only four countries have recorded a slight decrease in their overall electricity consumption in 2006 over 2005: Sweden (-0.7%), France (-0.8%) and Norway and Switzerland (each -1.4%).

Large incumbents have massively dominated the retail markets

The electricity retail market concentration indicator (Table 2.12 on pg. 35), released for the first time this year, shows that the most successful new entrants were the dominant vertically integrated players of neighbouring markets In the UK for instance, the "Big 6" capture the majority of the market shares, and among those six, three are controlled by neighbouring incumbents (EDF, E.ON, RWE). On the Nordic market, many regional incumbents (Fortum, Vattenfall, Dong Energy) have developed market shares in neighbouring countries.

* This Chapter was written in collaboration with VaasaETT

Table 2.11 Size of I&C and Residential electricity markets (2006)

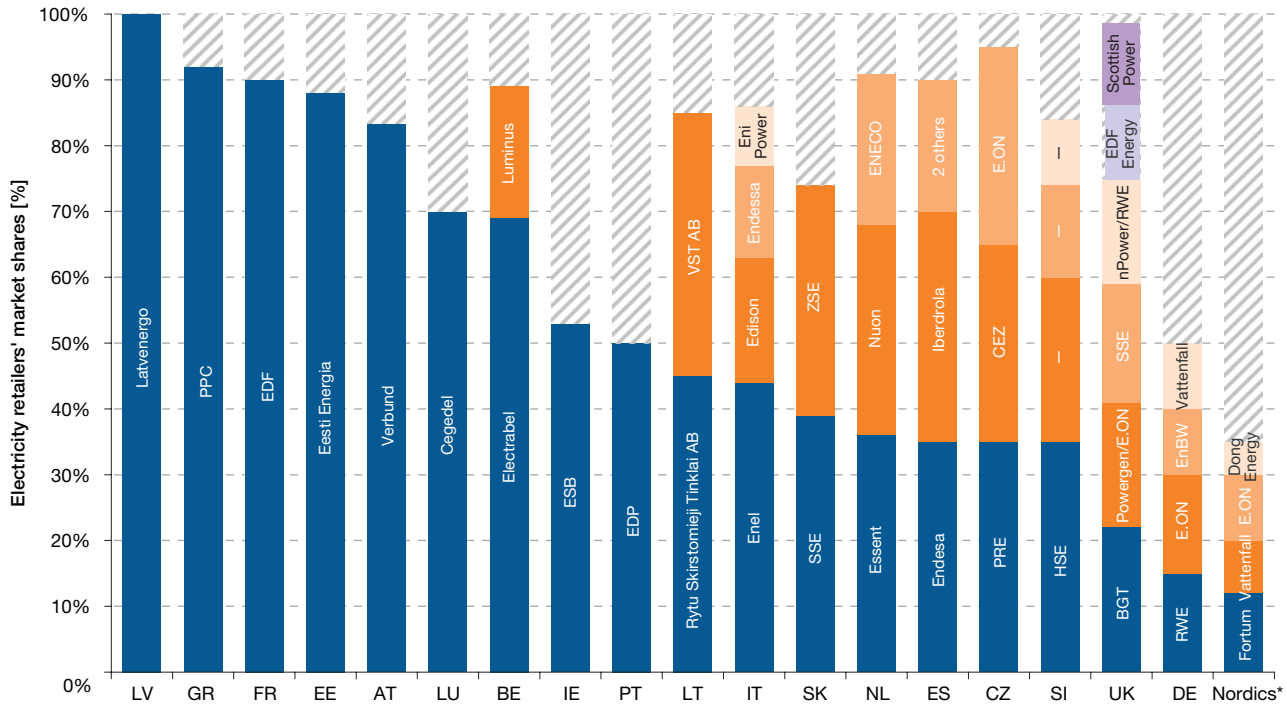


Source: UCTE, Eurostat, Nordel, DTI-UK, Eirgrid – Capgemini EEMO9

However, incumbents have also had to fight with their cost-to-serve. Should distribution unbundling be implemented, this would make them uncompetitive.

Small retailers or new entrants may survive by selecting a very specific niche. For example, God-El, a niche Swedish electricity retailer, has some 50,000 customers gained through socially responsible offers, and their dividend goes to charitable donations. Overall small retailers are either merging together to become bigger or are bought by bigger retailers. It is worth mentioning the success in Germany of E.ON with a new low-cost subsidiary (E WIE EINFACH – E for Easy) and the very successful marketing campaign that attracted 100,000 new customers (outside of E.ON historical service territory) within six months. Their simple price offerings undercut the local host supplier's standard tariffs for electricity and gas by €0.01/kWh and €0.02/cubic metre respectively. In the Nordic region, it was speculated that a big consolidation would happen. Yet there are still approximately 200 players on the market, even though residential customers have been eligible for many years now. Big incumbents cannot grow their customer base by buying local Utilities since there are no or few offers from municipals to sell.

Table 2.12 Electricity retail market concentration (2006)



*Nordics: Norway, Sweden, Finland, Denmark
Source: European Commission, Utilities' web sites – Capgemini EEMO9

Although new entrants try to differentiate with innovative offers, price remains definitely the "name of the game"

Electricity is a commodity, and finding other incentives than price is challenging. But, both incumbents and new entrants are seeking new ways to differentiate through innovative offers or energy-related services bundled with the commodity.

No big marketing breakthrough

Overall, 2006-2007 has not seen many breakthroughs in new or innovative offerings. However, there have been a few. First, there have been the dual offers: in recently opened markets, such as France and Italy, the main competitor of EDF is Gaz de France in the French market, and the main competitor of Enel is Eni in Italy. Next, there have been green offers: overall, these offers include a price premium which targets environmentally concerned clients. However, these green offers have so far been quite marginal. For example, they have accounted for 1% of the UK market. Next, there have been offers designed with financial services components, such as multi-year capped price or "flat rate" tariffs. Finally, there have been energy-related service offers: increasingly, Utilities throughout Europe have been offering advice to households regarding energy savings, such as information related to audits, assessments, etc.

Cost-to-serve

Cost-to-serve is starting to become a new industry benchmark and a best practice driver for retail restructuring. While the EU Commission is focusing on unbundling as a new driver to enforce true retail competition, the pressure of potential unbundling is forcing companies to really look into their competitive cost position.

Capgemini's annual global retail benchmark (including telecommunications, Utilities and financial markets) shows that the average retail cost-to-serve is "on par" or even above the customer gross margin. In an integrated Utility this is an issue, but not dramatic for the consolidated profit and loss statement. However, full unbundling will change the setting. A pure retailer will show that net results are under high pressure.

Across the globe we observe many ongoing transformation projects. We also see actual drastic business transformation going on towards best practice cost levels. This is not amazing, since true competitive markets, such as the UK, western Australia and to a somewhat lesser extent Sweden, are showing that new entrants compete fully on price and therefore on cost.

If full unbundling becomes a real fact (in fact, it is almost a must for true retail competition and customer choice) it will drive new market entrants from other industries towards the energy retail game. Full unbundling also means that the market will deliver greater transparency and that new entrants will be able to start as low cost energy retail operations (best practice retail cost-to-serve is €12.50 per contract).

Fierce retail competition will put even more pressure on cost-to-serve management, as "owning" fewer customers will drive up the cost-to-serve, as well as the cost of customer retention, switching and acquisition. Becoming best practice will then become a reality in order to overcome competition and to deliver results to shareholders and other stakeholders, i.e. the customers themselves. Companies operating at best practice also have realised best in class customer service and have realised high customer satisfaction scores.

Low cost operations therefore do not say so much on the level of cost spent for customer service, but say everything about being in control, and about "serving the right customer, at the right time, on the right channel with the right service and the best proposition". Doing things right adds more value for the customer at lower cost, and this therefore adds value for the company as well as the believed way of profiling the company as delivering high service at high cost.

Some first attempts at demand side management

Evolution of the meter fleet across Europe (which are to be eventually replaced by smart meters) should help in the design and proposal of more innovative offers to clients regarding the monitoring of their real time consumption. This was similarly done by the new entrant Poweo in the French market and by Oxxio in the Netherlands, with the proposal to their clients of a wireless handheld energy consumption monitoring device (more details about this in the Electricity Distribution Chapter).

Severe barriers to switching – such as the persistence of low regulated tariffs or the absence of effective unbundling – have been preventing customer churn from increasing over the past 12-18 months in all but a few EU countries.

17 years after the UK commenced deregulation in Europe and nine years after Finland became the first EU State[15] to achieve choice for all its electricity customers, over 85% of residential and I&C European electricity and gas customers theoretically have the freedom to choose their supplier. Unfortunately, it is estimated that less than 10% of these have exercised their freedom. Furthermore, this number has changed by less than 1% during the past 18 months.

[15] Norway, a non-EU State, was arguably fully deregulated one year earlier.

Purchasing consortiums

In the beginning of the 1990s, large electro-intensive industrials expected liberalisation to bring price reductions and to bring more transparency to their supply conditions. As new market conditions did not permit this, electro-intensive industrials tried to find new ways of purchasing their electricity. In some countries, under the threat of seeing industrial activities off shored, tariffs for industrials have been maintained or created (such as in Spain and France). This has allowed some industrials to avoid market price fluctuations. However, in some cases very large clients have settled consortiums, despite their unfavourable position with the European authorities.

Different types of consortiums are currently in progress:

- Plant construction consortiums, in which suppliers and/or industrials provide money to build reactors, such as in Finland where a first consortium (TVO) composed of suppliers (Fortum, PVO) and electro-intensive industrials has been created to build a nuclear plant at Olkiluoto. Recently (July 2007), another construction consortium has emerged between two steel companies, local municipalities and E.ON Suomi, the Finnish subsidiary of E.ON;
- Purchasing consortiums, in which industrials regroup their supply needs and issue tenders for electricity supply, such as in Belgium, France, Spain or the Netherlands. In France, the purchase financing is mainly based on long-term bank loans;
- Supply optimisation consortiums, such as in Switzerland, where the consortium is putting pressure on local distributors to obtain more transparency on distribution tariffs, energy costs and their discrepancies between regions. They are also encouraging active consumption monitoring to allow for better purchasing.

Current consortiums initiatives for long-term electricity purchasing

	Spain	Belgium	France	Finland	Switzerland	Finland/ Sweden/ Germany	The Netherlands
Name	AEGE	Blue sky	Exeltium	TVO	Valdem	Fennovoima Oy	On-going
Number of industrials	36	7	59	16 (industrials & suppliers)	15	1/3 for 2 industrials, 1/3 for local suppliers, 1/3 for E.ON Suomi	9
Type of consortium	Purchasing	Purchasing	Purchasing	Plant construction	Supply optimisation	Plant construction	Purchasing
Annual volume required	30 to 35 TWh	14 TWh	30 to 40 TWh	Nuclear reactor 1,600 MW	110 GWh	Reactor 1,100 to 1,800 MW	1,200 MW or 9.6 TWh
Duration	15 years minimum	Long term	15 to 24 years	Lifetime of the plant	Not communicated	Lifetime of the plant	20 years
Progress							

Source: Capgemini EEMO9

These initiatives have many impacts on the liberalised markets, either on retail organisations with which customers are tempted to negotiate the same conditions (also backed with governmental help), or on wholesale markets by withdrawing important amounts of energy from the volumes traded

These figures are cosmetic, as they are boosted by the relatively positive figures of a small handful of more active states. The vast majority of customer activity during 2006 and even for several years before that has consisted of customers opting for competitive tariffs from their incumbent suppliers as well as customers switching suppliers for the second or more time.

Existence of regulated tariffs is the major barrier to switching

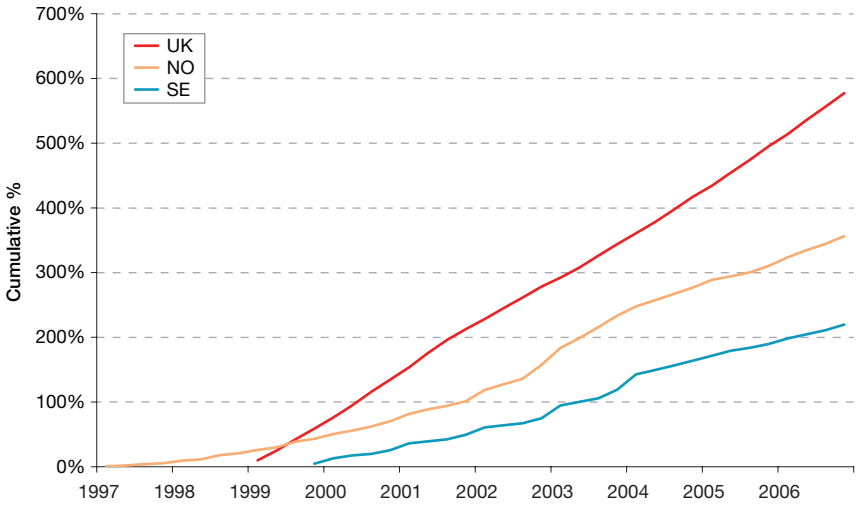
In France, the largest of the EU States to open its residential market in 2007, only a few hundred customers have chosen the open market in the first month of full (residential and I&C) market opening. This is at least partly attributable to the advice given by consumer groups to customers to remain with the lower regulated tariff. The result of this advice is the inhibition of the emergence of competitors and competition. However, France is not alone in its residential market inactivity. Competition-busting low regulated tariffs exist also in Spain, Portugal, Italy and Slovenia. Originally, these tariffs have been designed by the EU Commission for protecting 'vulnerable' consumers. So far, Germany has made an important step in abandoning its price control (cap) regime in all its "Länder" on July 1, 2007. This led to immediate increases of retail prices for residential clients ranging from 8% up to 34%. In fact, Germany, where the level of switching was less than 7% from 1998 to July 2007, experienced significant churn level as a reaction to the price increases. Spain has also made a step toward the EU Commission and has asked that regulated tariffs be withdrawn in 2009, and that they be kept only as a 'last resort' for "vulnerable" people.

Following the launch by the EU Commission of an inquiry on French regulated tariffs[16], France might follow the same path. However, today both electricity and gas regulated tariffs should remain until at least 2010 and probably beyond.

In Italy, less than two percent of households have switched from their gas supplier since the 2003 market opening. In Spain and Portugal, the level of switching has been no higher in the residential electricity and gas markets, which opened in 2003 (Spain) and 2004 (Portugal). Austria has had no more activity either since its electricity and gas markets opened in 2001 and 2002 respectively, dogged primarily by poor customer awareness in the face of heavy market concentration and incumbent privilege, even though customers could make substantial financial savings by switching suppliers. It is true that large I&C customers have switched in much larger quantities. Indeed, the majority of electricity purchased in Europe is under competitive conditions induced by the exercise of choice. However, this switching currently represents only a very small percentage of customers.

The slow start experienced by the majority of European markets is an indication of the failure of the EU to overcome the severe barriers to switching that continue to exist around the European zone. These barriers have been largely overcome in Australia and to a lesser extent in the UK. Key barriers include: the laczintensive direct marketing or strong, autonomous, competition-oriented regulators; incumbent price matching; customer unawareness; overwhelming incumbent privileges; price stability and low regulated prices[17]; State interests in incumbents and the status quo; and the absence of effective unbundling of retail, distribution and generation. Some countries lack appropriate Information Systems capable of seamlessly managing customer information sharing between retailers and Distribution companies.

Table 2.13 Electricity customers switch – Most active European markets



Source: First Data Utilities, VaasaETT – Capgemini EEMO9

The slow start is not permanent

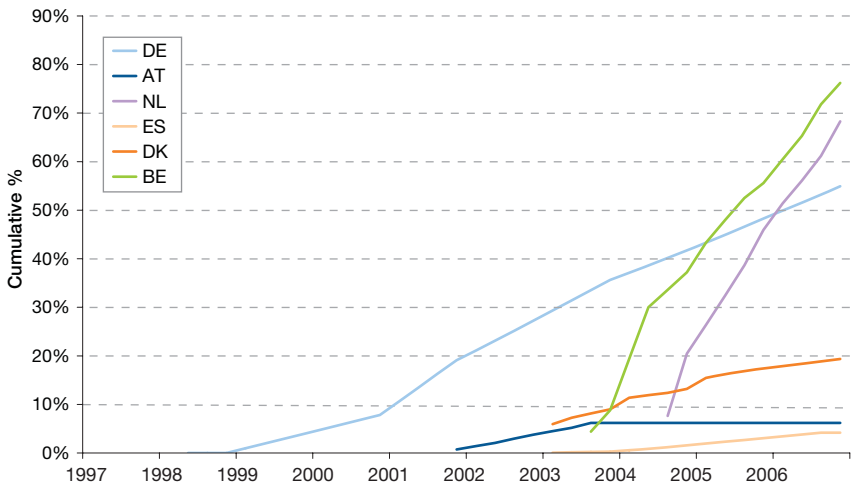
Analysis of global and European switching patterns following market opening reveals that a slow start is the norm. The slow start may last from a few months to years, but it is never too late for significant market activity to be stimulated, given the right conditions. As evidenced during the past 18 months in the Netherlands, the UK and the Nordic countries, switching is always cyclical and upturns often occur with little warning and are predictable only if the dynamics of customer switching are understood.

[16] In December 2006, the EU Commission delivered a reasoned opinion to the French government claiming that the country's regulated tariffs infringed upon EU objectives to open up energy markets. In addition, the Commission opened a State Aid procedure concerning regulated tariffs in June this year. This aims to determine whether large and medium-sized businesses benefit from assistance from regulated rates set at artificially low levels. This procedure is financed directly by State resources.

[17] Even in open markets, eligible customers in many states receive regulated tariffs or prices, unless they opt for competitive tariffs.

[18] This project comparatively monitors switching trends around the world. Data is derived from over 50 expert sources. For more information visit: www.firstdatautilities.com/customer-switching. Switching percentages aggregate residential and I&C switching, yet primarily reflect residential activity. A 'switch' is essentially seen as the free (by choice) movement of a customer from one supplier to another. Switching activity is defined as the number of switches in a given period of time and includes re-switching (when a customer switches for the second or subsequent time, even within the same measured period of time), switch-back (when a customer switches back to his/her former or previous supplier). A change of tariff with the same retailer is not equivalent to a switch.

Table 2.14 Electricity customers switch – Least active markets



Source: First Data Utilities, VaasaETT – Capgemini EEMO9

The latest figures (published by the Peace Software-VaasaETT Utility Customer Switching Research Project in July 2007[18]) show that successful Utility retail competition is being sustained in markets around the world. This is evidenced by the fact that of the world's nine active-rated markets which experienced levels of switching at or above 5% in 2006 (five EU states plus Norway, three Australian States, Texas and New Zealand), all have been open to full retail competition for at least five years. Furthermore, except for one, all have shown an uptrend in switching during 2006.

Drivers for European switching

During the past 18 months, it is clear that the major drivers of customer switching, where it has existed, have been customer awareness combined with price and publicity shocks. These triplets appear to be inextricably linked and absolutely essential for an active market. Politics, ever present in the energy industry, is becoming more important in a Europe which is ever more concerned with energy security, environmental protection and energy price volatility. Dual Fuel, affinity marketing and new player market entry have also continued to be key drivers of European switching, but only in the presence of the triplets. The promise of multi-utility, additional products, services and renewable energy have not had a significant impact on European switching.

The UK has once again topped the European rankings due to heavily marketed dual fuel offerings, separately owned retail and distribution Utilities and highly-publicised energy price volatility. According to UK utility market experts, "Retail price reductions during the past year provided significant impetus to customer switching. The year also witnessed increasing use of innovative pricing, with nearly 13 % of customers now on capped-price tariffs, 10% taking advantage of online-only tariffs, and one percent on green tariffs." Customer switching in the UK is today at its highest level in history, and it shows no signs of abating, even after seven years of high activity. This thus provides evidence that high levels of activity can be sustained in the long-term.

The UK is not the only source of European switching knowledge. Norway remains the fifth most active market in the world due in part to its relatively aggressive Utility acquisition marketing and due to its relatively high levels of customer awareness. A more prominent and significant characteristic of the Norwegian energy retail market is however the frequency of retail price changes. Utilities are able to alter prices as frequently as every two weeks. These changes lead to up and down wholesale energy costs, which are passed on to consumers. Energy price signals such as these are one of the key elements advocated by proponents of energy efficiency. This demonstrates the joint roles that resources and cost-reflecting retail prices can play in promoting energy efficiency and in stimulating customer switching. The highly fluctuating energy retail prices during 2006 led once again to an increase in switching.

Sweden was also more active in 2006. Sweden is now the eighth most active market in the First Data – VaasaETT rankings. In the Nordic region, Sweden now has the largest number of energy customers that are no longer served by their incumbent supplier. Switching activity has been encouraged by such factors as the media coverage of benefits available to customers for switching, negative publicity for some incumbent suppliers and price volatility. Publicity shocks

have in fact had a major influence on switching across Europe during the past 18 months. This is a consequence of the growing political implications of energy issues throughout the world. This was dramatically illustrated in Finland when a media frenzy surrounding energy price increases and large payouts to the directors of Utility companies led to higher levels of customer switching during late 2006 and early 2007. The negative publicity caused Utilities to cancel price rises, and in at least one case it necessitated increased spending on marketing and public relations to bolster the Utility's reputation.

The Netherlands experienced only 6% switching in 2006, which provides evidence that high levels of market concentration are bad news for switching levels. Yet new entrants have retained the advantage of lower cost-to-serve when competing with incumbents that are bogged down with expensive and inefficient systems. The beginning of 2007 has once again seen significant increases in switching in the Netherlands. This is the result of increased savings for the customer (a potential average savings of €92 per year per customer). It is also arguably the result of following over-confidence and excessive cost structures among the incumbents and subsequently increased levels of marketing campaigns.

Key issues in France

The last step of market opening for gas and electricity occurred in July 2007 (as per the French Law dated December 7, 2006). Very limited churn activity was recorded during the summer, which confirmed that the French market will require time and structural changes in order for liquidity to pick up. Regulated Tariffs for residential customers are still in place at least until 2010 and probably beyond. Following a claim by Direct Energie regarding a market squeeze and a limitation to enter the mass market, the competition commission has asked EDF to release power at a competitive price (Decision June 28, 2007, 07-MC-04). This should allow new entrants to be active on the French power market.

The low liquidity level in the I&C market was further hampered by the governmental decision dated January 3, 2007, which allows the client who has decided to subscribe to a "market" offer to go back to a regulated tariff known as the TaRTAM (Tarif Réglementé Transitoire d'Ajustement au Marché, valid for two years). Evidence of a negative impact on liquidity was seen on the volumes traded at Powernext.

The relaunch of generation based on nuclear is underway with intensive negotiations with counterparts interested in both technology and capacity rights in the French market.

CRE (French regulator) has asked for **an upgrade of all mass market meters (34 million)** to implement "Smart Metering". A first pilot of 300,000 is to be realised by 2009.

Regarding the industry structure, France has long been anticipating the outcome of the **Suez-Gaz de France mega-merger**. This will create another European champion and will probably trigger further consolidation from mega-players.

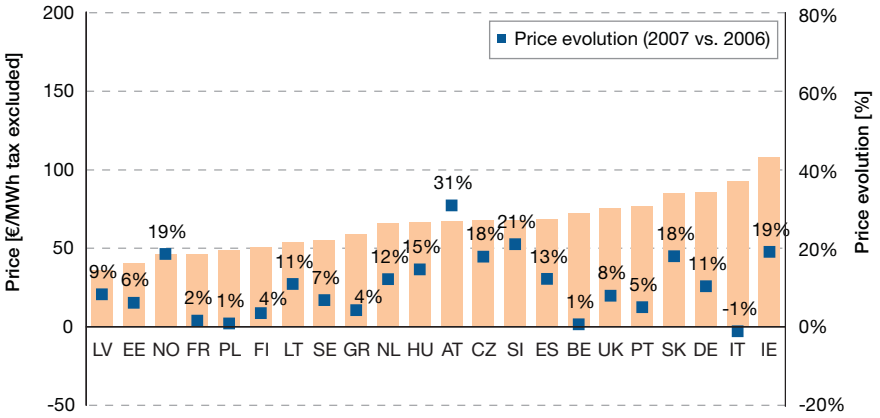
A major challenge for incumbent players is to **meet the unbundling requirements for distribution activity**. An independent distribution subsidiary is being created from EDF / Gaz de France previous large service entity (DEGS). This will gather around 50,000 employees.

Together with GRT Gaz (Gas TSO), Powernext has launched a balancing activity on PEGs, and they are willing to develop a gas exchange in France.

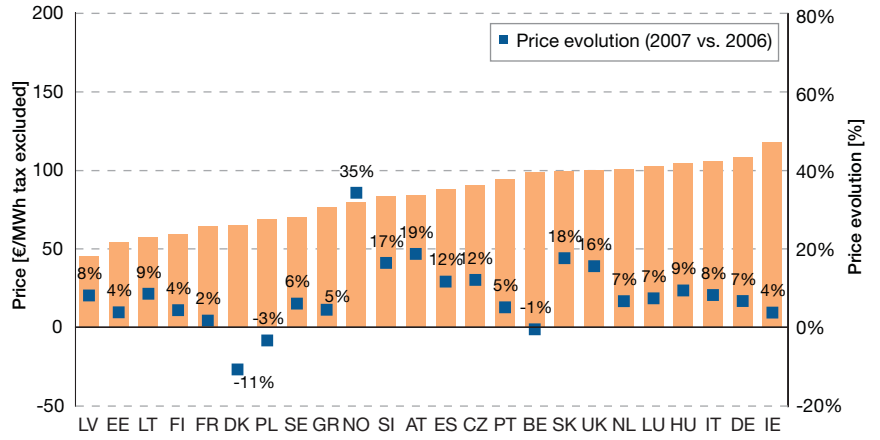
France is at the heart of four out of seven regional European ERGEG initiatives for power. France is also in two out of three regional European initiatives for gas. France could benefit from its central position and could play an active role in the construction of liquid gas and power markets in Europe.

Table 2.15 I&C electricity prices (January 2007)

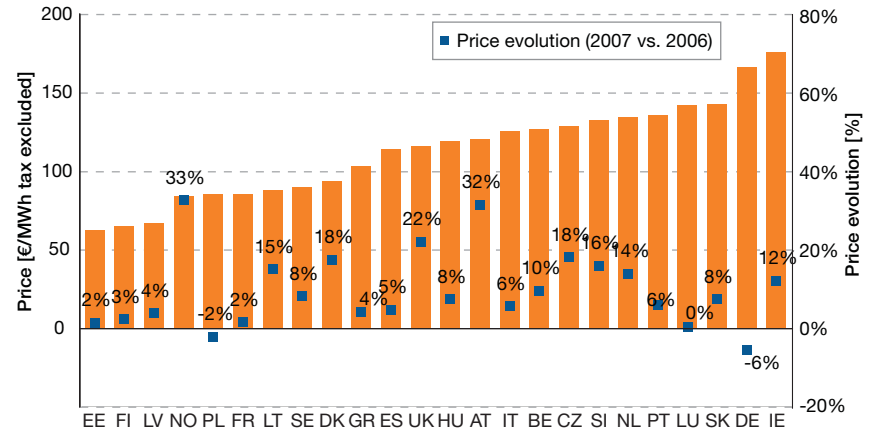
Medium to Large Industries
- Annual consumption: 24 GWh
- Maximum demand: 4,000 kW
- Annual utilisation: 6,000 hours



Small to Medium Industries
- Annual consumption: 1.25 GWh
- Maximum demand: 500 kW
- Annual utilisation: 2,500 hours

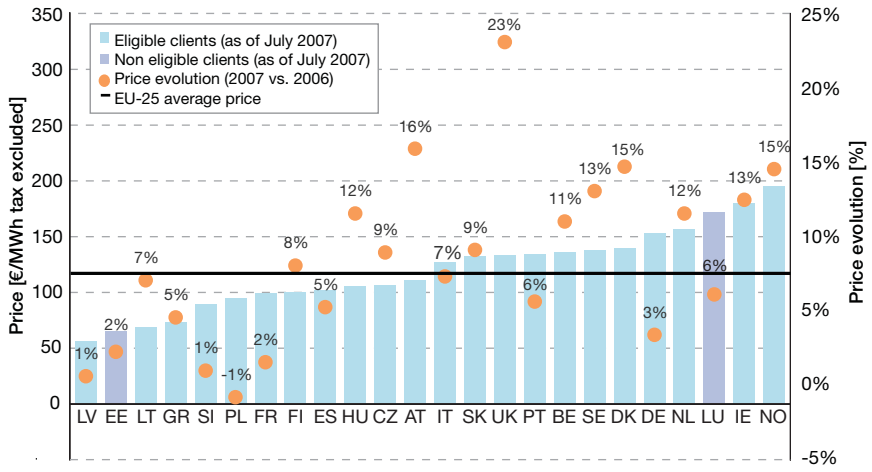


Very Small Industries
- Annual consumption: 30 MWh
- Maximum demand: 30 kW
- Annual utilisation: 1,000 hours



Source: Eurostat – Capgemini EEMO9

Table 2.16 Residential electricity prices (January 2007)



Source: Eurostat – Capgemini EEMO9

Statistical price trends confirm the continuation of a general substantial rise in retail prices, as well as the continuation of high discrepancies of price level between EU Member States throughout all market segments

General Price Trends

Price trends for energy have been surveyed, reported and published by many research groups over the past years. Price trends have also been an indicator broadly used by advocates or opponents to the energy liberalisation process. They have sometimes been used to make short-cuts too quickly in attempts to correlate price and competition. Let us also mention that the prices reported by Eurostat do not take into account prices under bilateral contracts (this particularly concerns the I&C segment).

Overall, this year we have again observed the continuation of a general substantial rise in retail prices since the emergence of competition, somehow conflicting with wholesale prices evolution on the same period. We also have continued to observe high discrepancies in price between the EU Member States, throughout all market segments (I&C or residential).

I&C Price Trends

Discrepancies of price across EU states vary from €70 to €160/MWh for small I&C; from €50 to €110/MWh for small to medium I&C; from €40 to €110/MWh for medium to large I&C (see Tables 2.15 on previous page).

Overall, Ireland, Germany and Italy are the EU states with the highest average electricity prices; Finland, France, Norway and Poland are the four Member States with the cheapest average electricity prices, excluding the Baltic states (as some of them have no real open market yet). When it comes to price evolution trends, the situation is different across EU Member States. We can observe increases ranging from 8% to more than 20% for the small I&C segment; increases from 0 to more than 10% for the small to medium I&C segment, with some downward trends recorded in Denmark (-11%), Poland and Belgium (-3% and -1%); increases ranging from 5% to 20% for the medium to large I&C segment, with a few exceptions, such as Belgium (+1%) or Austria (+31%).

Residential Price Trends

Discrepancies of price across EU states vary from €0.06 to almost €0.20 per kWh (see Table 2.16), with the cheapest electricity prices in Poland, France, Finland and Spain. This is based on the exclusion of countries in which the competitive market is theoretical, such as the Baltic States, Greece, Slovakia and the Czech Republic. The most expensive electricity was observed in Norway and in Ireland (close to an average of €0.20/kWh) and in the Netherlands and in Germany (around an average of €0.15/kWh). These four countries were already the ones with the highest average residential prices in our previous report.

When it comes to residential electricity price evolution trends, the situation is also disparate between the EU Member States. One can observe a 5% to 12% increase from 2005 to 2006 in many countries, with a few of the following exceptions. There were double digit increases (between 12% and 20%) in the UK, Norway, Denmark, Austria, Sweden, Ireland and the Netherlands. There was flat evolution for recently opened markets or markets where regulated tariffs (or price cap regimes) were still broadly in use, such as in France, Germany, Poland, Slovakia and the Baltic States.

Competitive Gas

Upstream Gas

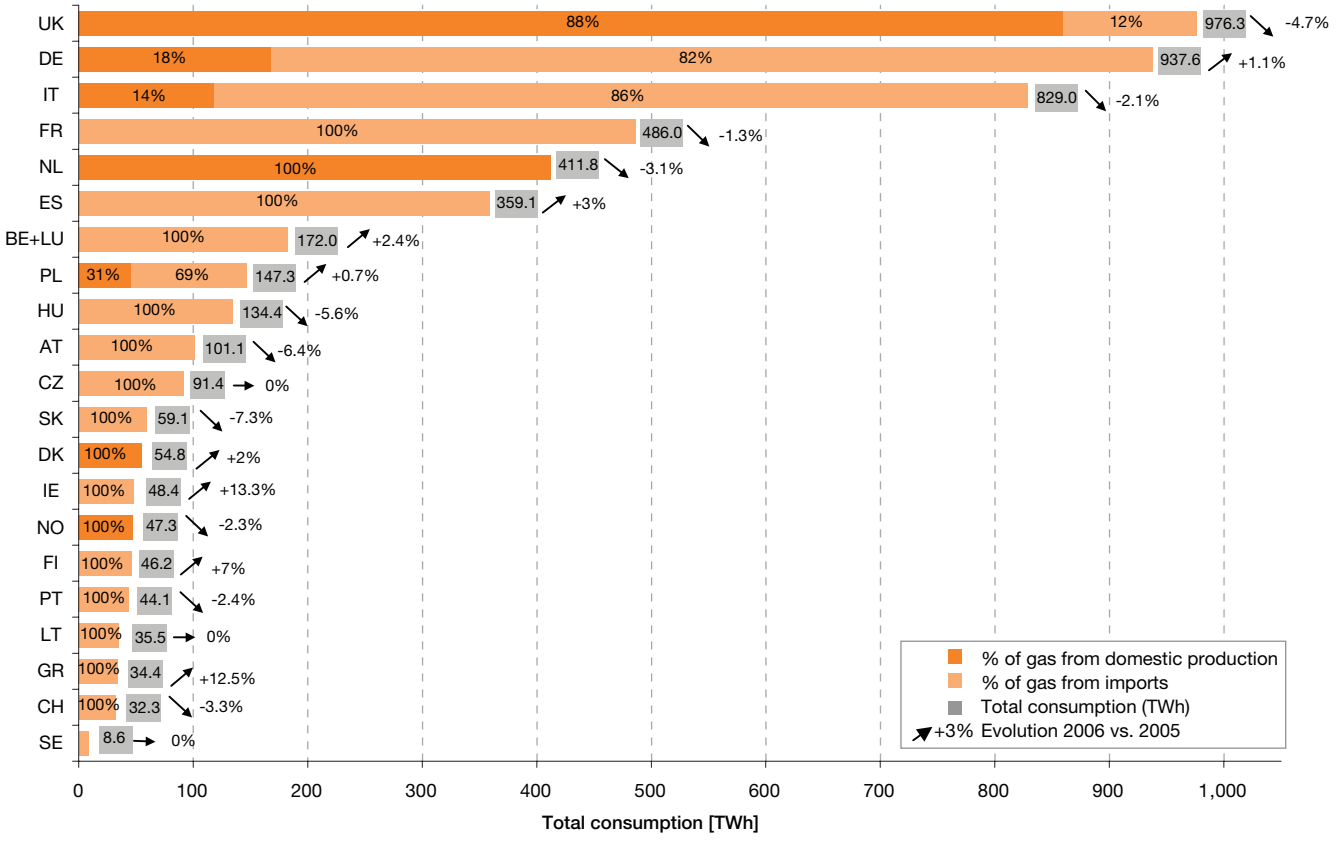
A greater proportion of European gas consumption is met by imports, as demand growth continues to outpace growth in production

Although gas consumption in European countries registered a slight decrease between 2005 and 2006, in contrast to the trend observed in the last few years, it is expected to grow by 2 to 2.5% per year by 2015, according to CEDIGAZ. This forecasted growth will be led by increasing gas power demand – in Europe, two-thirds of new electricity plants under construction are gas-fired (see Generation Chapter) – and by additional economic growth in the new EU Member countries.

On the supply side, domestic production, which currently represents 43% of European consumption, has globally continued to decrease over the period (see Table 3.1). The fall in domestic production reached 4.6% in 2006, after a 7.1% drop in 2005. Whilst some countries like Romania increased their production, the drop is mainly due to a large decrease in the UK (-8.6%) and in the Netherlands (-1.6%), which are the two largest European producers. These two countries have reached their peak production and are now experiencing reserves decline.

European dependency on gas imports is growing. Currently, Russia, Algeria and Norway are the main external suppliers to European countries, followed by Egypt, Nigeria and Libya for a smaller share. Even if most of its production comes from the relatively mature North Sea fields, Norway has increased its global production by 3.1% between 2005 and 2006. This is a consequence of the new licensing and

Table 3.1 Domestic gas production vs. imports (2006)



Source: BP statistical review of world energy 2007 – Capgemini EEMO9

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0091-8_4,

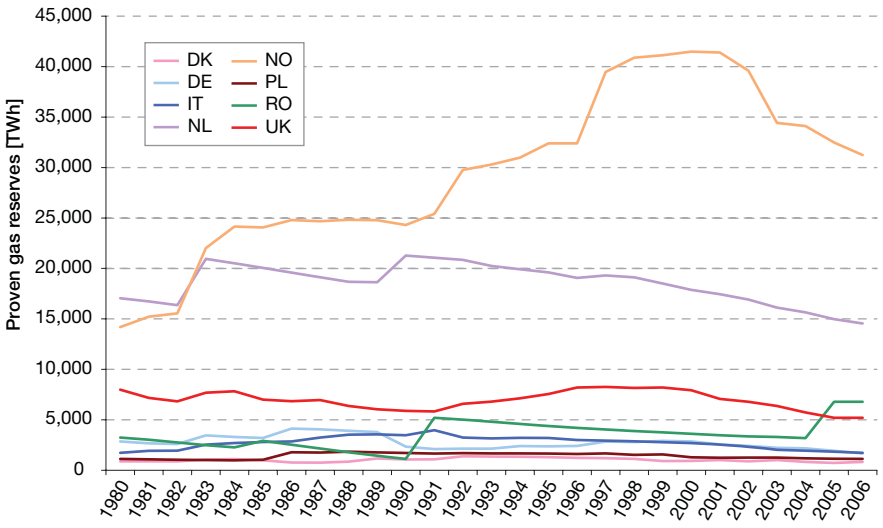
taxation policy launched in 2003. The main objectives of the changes were to encourage smaller companies to enter the Norwegian exploration and production market and to participate in award rounds, to favour rapid exploitation of awarded blocs and to increase exploration in mature areas.

Despite the high Norwegian potential, European dependence on external suppliers is growing

In 2006, reserves level globally continued to decrease as shown in Table 3.2. The UK managed to maintain the same level of reserves in 2006, due to the large drop in gas consumption. In 2007, operations started up for the Snohvit LNG terminal, which contributed to the overall decrease of the Norwegian reserves to production ratio. This ratio slipped to 33 years in 2006 compared to 35 years in 2005. The beginning of production of the Ormen Lange field, which is expected to occur in late 2007, should also contribute to that drop.

Norway, which holds by far the largest natural gas resources in Europe, still has a considerable potential for further significant gas discoveries. Although there were few gas resources discoveries in 2006 – some of which are still being evaluated – the Norwegian Petroleum Directorate (NPD) estimates that there exists undiscovered resources of 2,510 bcm (26,990 TWh) of gas in the Norwegian Continental shelf, an amount which represents over four years of European consumption. Another important resources potential lies in the Barents Sea. On November 27, 2006, Norway submitted a request to the United Nations Commission on the limits of the continental shelf. The request sought to extend Norway's shelf beyond the 200 nautical miles (370 km) limit. If Norway's request is granted, then the Norwegian continental shelf will be expanded by an area corresponding to half the size of mainland Norway, which would allow additional exploration activities in this large resources area. These additional reserves are expected to be obtained at high cost since Barents Sea resources are located offshore, in environmentally sensitive areas. But the Norwegian potential is not expected to be large enough to compensate for the decline of reserves and production in Europe and for the expected growth of European gas consumption.

Table 3.2 Proven gas reserves (2006)



Source: BP statistical review of world energy 2007 – Capgemini EEMO9

In order to secure additional supply, market actors are actively planning new import capacity

Russia seeks to diversify its client portfolio (there are intensive discussions around pipeline projects between eastern Russian fields and China, in order to market natural gas to China, Japan and Korea), which would lead to a diminished quantity of gas available for EU countries. Meanwhile, European companies have launched several new projects in order to increase pipeline deliveries, to create new routes or to extend the existing infrastructure. But there are many factors that endanger the realization of planned large pipeline investments:

- Slippage in timeframe;
- Lack of political support;
- Lack of trans-European regulations;
- Cost inflation that deteriorates rate of return;
- Growing competition of LNG shipping over long distance.

The Yamal II project, which was put on hold some time ago due to the Gazprom and Poland disagreement on the exact route, illustrates some of the difficulties that pipelines projects can encounter.

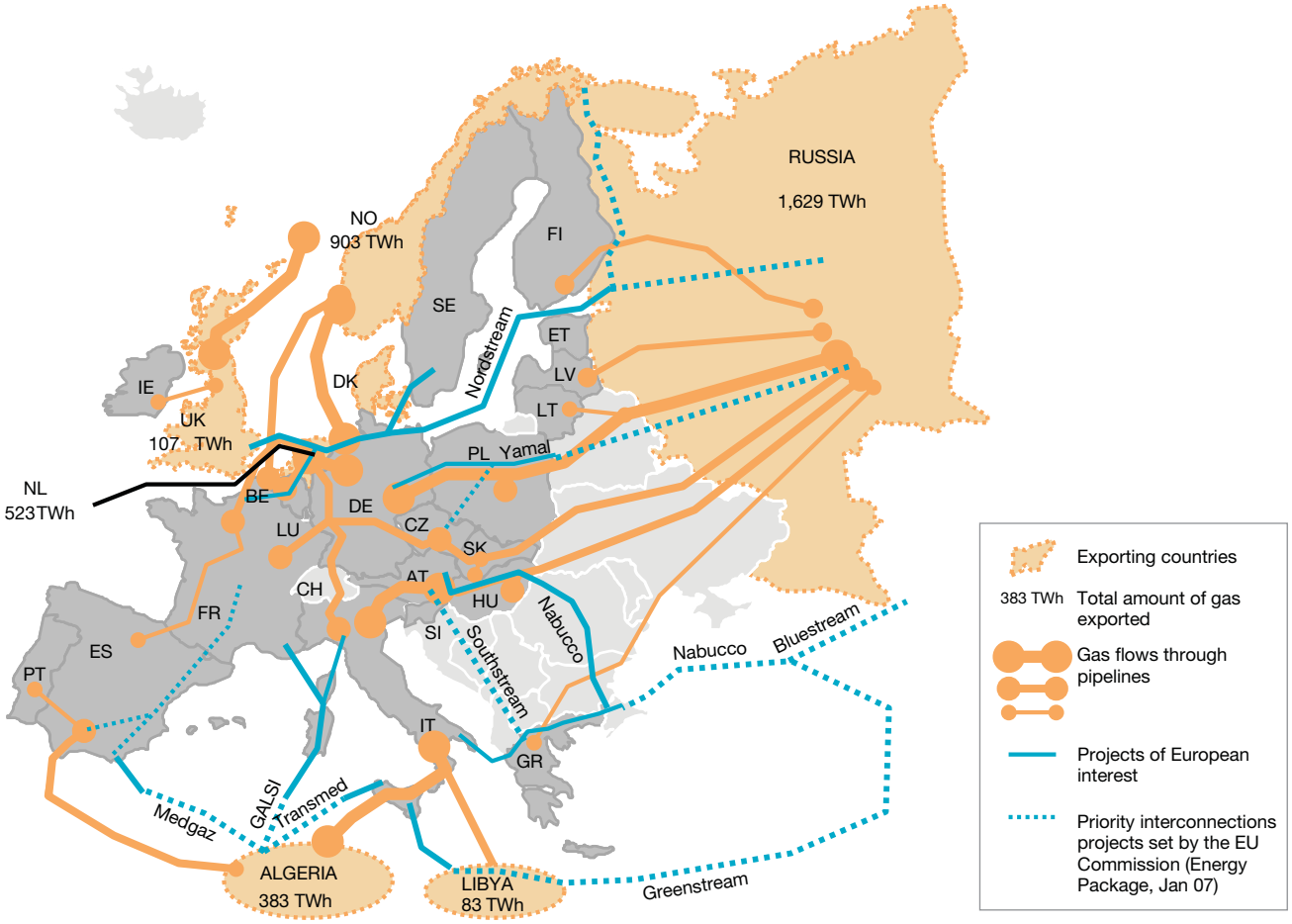
Many pipelines projects are on their way, and they are at various stages of completion (see Table 3.3). Some are close to operations start up, whereas others are not very much further along than having made a large press announcement. Some of these projects should increase gas supply from countries such as Norway

(BBL, Sleipmner, Interconnector extension, Troll gas pipeline), Algeria (Gasli, Medgaz, Transmed) or Libya (Greenstream pipeline). Yet the most significant projects are developed to increase delivery from Russian gas fields, which are the main source of supply of natural gas to European countries. Since January 2006, Moscow has negotiated separate deals with energy companies from Germany, France, Italy, Serbia and Hungary that could undermine a common European approach to build additional pipelines aimed at bypassing Russia's near monopoly of supplies from Central Asia.

Major new projects extending the existing infrastructure:

- In late 2007, the Langeled pipeline began piping gas from Ormen Lange field to the UK. It is the world's longest subsea pipeline, and it should provide 20 bcm/year (215 TWh/year) to the UK market. This amount represents over 20% of the UK gas supply;
- The capacity of the Interconnector (the pipeline between continental Europe – Zeebrugge and the UK-Bacton) was extended last October to 23.5 bcm/year (253 TWh/year). It is owned by E.ON-Ruhrgas, Distrigas, Conoco, Gazprom, Total and Eni;
- The 235 km long BBL pipeline (Balgzand Bacton Line) became operational in December 2006. It is the first gas pipeline between the Netherlands and the UK. With an estimated cost of €500 million, it has a 42 mcm/day capacity. It is currently owned by three companies (Gasunie, E.ON-Ruhrgas and Fluxys). The BBL company entered an open season in July 2007;

Table 3.3 Gas flows through pipelines (TWh) and priority interconnections (2006)



Source: European Commission, BP statistical review of world energy 2007 – Capgemini EEMO9

- The Trans-Mediterranean pipeline (Transmed) is 20 years-old, and it ensures transportation of natural gas over 2,000 km from Algeria via Tunisia to Sicily and further to the mainland of Italy. While its current capacity is around 25 bcm/year (269 TWh/year), Sonatrach and Agip signed an agreement in May 2005 to bring it up to 33.5 bcm/year (360 TWh/year) by 2012.

Potential new routes:

- The Nabucco gas pipeline, which is 3,300 km long, will offer an alternative to Russian gas by transporting natural gas from the Middle East and the Caspian region from countries such as Iran, Azerbaijan and Turkmenistan, through Turkey to Western Europe and to other countries along its path (such as Bulgaria, Romania, Hungary and others). OMV, MOL, TRANSGAZ, BULGARGAZ, and BOTAS each own 20% of the project. The expected supply capacity is forecasted at a maximum amount of 31 bcm/year (333 TWh/year) of natural gas, representing 6% of annual European consumption. Project costs are estimated at around €5 billion. The project is expected to begin construction in 2009 and to end by 2013, with initial start up of operation and marketing by 2012. This massive investment project will need substantial political backing in order to be realized in the 2012 timeframe, since it faces major regulatory risks and uncertainties. Many factors must be individually negotiated as there is no European regulation on the matter yet;
- In late 2005, Gazprom has proposed an alternative project which competes with the Nabucco Pipeline. This project would construct a second section of the Bluestream pipeline, which is owned by a joint venture company between Gazprom, Eni and OTAS. This construction would be beneath the Black Sea to Turkey, and extend up through Bulgaria, Serbia and Croatia to western Hungary;
- The Northern European gas pipeline – Nordstream – ensures supply between Russia and Northern Germany across the Baltic Sea. It is owned by Gazprom (51%), Wintershall (24.5%) and E.ON-Ruhrgas (24.5%). Construction of this 1,200 km long off-shore natural gas pipeline started in 2005. It is scheduled to start operations in 2010, with a capacity of 27.5 bcm/year (296 TWh/year). In a second phase, a parallel pipeline will be laid by 2012 in order to double the annual transport capacity to approximately 55 bcm/year (591 TWh/year);
- On June 23, 2007, Gazprom and Eni signed a memorandum of understanding (MoU) on the construction of Southstream, a 900 km long pipeline to take Russian gas under the Black Sea to Europe;
- GALSI, the 310 km long Algeria-Sardinia-Inland Italy natural gas pipeline is expected to start operations in 2010. It will have a 8 to 10 bcm/year (86 to 108 TWh/year) capacity. Sonatrach owns 36% of the GALSI pipeline company, and the rest of the ownership is divided between several Italian energy companies (Edison, Enel, Wintershall, Hera Trading, Sfirz and Progemisa);
- On the other side of the Mediterranean Sea, Medgaz is a planned submarine pipeline project of 210 km. It is estimated to cost a total of €900 million. It will allow transportation of natural gas directly from Algeria to Spain, without requiring transit through third countries. Gas delivery is anticipated to begin by mid-2009.
- Medgaz capacity is planned to be around 8 bcm/year (86 TWh/year). This project includes a wide range of energy companies such as CEPSA, Sonatrach, BP, Endesa, Gaz de France, Iberdrola and Total;
- The planned Greenstream pipeline, owned by Eni and Lybia NOC, is a 540 km long natural gas submarine pipeline from Libya to Sicily, Italy. Inaugurated by the end of 2004, it reached full transmission capacity at the end of 2006 with 8 bcm of natural gas per year (86 TWh/year). Its estimated costs were around $6.6 billion (€5.3 billion);
- Other projects such as TAP (Trans Adriatic Pipeline) and IGI (Interconnector Greece – Italy) should provide 10 Gcm/year each by 2010-2011.

The unknown evolution of the Russian gas supply strategy contributes to deteriorate Europe's gas security of supply

From the supply disruption in the Ukraine in 2005, due to a dispute between Gazprom and Minsk (Ukraine) on natural gas price, to the energy crisis between Russia and Belarus in late 2006, several crises have triggered alarm in Europe, where over one-quarter of the gas consumed is coming from Russia.

Many observers are worried that the lack of investments in upstream activities in Russia might tighten supply. The country extracts 50% of its production from fields brought into exploitation in the 1970s and 1980s. In many of these fields, the decline is already advanced. For instance, the three biggest gas fields are over 50% depleted. Recently newly developed gas fields are smaller or unable to compensate for the decline of production of the other older fields.

Several large fields such as Shtokman will be developed, but this will not occur before 2012-2013. Discovered in 1988 in the Barents Sea, the Shtokman field contains estimated reserves of 3.7 Tcm of gas and more than 31 million tons of gas condensate. Located roughly 550 km northeast of the Russian mainland in extreme artic conditions and 300 m below ground, its development is particularly challenging. In July 2007, Gazprom and Total have signed a framework agreement for cooperation in the first phase of Shtokman development. The first phase of development is intended to produce 23.7 bcm/year (255 TWh/year) of natural gas. Deliveries of pipeline gas are expected to start in 2013. The first LNG will be delivered in 2014.

Facing potential cartelisation of gas suppliers, European buyers failed to coordinate negotiation needed to increase security of supply

This coordination of European buyers is necessary in order to anticipate negotiation with other external suppliers as moves toward a "Gas OPEC" (GASPEC) raise further concerns, as explained below.

The 6th Gas Exporting Countries Forum (GECF) was held in Doha (Qatar) on April 9, 2007. Established on the idea of Russian President Vladimir Putin, the forum does not have a fixed membership structure. However, Algeria, Bolivia, Brunei, Egypt, Equatorial Guinea, Indonesia, Iran, Libya, Malaysia, Nigeria, Oman, Qatar, Russia, Trinidad and Tobago, the UAE and Venezuela can be identified as current members. Norway has the status of observer. During this meeting, participants decided that Russia will take the lead of a study group on gas prices. While no official creation was announced yet, this study on coordination of gas prices is a step toward a Gas OPEC. So far GECF members only claim to promote coordination between gas producers.

For example, Russia's Gazprom and Algeria's Sonatrach signed a MoU in August 2006. This agreement covered "activities in the oil and gas sector such as: exploration and production, gas transmission and distribution network development, asset swaps, natural gas and oil processing and marketing". This MoU could increase concerns from European countries since Russia and Algeria are the two largest gas exporters to the EU. The GECF nations will meet in Moscow in 2008 for the 7th forum. They will then decide their next step.

Coordination of energy policies across Europe could contribute to an increased security of supply. Having a common energy policy will strengthen the position of European countries in negotiating with Russia as mentioned in the treaty signed in June 2007. Nevertheless, countries have supported their national champions and several bilateral agreements with Russia (Eni/Gazprom, Total/Gazprom, Gazprom/E.ON) were signed. It is reasonable to think that a multilateral agreement could give Europe a wider scope of options to negotiate with Russia.

Key issues in Germany
Signs of increasing competition in the German retail market

German politics and Utilities are currently facing major issues, such as **regulatory action**, as well as **pressure resulting from increasing competition**, **environmental protection** and **security of supply**.

German Utilities must cope with the consequences of regulatory actions. The majority of the players of this industry (consisting of the Big Four, E.ON, RWE, EnBW and Vattenfall Europe, approximately 60 regional and more than 700 municipal Utilities, as well as their DSOs) are struggling with **tariff reductions of up to 30%**. Due to the enormous cost pressure and the coming incentive regulations in 2009, all Utilities are compelled to re-organize their processes and structures. Therefore, an increasing number of Utilities are striving for co-operative models and merger opportunities. In the end, this may lead to **further market consolidation**.

The combined effect of regulatory actions and political pressure has encouraged a competitive market and has subsequently also encouraged national retail activities. As with foreign Utilities (e.g. Nuon's retail commitments in Berlin), the national incumbents have followed EnBW´s Yello and have started national low-cost retail entities to compete, such as E.ON's "E wie Einfach" ("E for Easy") or RWE´s internet offer "eprimo". In parallel, both the regulating Bundesnetzagentur as well as the customer associations have started campaigns that call for supplier switching. The results of these actions have appeared to be convincingly successful. There has been increased switching or intentions of switching electricity and gas suppliers. So far these figures have nearly doubled in 2007. By the end of July, "E wie Einfach" had gained 100,000 customers after only just their first six months of operation.

Furthermore, environmental protection and security of supply are also both highly prioritised on the German energy agenda. **The climate protection budget will increase from €700 million to 2.6 billion as of 2008**. Their aim is to reduce their CO_2 emissions by 36% by 2020, compared with their 1990 levels. This will be costly to achieve as they intend to reduce stable coal capacities and to rely on volatile production from renewable energies to an increasing degree. Together with **the dependency on Russian gas flows, this also adds to the ongoing discussion of security of supply**.

LNG

LNG market is very active and is experiencing fast growth

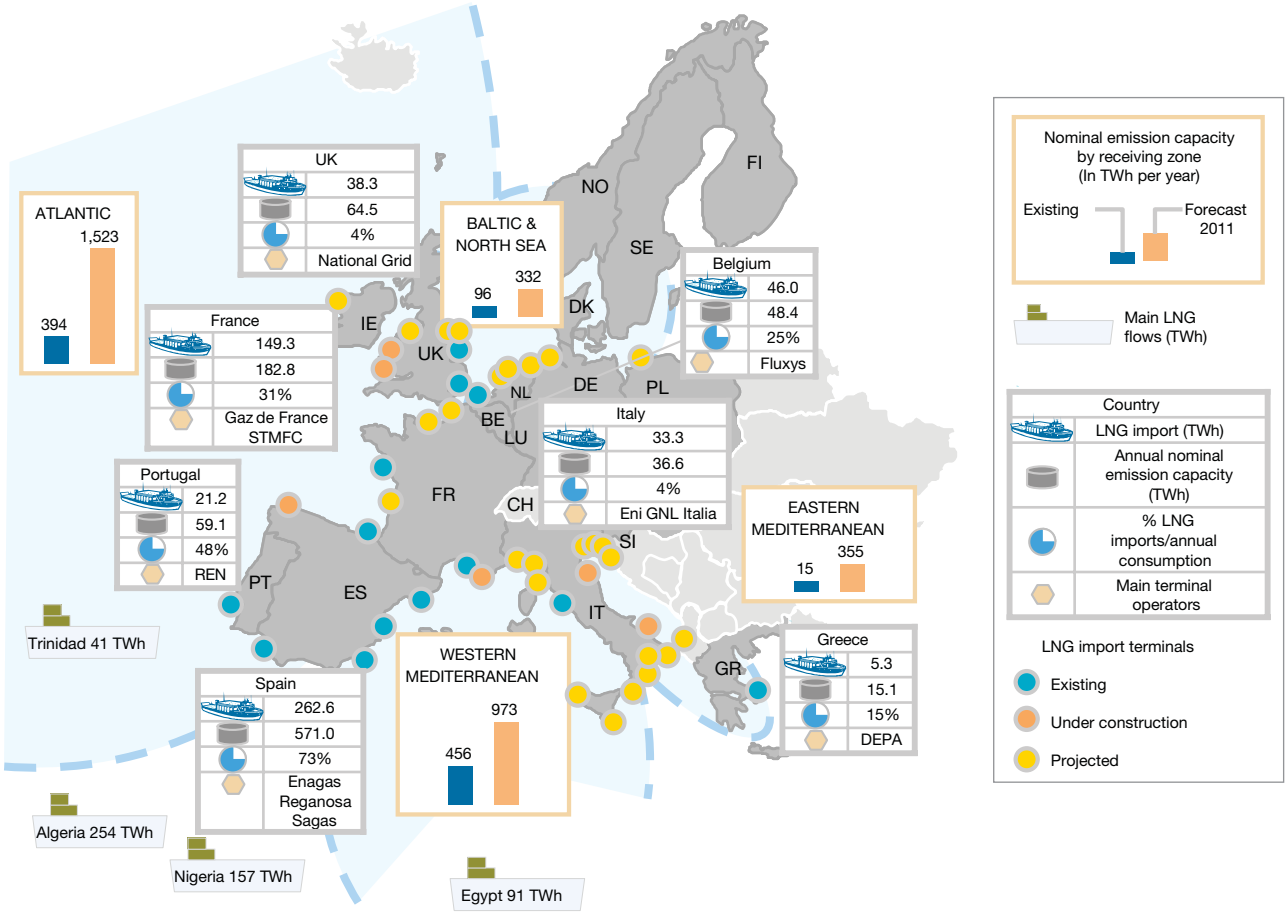
While European domestic gas production continued to fall in 2006, liquefied natural gas (LNG) imports to Europe increased by 17%, reaching 52 bcm (556 TWh) in 2006 compared to 43 bcm (459 TWh) in 2005. The biggest importer of LNG is Spain with 47.2% of the European market followed by France with 26.8%.

Belgium, France, Spain and Portugal cover more than 20% of their gas consumption by LNG. Italy and the UK cover only 4% of their consumption with LNG, yet they plan to start many new projects or extensions (see Table 3.4).

The Netherlands, Germany and Poland launched their first projects to diversify their supply, as they want to depend less on Russia.

Other than the strong penetration experienced in a few countries (Belgium, France, Spain, Portugal as explained before), the overall share of LNG in the gas supply balance reached only 7% of the EU market in 2007.

Table 3.4 Map of LNG terminals and flows (2006)



Source: GIE gle, BP statistical review of world energy 2007 – Capgemini EEMO9

The LNG supply sources to Europe are diversifying as number of routes grows

A light rebalancing took place in terms of the sources of LNG imports (see Table 3.5). Yet Algeria remains the biggest LNG supplier to Europe, with a share of 36.7%. Some countries have increased their supplies of LNG in a significant way:

- Egypt increased by 84.5% and now represents 16.3% of the LNG imports in the EU;
- Trinidad and Tobago have become a significant source of LNG imports for the EU, representing now 7%.

New projects for receiving terminals will allow improved imports of LNG in Europe

New LNG receiving terminals projects, if realised, will allow a rebalancing between the maritime zones. This is mainly the case for the Mediterranean basin where the Eastern area is set to increase its part of the total European import capacity from 2% in 2006 to more than 10% in 2011, while the Western area is set to decrease its part from 47% to 31%.

Nevertheless a lot of these projects are delayed or still waiting to be fully funded:

- **Belgium:** LNG capacity is set to increase from 4.5 bcm (48.4 TWh) in 2006 to more than 14 bcm (151 TWh) per year in 2009. Fluxys has made some changes to the rules

Table 3.5 Imports through LNG terminals (2006)

	FROM						
	Trinidad & Tobago	Oman	Qatar	Algeria	Egypt	Libya	Nigeria
Total EU=556 TWh	40.4	10.8	57.6	203.8	90.9	7.7	144.7
% of total EU	7%	2%	10%	37%	16%	1%	26%
Evolution (2006 vs. 2005)	+478.5%	-42.2%	+17.5%	-0.3%	84.5%	-17.2%	24.9%

				FROM						
	LNG imports (TWh)	% of total EU	Evolution (2006 vs. 2005)	Trinidad & Tobago	Oman	Qatar	Algeria	Egypt	Libya	Nigeria
Belgium	46.0	8%	44%	1.72		3.87	36.02	2.69		1.72
France	149.2	27%	8%				79.03	24.73		45.48
Greece	5.3	1%	7%				4.84	0.43		
Italy	33.3	6%	24%				32.26	1.08		
Portugal	21.2	4%	25%							21.18
Spain	262.6	47%	15%	32.26	10.75	53.76	30.11	51.61	7.74	76.34
UK	38.3	7%	585%	6.45			21.51	10.32		

Source: BP statistical review of world energy 2007 – Capgemini EEMO9

under which LNG terminalling capacity at Zeebrugge can be resold on the market citing its aim to facilitate secondary rights trading;

- **France:** France's LNG capacity is set to increase from 17 bcm (182.8 TWh) in 2006 to more than 50 bcm (538 TWh) per year in 2009. With the new terminal Operator STMFC, the terminal of Fos-Cavaou will be able to distribute 10% of its capacity on a short-term basis from the start of 2008;
- **Italy:** Italy's LNG capacity is set to increase from 3.4 bcm (35.6 TWh) in 2006 to more than 35 bcm (376 TWh) per year in 2010. While local opposition persists for terminals in Brindisi and Trieste, new localities are saying that they would welcome regasification plants if they pass environmental impact assessments and make a major contribution to local economies;
- **Netherlands:** The GATE LNG terminal which Dutch utility Gasunie and Vopak are planning for the Europoort terminal in Rotterdam has obtained exemption from regulated third-party access for 20 years;
- **Poland:** Poland plans to build an LNG terminal at the Baltic Sea town of Swinoujscie near the port of Szczecinto as part of its plans to diversify the country's gas supply and to decrease Poland's dependence on Russian gas;
- **Portugal:** In Portugal, LNG deliveries need to be flexible given that 50% of gas is consumed by power plants. This demand depends on the availability of hydro power resources, which ultimately depend on the unpredictable factor of weather. The regulator ERSE has suggested that it could list separate prices for storage and regasification, which could allow users to do arbitrage;
- **Spain:** Spain's LNG capacity is set to increase from 53 bcm (571 TWh) in 2006 to more than 120 bcm (1,290 TWh) per year in 2015. Spain has the largest number of LNG facilities in Europe. It is in the process of expanding and developing new facilities;
- **UK:** The UK's LNG capacity is set to increase from 6 bcm (64.5 TWh) in 2006 to more than 60 bcm (645 TWh) per year in 2015. National Grid has decided to go ahead with a third phase of capacity at its Grain terminal in Kent. Castle Point Borough Council rejected the terminal on Canvey Island in the Thames estuary east of London.

New LNG onboard regasification technology bring new potential for capacity increase at lower capital expenditures

Offshore regasification is a technology which allows regasification onboard the LNG carrier and delivery into natural gas pipeline networks. Due to a quicker implementation than with inland LNG terminals, this technology is becoming popular (as experienced first in the US by Exelerate Energy in 2005). The first dockside regasification installation was launched by Exelerate Energy in the UK in early 2007. This technology could be an answer to environmental constraints faced by several ongoing projects, mainly in the UK and Italy.

Gas Wholesale Markets

- Gas wholesale markets continue to develop and mature, but at different speeds depending on the countries;
- Contrary to 2005 when prices were quite high and volatile, 2006 and 2007 were bearish years;
- Several initiatives in continental Europe are accelerating the development of natural gas wholesale markets, both by creating new market places and by fostering the growth of liquidity.

Gas wholesale markets continue to develop and mature, but at different speeds depending on the countries and availability of free gas

Several types of markets can be qualified as "gas wholesale markets":

Trading and clearing exchanges, which provide a service as a central counterpart;

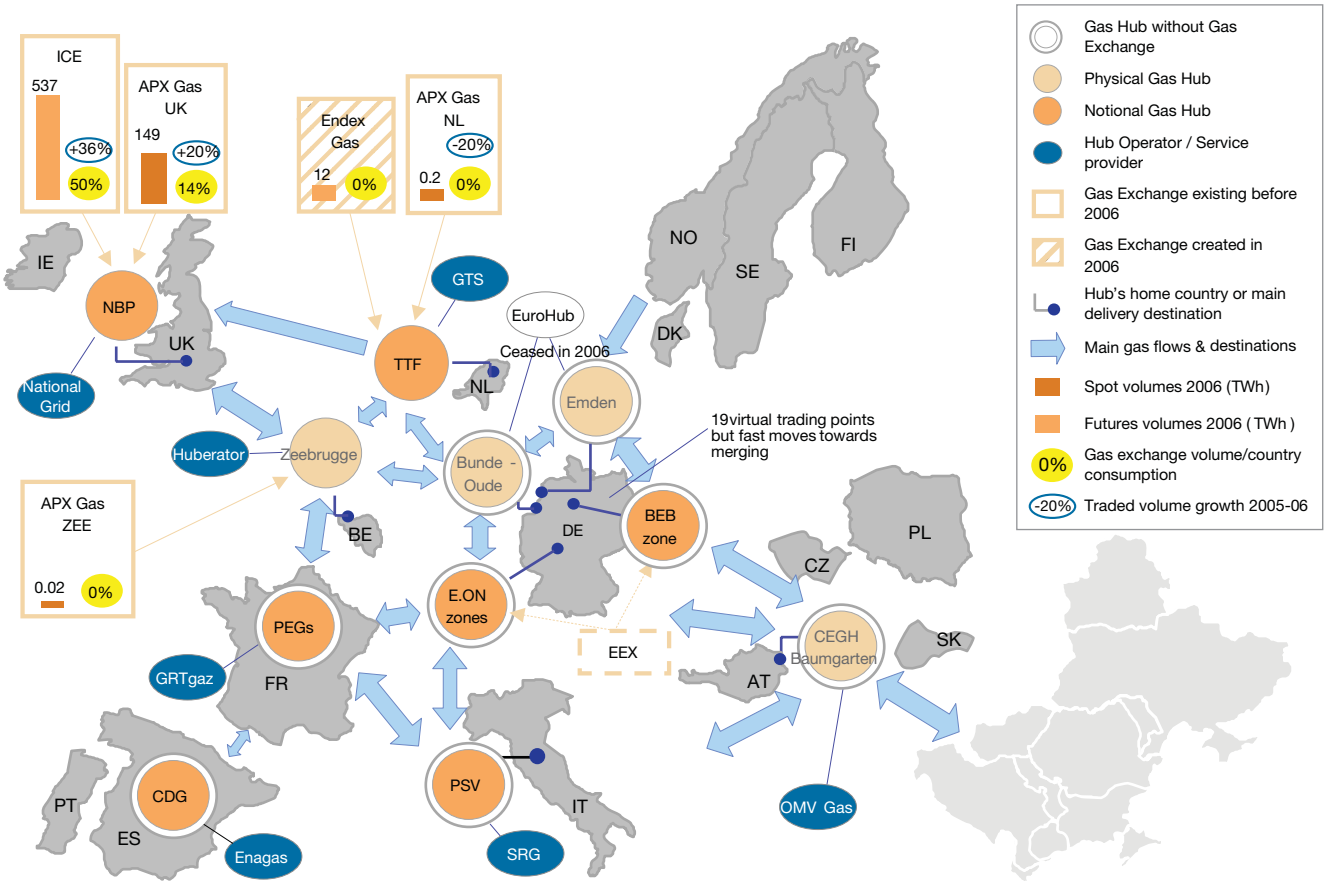
- OTC trading, or bilateral trading;
- LNG spot trading which has begun to develop, even if no regasification terminal in Europe can be considered as a gas hub.

Those three segments of the wholesale gas markets offer complementary services but are also competing with each other.

Gas exchanges are still at a nascent stage in Europe, while gas trading points are at various levels of maturity. Even though gas trading is maturing in North-West Europe, it is still at early stages in other countries, such as Italy or Germany (see Table 3.6). Gas exchanges, which usually appear after the settlement of strong OTC activities, are also nonexistent from many trading platforms. Improvements can be made towards liquid markets:

- Physical flows on the Zeebrugge hub represent only one-fifth of the traded volumes;

Table 3.6 Map of gas trading (2006)



Source: Gas Exchanges websites– Capgemini EEMO9

- The network bottlenecks and the lack of network capacities are still slowing the development of gas exchanges and trading specially for new entrants. This lack of available capacities is a barrier to entry and prevents incumbent players from contributing to the development of liquidity on their historical markets (for example acting as market players, ensuring that existing transportation and storage capacity is fully offered and used, facilitating intraday trading through balancing markets).

Alongside the exchanges that are developing on nearly mature markets (the Netherlands), physical trading is increasing quickly in emerging hubs.

A few organised gas exchanges are now established in Europe, and they help to foster liquidity in the main market places

- The ICE clears Natural Gas Futures on the UK market;
- EEX, which was originally an electricity exchange, is now evolving to forward trading and clearing on the continent. They extended their natural gas activities to TTF when they signed a clearing service agreement with the electronic trading system operator Endex for TTF future products in July 2006;
- This consecrated the Dutch market place as the third installed market reference in Europe, together with NBP and Zeebrugge. Continuing on from this agreement, EEX intends to offer the clearing of gas futures through Endex Zeebrugge platform by the end of 2007;
- APX, which was also first created as a power exchange, has developed specific capabilities on spot products, both in the UK and in continental Europe.

After years of standby, a strong involvement by incumbents gave an acceleration to the creation of gas exchanges

- EEX gas exchange was officially launched on July 1, 2007 with strong endorsement from E.ON-Ruhrgas.
- E.ON has been attacked on several occasions by the regulator for slowing the deregulation processes and exchange development. Rulings were issued to limit its long-term contracts, and to ease gas auction selling. Judicial complaints were launched for ensuring the right to switch suppliers.
- E.ON recently changed its position and decided to fully and proactively support market developments. This has been exemplified by its new role as the market maker for EEX gas exchange, the proactive bundling of its three virtual trading zones and a new Market Choice offer that fosters spot trading.

The EEX gas exchange is based on two Entry-Exit virtual zones operated by E.ON-Ruhrgas and BEB, which together comprise around 60% of the transport volume in the German gas H market. Future trading started from July 1, 2007 for delivery in October 2007. Spot trading is due to begin on July 2007 in the BEB area and on October 2007 in the E.ON area.

The EEX gas exchange setting was decided within a few months and the calendar was reworked in order to ensure a start three months in advance. This is evidence of the extreme desire of its supporters for its creation. First trading was planned for October 2007, and instead it occurred in July. 26 active members are already trading on the E.ON Gastransport virtual trading point. 20 traders were recorded at the virtual trading point of BEB. However exchanged volumes are still low so far. They were around 4 to 5 TWh in the first half of 2007. This is the equivalent of less than 0.3% of Germany's annual consumption.

The launch of the EEX gas platform in Germany has clearly been a result of regulatory pressure over market liberalisation. The success of the platform will now depend on:

- Key players transforming their commitment to support EEX into actions. E.ON-Ruhrgas, RWE Trading, Electrabel, and Essent have mentioned they were ready to assume the roles of market makers;
- New supplies flowing at southern borders, once the LNG import projects in countries such as Italy have materialized.

In the Netherlands, GasTerra, the incumbent gas player, announced its backing of the TTF exchange. Until 2005, GasTerra in the Netherlands stayed completely out of TTF and did not trade anything on it. Given its position of incumbent in the Netherlands, it has been under some pressure from the regulator to support trading at TTF, and it has slowly started operating limited volume. GasTerra then moved further in that direction by starting to trade on APX in March 2007. It also announced it would sell gas on TTF and on a TTF spot indexation.

In France, GRTgaz is actively promoting new balancing agreements. The Powernext-Balancing GRTgaz in France has been launched in April 2007. It is a trading platform that will progressively allow the TSO GRTgaz to cover its daily balancing

needs. Gradually the prices of the platform will serve to increase the value of imbalances of the shippers in GRTgaz's zones. Moreover Gaz de France have increased the volumes traded on the PEGs. However, those remain limited so far.

Contrary to 2005 when prices were quite high and volatile, 2006 and 2007 were bearish years

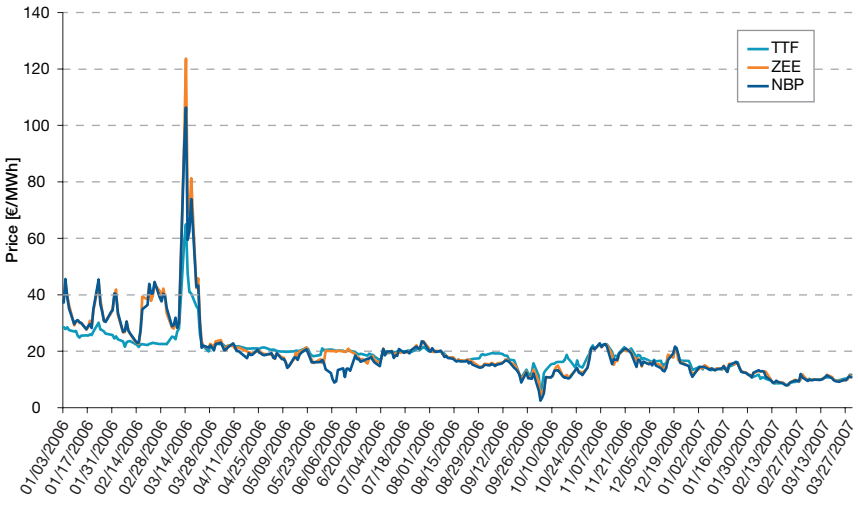
Globally, apart from the very first months of 2006, the 2006-2007 period has encountered quite low price levels and low volatility in Europe. In the UK, after the tense winter 2005-2006, attributable to a tight supply situation, prices fell down dramatically. Whereas spikes at around €100/MWh were recorded in March 2006, day ahead contract prices went down to €9/MWh in March 2007. At some points during the winter 2006-2007, spot prices were even below those of summer 2007. On the forward contracts, gas year 2007 (October 2007 to September 2008) was assessed around €20/MWh in April 2007, against €37/MWh for the gas year 2006 in April 2006. This decrease in prices was mainly due to the BBL and Langeled pipelines coming on stream in September 2006 and to the mild winter 2006-2007 that drove consumption down whilst storage remained full.

On the continent, prices remained stable due to warm weather but stayed higher than in the UK

Zeebrugge winter spot prices were slightly higher than in the UK, which led the gas at the Interconnector flowing forward, from the UK to the continent. TTF prices were higher than UK prices, especially for the forward curve, even if spot prices have been converging since the opening of the BBL line (see Table 3.7).

NL-UK pipeline Balgzand-Bacton Line began its commercial operation in December 2006. It carries gas from the Netherlands to the UK (only

Table 3.7 Gas day-ahead spot prices



Source: Platt's – Capgemini EEMO9

forward flow at the moment) at a rate of 12 mcm/day in summer and of 25 mcm/day in winter. The BBL accounts for 15% of the total UK gas supplies. UK imports are expected to soar from 55% in 2011 to 80% in 2016. Those further needs could be attended to through an extension of the current BBL capacity, from 0.11 bcm/year up to a maximum of 0.34 bcm/year. An open season is currently being held to decide on the launch and size of such an extension.

This linkage leads to price alignments between NBP and TTF spot prices. From September 2006, the Langeled-Easington line delivered Norwegian gas, either to the continent or to the UK. It is a further link between those markets. It contributes to the increasing convergence between NBP and TTF spot prices.

Alleviating some bottlenecks for the trade, this regional physical integration might very well anticipate what could occur on a much longer term between markets providing adequate capacities. Once enough infrastructures are developed, there could be a single price in Europe.

Liquidity and transparency (atomicity of players, clear rules and information for capacity allocation, etc.) are essential in order to ensure the future success of gas wholesale markets. Changes of TPA (entry-exit) rules (covered in the Gas Transmission Chapter) are instrumental in building a successful gas wholesale market.

New initiatives announced are paving the way for increased gas to gas competition

In the coming years, a range of initiatives in continental Europe shall help the development of natural gas wholesale markets, both by creating new market places and by fostering the growth of exchanged volumes as well as of liquidity in the existing market places:

- A new trading hub is due to be developed by 2010 in Baumgarten. Indeed, OMV, which currently operates the Baumgarten physical interconnection point, intends to sharply increase its gas activity over the coming three years. Both gas sales and gas transit from Russia are expected to grow significantly as new pipelines are built and as existing pipeline capacities are expanded. This move is also supported by the EU since it helps to ensure Europe's security of supply over the coming years, by calling for new gas hubs in Central Europe. Such hubs would enable a better use of strategic storage capacities and would make it easier to build LNG terminals;
- Spain and Portugal formally signed up for a single Iberian energy market on March 8, 2007. Spain and Portugal are already among the European countries that have gone the furthest in liberalising their energy markets. Their current governments are eager to keep improving their gas markets. Working groups are due to present recommendations for discussion at a ministerial summit in December 2007. New services are to be launched on some existing hubs. This could help increase the level of maturity in such places;
- Powernext/APX are considering the opportunity to extend their service to gas Futures in France, once the number of PEG has been lowered (2009);
- Fluxys shall offer spot slots from April 2007 at Zeebrugge LNG terminal. This should enable extra volumes of gas to come to the Zeebrugge hub.

Gas Retail Markets

- Gas markets are open in most of the EU-25, but switching among household clients is very limited;
- Total EU-25 consumption has slightly decreased, yet demand for power generation has increased;
- Incumbents maintain a dominant position, even in non-domestic markets;
- Gas prices have increased, as did the oil price, and prices are very variable across the EU.

Gas markets are open in almost all EU-25 countries

In most EU-25 countries, customers are now free to choose their gas suppliers (see Table 3.8). Only Finland, Greece, Latvia, Luxemburg and Portugal will fully open their markets after 2007. Greece and Portugal are allowed to do so later since they are considered as emergent markets according to the provisions of gas directive 2003/55/EC. In accordance with the reciprocity principle, each of the above countries shall not sell gas outside domestic markets.

The gas consumption of the non-open markets is negligible when compared to the demand of the other Member States. Hence, from a volume viewpoint most of the European citizens are now eligible customers.

Total EU-25 consumption has decreased slightly, though the gas demand for power generation has increased

EU-25 gas consumption in 2006 has amounted to some 5,000 TWh, which is a slight decline (-0.6%) from the 2005 figures. The reduction can be explained by the above average temperatures of winter 2006-2007, which were only slightly counterbalanced by the increase in demand from the power generation sector.

The gas consumption picture shows different situations across the EU-25. The UK (20%), Germany (19%) and Italy (17%) have had the greatest gas markets. Together they comprise 56% of EU-25 final consumption. The second tier markets are France, the Netherlands and Spain. Although it has a significant population and economic activity, France employs little gas to feed its power generation, which is mainly nuclear.

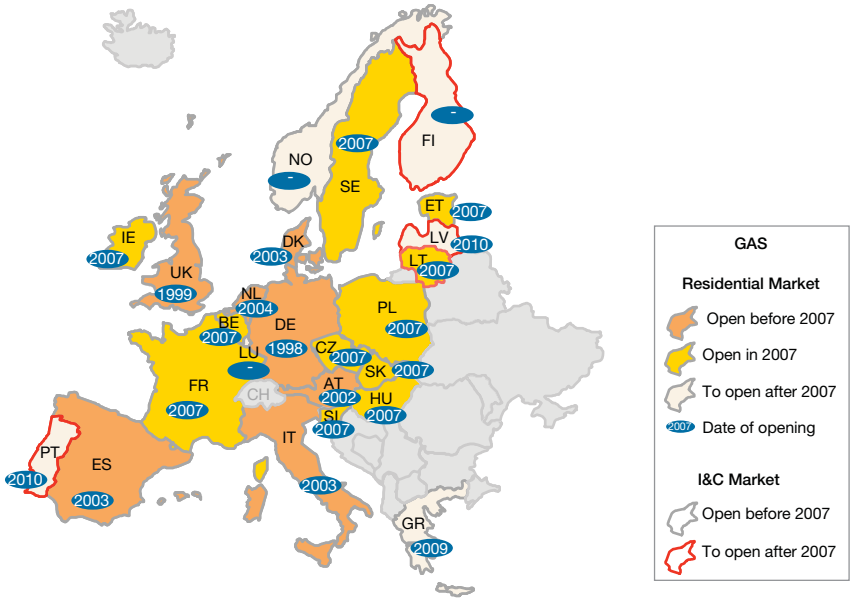
First and second tier markets, i.e. the top six nations, have an 81% share of total European consumption (see Table 3.9 on the following page).

Gas is mainly used for heating households and working places, for industrial processes and for power generation. In 2006, 40% of gas was burnt to heat domestic and commercial interiors (R&C), to cook and to warm water. Countries with a high incidence of R&C consumption are France (54%), the UK (50%), and the Netherlands (42%).

Some 33% of gas was employed to produce goods and services. Member States with the greatest industrial use of gas are Spain (55%), Germany (42%) and the Netherlands (40%).

Finally, 21% of gas has been used to feed power plants. Countries with a high incidence of thermoelectric gas consumption are Italy (38%), the UK (31%), and Spain (30%). The thermoelectric segment shows the greatest growth (1.4%) as many countries concerned with energy efficiency and environmental protection are switching to CCGT

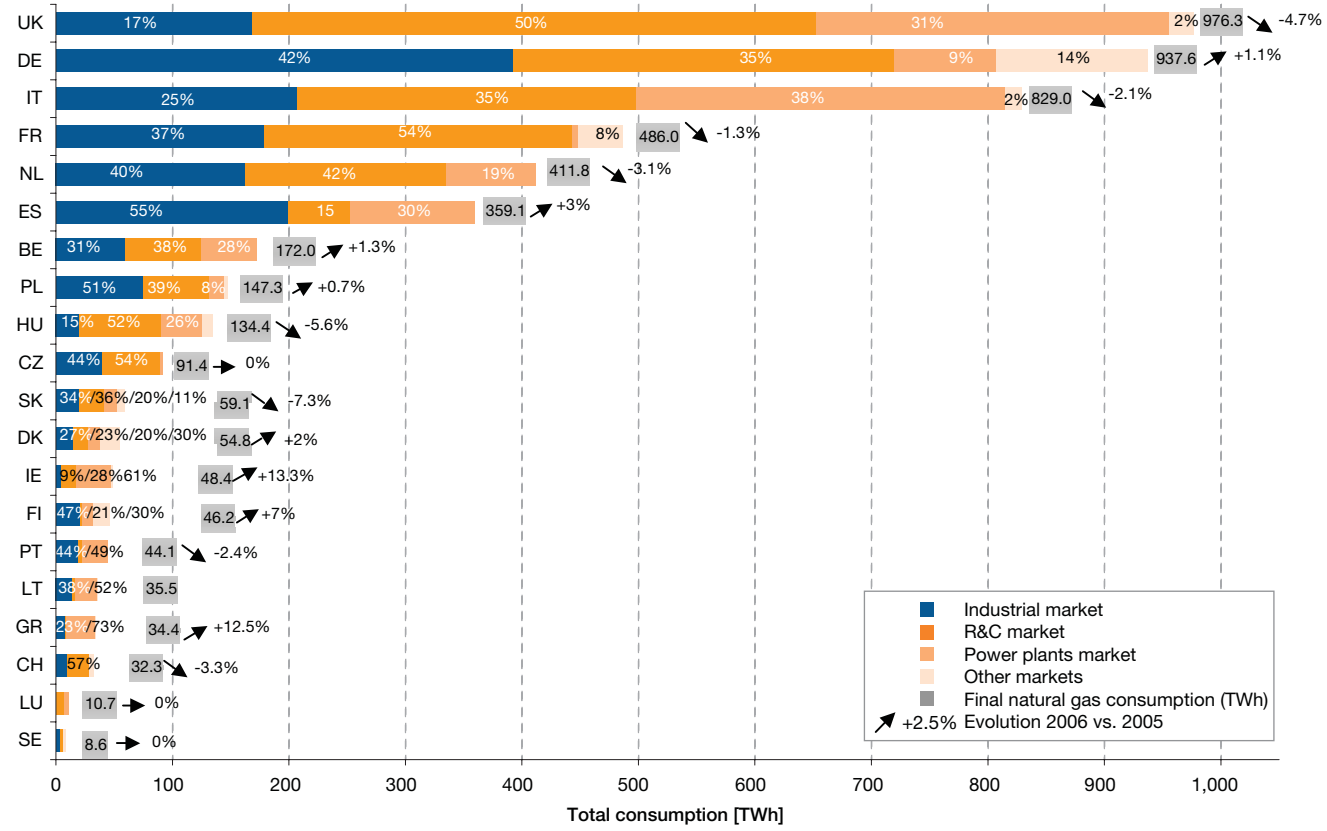
Table 3.8 Gas market opening milestones (as of July 2007)



Note: Finland gas residential market will open after 2007 (no precise date -), and I&C market also.

Source: European Commission – Capgemini EEMO9

Table 3.9 Size of I&C and Residential gas markets (2006)



Source: Eurogas, BP statistical review of world energy 2007 – Capgemini EEMO9

plants. These plants also offer high flexibility that is needed to cover power demand peaks.

Incumbents maintain a dominant position, even in non-domestic markets

The competitive landscape (see Table 3.10) shows the dominance of incumbents in their domestic markets and, in some cases, also in foreign arenas.

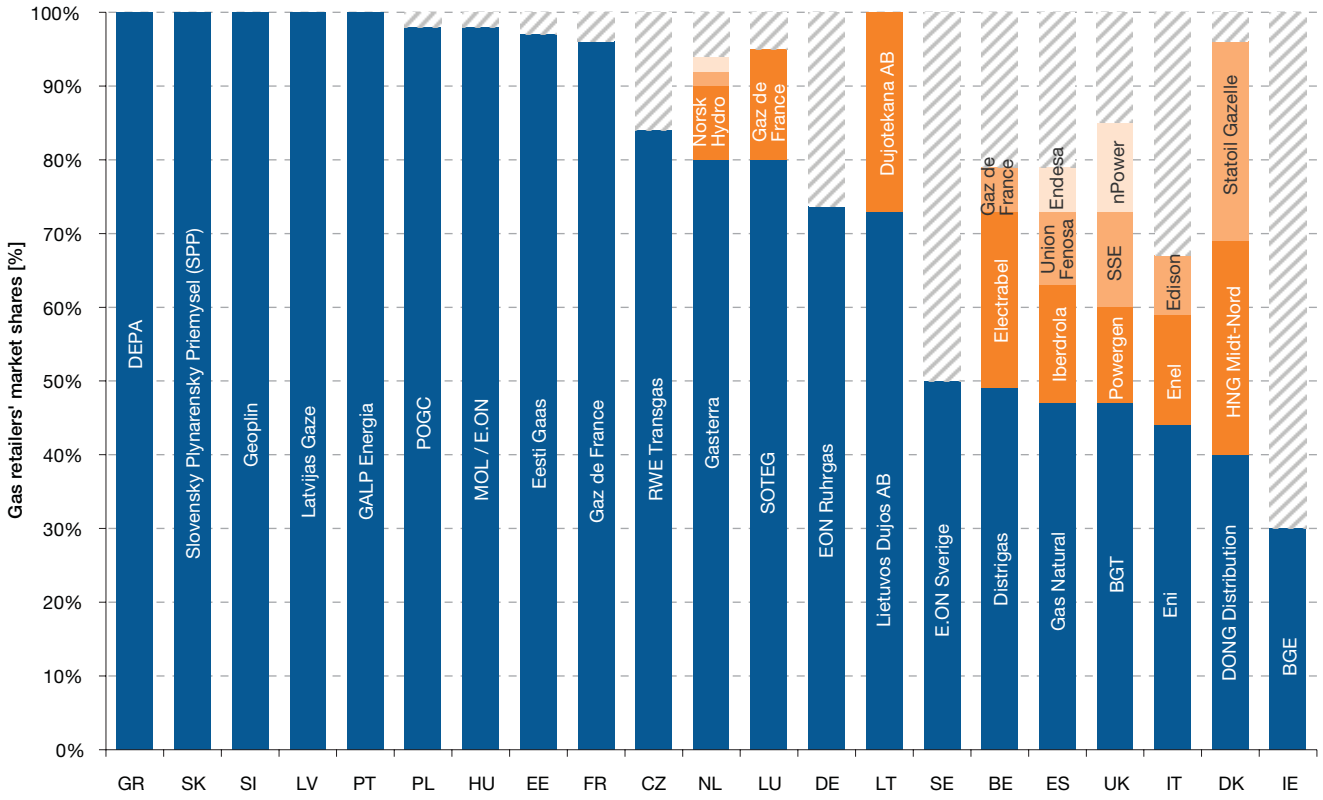
In France, Germany and the Netherlands the main operators are the incumbents who enjoy market shares above 75%. In Italy, Spain and the UK the main suppliers are again the incumbents, although their market shares are below 50%.

One could argue that since Italy, Spain and the UK were among the first countries to open their gas markets (the UK opened its gas market as early as 1996), it is of no surprise that those countries show the smallest market concentrations. These results, however, do not come necessarily from purely virtuous market dynamics. In the early time of gas deregulation in the UK, British Gas/Centrica faced a two year ban on end-user price which prevented them from adjusting their prices to those of new entrants. In Italy, the gas reform imposed on the main supplier (Eni) a market cap of 50%. In Spain, the regulator has implemented measures, mainly gas releases programs, in order to increase competitors' market shares.

In countries where such measures – market caps – do not exist (other than for gas releases) the incumbent still enjoys very high market shares.

In domestic markets, usually, the main competitor of the gas incumbent is the electricity incumbent. This is true for France, with EDF competing against Gaz de France, for Italy, with Enel competing against Eni, and for Belgium, with Electrabel competing against Distrigas. The vehicle for competition is often the dual fuel offer. In the UK, all the major retailers include it in their commercial portfolio.

Table 3.10 Gas retail market concentration (2006)



Source: European Commission, Utilities' web sites – Capgemini EEMO9

Some of the "ex-monopolists" show interesting performances also in non-domestic markets. E.ON is the main player in Hungary and Sweden, and it is the second biggest player in the UK (through Powergen). Gaz de France (39% of sales are generated by international activities) is well positioned in Luxemburg and in Belgium. Eni, with 50% stakes in Union Fenosa, and GVS, with a 33% stake in GALP Energia, are also performing well in non-domestic markets.

The reason why incumbents obtain good results abroad lie mainly in their procurement capacities that are then transferred on to final prices. Smaller suppliers cannot compete with ex-monopolists in the cost structure, although some of them may have lower costs to serve.

The major European gas suppliers are GasTerra (Netherlands, 75 bcm [806 TWh]), Eni (Italy, 70 bcm [753 TWh]), Gaz de France (France, 60 bcm [645 TWh]), E.ON-Ruhrgas (Germany, 58 bcm [624 TWh]) and Centrica (UK, 45 bcm [484 TWh]).

Incumbents' dominant position largely prevents competition from developing in newly open markets

Although theoretically free to choose their suppliers, customers do not switch much. In Italy only 1% of the households have changed their gas supplier since the 2003 market opening. In Germany, although the retail gas market has been open since 1998, switching rates were reported to be null until May 2006, as there was no other supplier to switch to. This does not come as a surprise. Profitability of the low-consuming segments is poor and suppliers do not go around contracting with new clients. Switching among residential

clients is also very limited because of only modest awareness by consumers, complex switching processes, and loyalty to traditional suppliers.

Within the high-consuming segments, however, customer mobility is greater. Since the influence of energy costs on their overall expenses is high, thus even a little discount can be a very appealing motivation to change suppliers.

End user gas prices are still tightly correlated to oil prices leading to significant variation in prices

Gas prices have increased, as did the oil price, and they are very variable across the EU.

Final prices (excluding taxes) for all consuming segments have generally increased, both in the short and in the long term. The increase of Brent has driven the rise. The oil price has gone from $54/barrel in 2005 to $65/barrel in 2006. This 20% hike has been passed on, to varying degrees, to final gas prices, on the basis that supply is regulated by long term contracts in which the gas price is indexed per contract to the oil price.

Within the I&C segments (See Tables 3.11), the highest increase occurred in the Baltic States, in particular in Latvia (41%, very small industries) and in Lithuania (37%, medium to large industries).

Nevertheless, it is worth noting certain decreases in gas price, such as the case of France's gas prices that went down by 10 % for the medium to large industries, reflecting dynamics of the gas wholesale market.

Innovation in Retail

The energy retail market is still lacking true competition on a European scale. Only the UK, Norway and Sweden show high cumulative switching behaviour. This also relates back to innovative product development and marketing strategies. A lack of real net churn and a high degree of "sticky" customers does not create a true need for innovation (liberalized energy markets do show a high degree of competitive I&C and SME markets). The process of unbundling and the continuous market development do create a need to become more competitive and innovation will drive new market successes.

Capgemini observes new trends in the energy retail space. Energy companies that are driven by retail competition and/or by lack of growth drive market innovations forward. Three main themes are evolving: 1) development of telecommunications such as mobile virtual network operators (the MVNO model) or the new energy adaptation as a Virtual Energy Retail Operator (VERO), 2) minority group marketing and 3) real time marketing on inbound channels.

The VERO strategy can drive new competition in the market, while incumbent utilities can still leverage on core gross margin drivers around production and trading. Retail costs to serve of incumbents are much too high and VERO supported brands can leverage on low cost business operating models and minimize acquisition costs for incumbents while on the other hand maximize the production and trading revenue. Best practice cost-to-serve operating companies can even drive new revenue from front- and back-office activities for VERO brands.

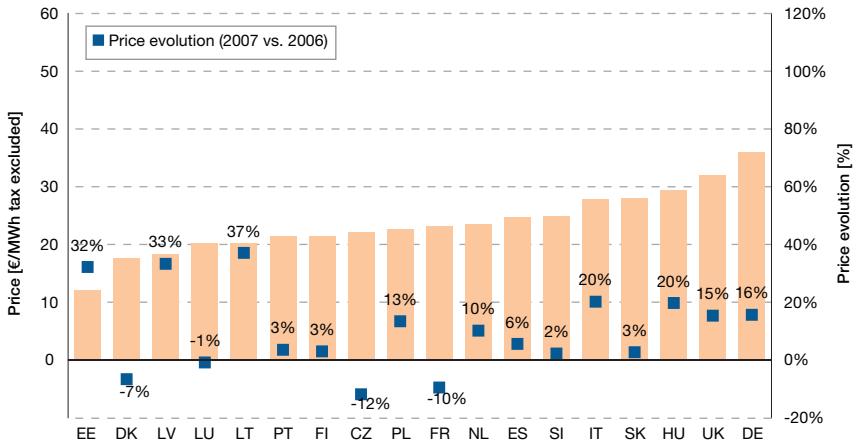
A focus on minority group marketing can deliver new markets as well as create high loyalty customers (as has been proven in mobile telecommunications). Combined with a VERO strategy, minority group focused brands can create new markets and dominant loyalty positions with unique propositions. Alignment with existing minority brands such as telecommunications brands can strengthen the customer loyalty even further.

Outbound marketing creates ever reducing conversion rates. Optimizing inbound channels like contact centres and customer self care sites create much higher conversion rates (up to 38% in telecommunications and 29% in travel and leisure) of marketing activities. In low margin energy retail markets, the cost of marketing is an ever lasting pressure and marketing needs new strategies for retention and growth driven campaign activities. Real Time Marketing can deliver these new high conversion and therefore low cost successful strategies.

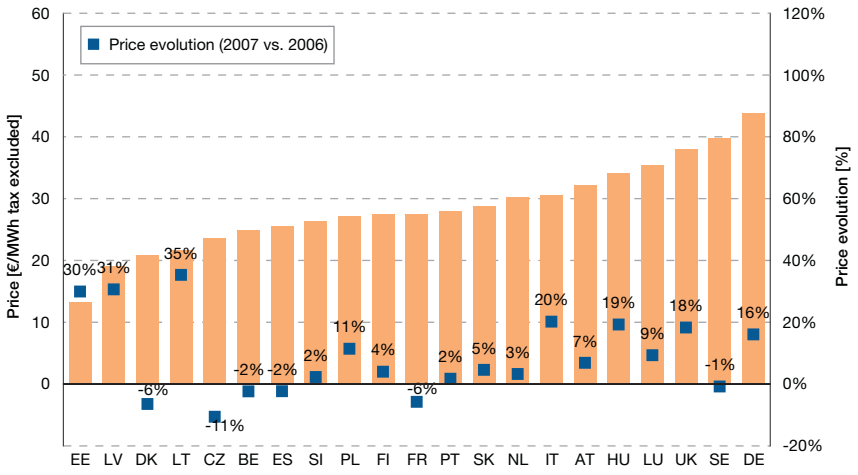
The road to a competitive energy market will show new convergence with other markets. Pure commodity products like energy are "the ultimate tool" for other existing brands to improve loyalty and product portfolios. Energy companies must be aware of trends in other markets and must use these trends in their retail strategy.

Table 3.11 I&C gas prices (January 2007)

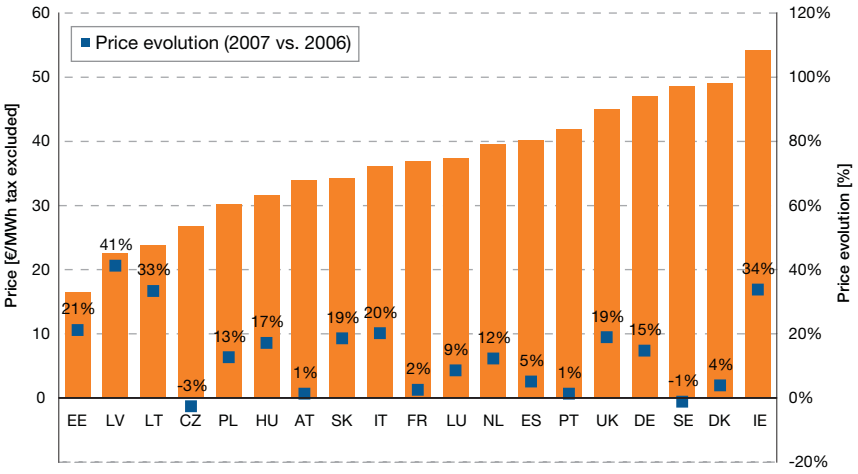
Medium to Large Industries
- Annual consumption: 116.3 GWh



Small to Medium Industries
- Annual consumption: 11.63 GWh

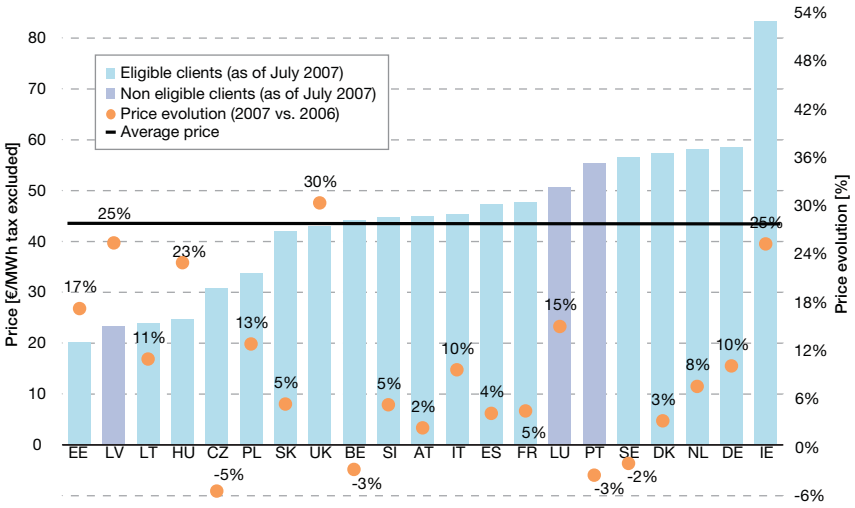


Very Small Industries
- Annual consumption: 116.3 MWh



Source: Eurostat – Capgemini EEMO9

Table 3.12 Residential gas prices (January 2007)



Source: Eurostat – Capgemini EEMO9

The Baltic States enjoyed the smallest gas prices for the I&C segments. They ranged from €10 to €25/MWh. Germany and the UK, instead, had the highest gas prices in the EU-25 for the I&C segments. Customers from the very small industries paid gas at below €50/MWh, the ones from the small to medium segment paid gas at €45/MWh and the clients from the medium to large industries paid the commodity at some of €35/MWh.

Within the residential segment (see Table 3.12), in contrast, the greatest hike occurred in the UK (30%), as a result of an increase in the base price. Meanwhile, Czechs enjoyed a decrease of 5%.

Germany, Denmark, Ireland and the Netherlands have the highest prices for the residential clients. For example an Irish household pays gas at €80/MWh.

As in the I&C segment, residential customers in the Baltic States enjoyed the lowest prices: €20-€25/MWh.

High prices in Germany and the UK can be explained by high infrastructure costs. German transportation fees are very high and off-shore gas from the North Sea is expensive. Also, in Germany there is no real competition because even if the market is open, players tend to operate in their own local monopolies. These elements of high costs are transferred on both to the big clients and to the households, with no apparent cross subsidies.

Instead, the Baltic States are very close, both politically and geographically, to Russian gas production, resulting in a direct benefit to final gas prices. But Gazprom's special treatment has come to an end, and hence prices have increased.

There are cases of cross subsidies. In Italy, industries pay high prices but residential customers enjoy European average prices. The cross subsidy seems to reverse in the Netherlands, with household consumers paying higher than average prices to the benefit of industrial consumers.

It is tempting to think there are correlations between price levels with the degree of market openness, but consistency is difficult to find. Prices in the UK are high although the market has been open since 1996 (and it also has one of the lowest concentration levels in Europe). The Baltic States instead are opening their markets now, yet they still enjoy the lowest prices. This lack of correlation is explained by the interference of predominant economic factors that drive the price levels, such as mostly indexation on oil-prices but also political will, (regulated tariffs or subsidies, approval of gas increase) and short term supply and demand dynamics.

There is no such a thing as a European gas price reference, as values vary significantly among Member States. For very small industries the price ranges from €15 to €55/MWh, with a deviation among countries of €40/MWh. For large industries, prices instead go from €10 to €35/MWh, with a deviation among countries of €25/MWh. Households show similar deviation and vary from €20 to €80/MWh (although, when not considering Ireland, they go from €20 to €60/MWh).

This variability tells us something about the modest gas retail markets' convergence and interactions. The new EU energy package could favour the convergence toward a single market with a consequence being the equalization of prices.

Infrastructures and Regulated Activities

Transmission Electricity

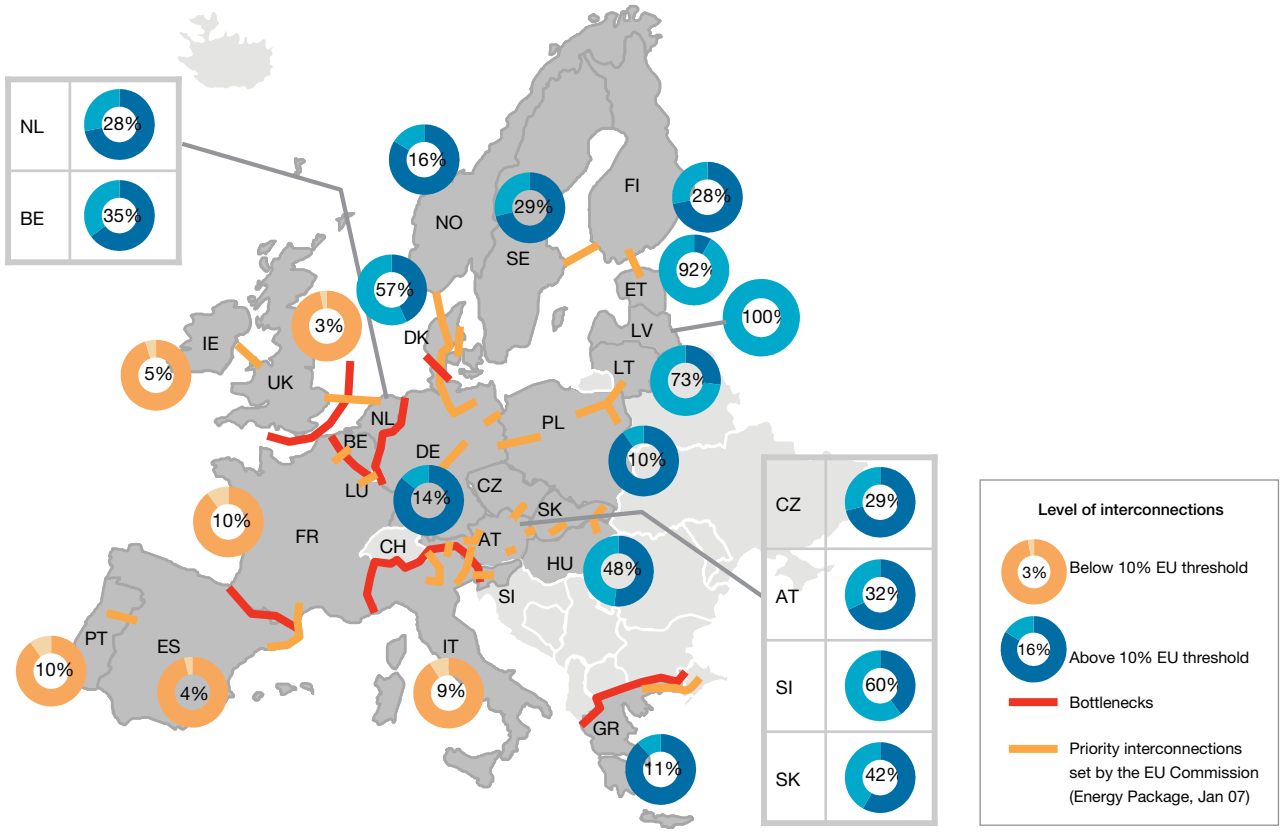
- Despite a very small increase in the level of interconnection between EU countries, there is no real improvement that ensures:
  - Real access to the market from neighbouring countries,
  - Reinforcement of the security of supply,
- There is a clear move for market integration at the regional level. This is a step towards a European-wide market;
- The EU confirmed its willingness to go further in the TSO unbundling;
- After years of low investments, European TSOs have now engaged in high investment policy. However, this is mainly focused on their internal markets (line reinforcement, improvement of network quality standards, etc.)

Overall, there is no noticeable improvement in the level of interconnections, bottlenecks and priority interconnections within the EU

Cross-border flows are essential for the development of a liquid European-wide market. Yet the EU countries are limited by physical transfer capacity. Table 4.1 expresses the level of interconnection as the import capacity divided by the total generation capacity of a country. It is recognized by the EU authorities that a 10% interconnection level is sufficient to provide access for competition coming from outside the country.

During recent years, cross-border electricity flows across Europe have modestly but steadily increased, and they now represent approximately 10% of the total European consumption. However, this figure only gives a rough estimate of the traded volumes between different European countries, because the

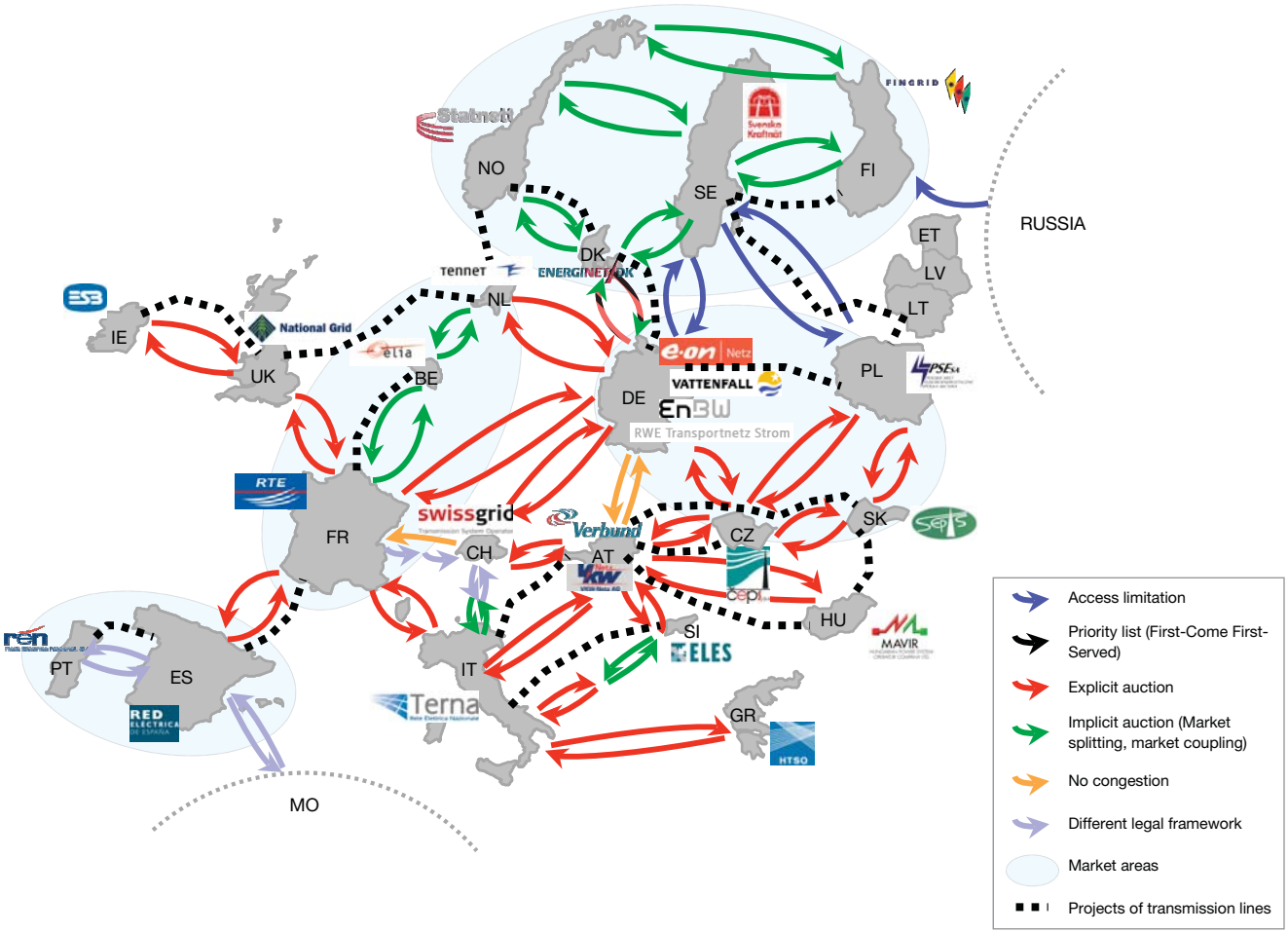
Table 4.1 Level of interconnections, bottlenecks and priority interconnections (2006)



Source: ETSO, UCTE, European Commission – Capgemini EEMO9

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0091-8_5,

Table 4.2 Electricity TSOs, congestion methods and on-going projects of transmission lines (2006)



Access limitation	Access rationed. The instances still present in the list, consist of DC links with ownership different from linked networks.
Priority List (First-Come, First-Served)	The marketer gets capacity in a priority order until the whole Available Transfer Capacity (ATC) is allocated. Examples of priority criteria are: chronological order, past use of capacity, etc. Transparency limited by confidentiality of trade.
Explicit Auctions (ATC based)	The seller (TSO) determines ex ante ATC considering security analysis, accepts bids from potential buyers and allocates the capacity to the ones that value it the most.
Implicit Auctions (Market Splitting; Market Coupling)	The energy markets provide initially a common clearing. If ATC reached, markets “split” into pre-determined price areas cleared individually at area prices.
Different legal framework	For non-EU member states ; EU legislation doesn’t apply to them. In the CH case, current legislation is governed by ownership rights. A new legal framework (revision of the so called EleG) is proposed by the government and currently under consultation.

Source: ETSO, UCTE, European Commission – Capgemini EEMO9

physical and commercial flows are sometimes quite different (e.g. due to netting or loop-flows). Countries such as France, the UK, Italy and Iberia still lack interconnection capacities, and therefore they are preventing the development of competition from neighbouring countries.

Flows across European electricity markets are restrained by insufficient physical capacities

The interconnection levels[19], particularly in Western Europe, remain below the level of 10% that was agreed upon at the Barcelona European Council of March 15 and 16, 2002. Since then only a little progress has been made, and most of the physical bottlenecks still exist. Consequently, the list of priority projects has not changed much since 2002, even if the EU has tried to accelerate market integration by financing electricity transmission infrastructure projects of European interest.

After having financed electricity transmission projects for more than €11 million in 2006 (mainly spent for supporting feasibility studies) the EU has budgeted €21.2 million for 2007 of which 80-85% should go to the priority projects. But nevertheless electricity market integration remains hampered by insufficient interconnection capacity and by a lack of investment in eliminating established bottlenecks.

As an illustration of this slow increase in interconnection capacity, very few new projects or improvement projects were observed during 2006-2007:

- A 225 kV tie-line between Saint-Victor in France and Camporosso in Italy replaced the existing 225 kV tie-line Broc Carros (F) - Camporosso (I);
- A new 400 kV line between Falagueira (Portugal) and Cedillo (Spain) has been implemented;
- In 2006, the construction works for the HV-DC cable-connection between the Netherlands and Norway started as planned, and good progress was made. At the end of the year 2006 about 35% of the 580 km cable was realised, and the converters and the buildings for the converter stations were nearly completed. This cable should be put in service at the end of 2007;
- At the end of 2005, a new 400 kV tie-line project was started between Oradea (Romania) and Nadab-Bekescsaba (Hungary). The deadline for the completion of this project is February 2008.

Nevertheless, some progress in congestion management methods has been found

Improving access to limited interconnection capacities requires the implementation of appropriate methods for congestion management. The most efficient methods are market-based in order to facilitate a fluid cross-border trade. Consequently, capacities that are allocated only by means of explicit (capacity) or implicit (capacity and energy) auctions are the only ones fulfilling the requirements of Regulation 1228/2003, which was amended in early November 2006, as explained in Table 4.2 on the following page. However, some non-market-based methods are still in use, which prevent the efficient trade of power through interconnections.

The main element of the amended congestion management guidelines is the requirement for transmission system operators to apply a common coordinated congestion management method and procedure for the

[19] In March 2002, the heads of State and Government bodies agreed to set a target for Member States, according to which the level of electricity interconnections should be equivalent to at least 10% of their installed production capacity by 2005.

allocation of capacity by no later than January 1, 2007 between the countries in the following seven regions:

(a) Northern Europe (i.e. Denmark, Sweden, Finland, Germany and Poland);

(b) North-West Europe (i.e. Benelux, Germany and France);

(c) Italy (i.e. Italy, France, Germany, Austria, Slovenia and Greece);

(d) Central Eastern Europe (i.e. Germany, Poland, Czech Republic, Slovakia, Hungary, Austria and Slovenia);

(e) South-West Europe (i.e. Spain, Portugal and France);

(f) UK, Ireland and France;

(g) Baltic States (i.e. Estonia, Latvia and Lithuania).

Significant initiatives have been taken to foster the creation of a single European electricity market

Regional initiatives are clearly seen as a step toward the constitution of a single European electricity market. The European Regulator's Group for Electricity and Gas (ERGEG) has unveiled seven electricity Regional Energy Market (REM) projects. Those REM mean:

- Priority regarding congestion management methods;
- Use of interconnections improvement;
- Wholesale market transparency;
- Balancing market integration.

In March 2007, 24 TSOs, 20 market operators and 60 other shareholders were involved in these initiatives.

In parallel to the ERGEG initiatives, TSOs are seriously tackling the challenges of regional cooperation. Several projects dealing with the integration of Europe's electricity markets are currently underway:

- The first step was the successful launch on November 21, 2006 of the Trilateral Market Coupling between the Netherlands, Belgium and France. In early June, Luxembourg and Germany decided to join the initiative. A MoU that agreed on the implementation of a coupled market

Recommendations after the November 4, 2006 blackout

Due to the number of involved TSOs and the interruption of supply for more than 15 million European households, the events on November 4, 2006 constitute one of the most severe European disturbances in the history of the power industry.

The investigations identified many improvement factors:

- Major switching manoeuvres have to be simulated and analysed numerically;
- Inter-TSO coordination has to be put in place to avoid domino effects;
- Real-time data regarding power generation units connected to the distribution grids have to be exchanged by TSOs in order to better anticipate the evolution of flows over the grid;
- Coordination between TSOs and DSOs has to be improved in order to accelerate the recovery;
- Dispatchers have to be better trained in procedures and tools under normal and emergency conditions.

Smart Grids: dream or reality?

Electrical power is entering its greatest revolution in a century. This will impact the way electrical power will be produced, delivered and used. The source of this revolution: electronic intelligence. Information technology is starting to enable electronic intelligence throughout the grid. Driven by the emergence of cheap computing power and low-cost bandwidth, the traditional grid is in the early stages of transformation to a "smart energy network" known as "smart grid". The key to smart grid is how information technology can optimise grid operations:

- Electrical devices coupled with Smart Metering will be operated by their own intelligent software agents that communicate information on operating status and needs to the network, collect information on prices and grid conditions, and respond in ways that most benefit their owners and the grid;
- Constant interactions and transactions of millions of smart agents will move the grid beyond central control to a collaborative network nearly as complex as biological systems;
- For everyone concerned about power reliability, the smart network will offer:
  - Greater capacity to bounce back from troubles;
  - Fewer blackouts and brownouts;
  - Better used of old plants;
  - A contribution to security of supply.

Momentum toward this smart energy network is starting to speed up, and it will reach critical mass over the next five to ten years.

Smart Grids

Today's grid	Main characteristic	Modern grid
▪ Responds to prevent further damage ▪ Focus is on protection of assets following system faults	▪ Self heals	▪ Automatically detects and responds to actual and emerging transmission and distribution problems ▪ Focus is on prevention ▪ Minimize consumer impact
▪ Consumers are uninformed and non participative with the power system	▪ Motivates and associates with the consumer	▪ Informed, involved and active consumers ▪ Broad penetration of demand response
▪ Focused on outage rather than power quality problems ▪ Slow response in resolving quality of supply issues	▪ Improves quality of supply	▪ Quality of supply meets industry standards and consumer needs ▪ Various levels of quality of supply at various prices
▪ Relatively small number of large generating plants provide majority of generation ▪ Numerous obstacles exist for interconnecting distributed generation	▪ Accommodates all generation options	▪ Very large number of diverse distributed generation devices deployed to complement the large generating plants ▪ Plug and play convenience ▪ Significantly more focus on and access to renewables
▪ Minimal integration of limited operational data with asset management processes and technologies ▪ Siloed business processes ▪ Time-based maintenance	▪ Optimizes assets and operates efficiently	▪ Greatly expanded sensing and measurement of grid conditions ▪ Grid technologies deeply integrated with asset management processes to most effectively manage assets and costs ▪ Condition based maintenance

Source: Capgemini EEMO9

In Europe, several initiatives are geared toward innovation in the T&D activities:

- Smart Grid's European technology platform for Electricity Networks of the future began its work in 2005 under the guidance of the EU Commission. Smart Grid's mission is to create a vision that:
  - Enables Europe's electricity grids to meet the challenges and opportunities of the 21st century;
  - Fulfils the expectations of society;
  - Strengthens the European business context for the electricity sector and its international opportunities.
- ERMINE project: Electricity Research Road Map IN Europe:
  - A coordination of action supported by the European Commission under the 6th R&D Framework Programme to guide the strategic European Research, Development and Demonstration in the electricity sector for the next 25 years.

was signed between the interested parties on June 6, 2007. Hence, according to the plan, the electricity markets of France, Belgium, the Netherlands, Luxembourg and Germany will be integrated into a single regional market area by January 1, 2009. It is even intended to use market coupling to link the North-West European and Norwegian markets across the NorNed cable, which should be in operation at the end of 2007;

- The creation of a single regional market area in Northern Europe was also a step forward. After a six- month conceptual phase, the market coupling project between Denmark and Germany entered into its implementation phase in April 2007. Operation is expected to start at the end of 2007. The creation of regional markets as an intermediate step seems to be the key for the integration of European electricity markets and the creation of a single European electricity market.

From a legal point of view, on April 2007, EU energy regulators recommended measures to facilitate grid expansion. The most efficient measures proposed include:

- The acceleration of authorisation processes for building new electricity lines – political support is needed to deliver necessary permits;
- The promotion of EU-wide operating and security standards to operate a single EU grid.

In the September 2007 new energy package, the EU has reinforced the need for clearer unbundling of TSOs in order to ensure a fair and transparent access to capacities

The issue that is receiving a great deal of attention by the EU Commission in its reviews of the Electricity Directive is what measures are needed to ensure that all generators have fair access to the transportation networks.

Different models for transportation and for the management of distribution networks exist in Europe:

- Administrative unbundling: different accounts for the network exploitation and for sales/ production, shared operational activities in one company;
- Management unbundling: in addition to the administrative unbundling, the staff is assigned to different business divisions/units that operate independently from other business activities, but that are still managed from a central holding;
- Legal unbundling: network activities are organised in separate legal entities, which might however operate in a holding company together with production and sales activities;
- Ownership unbundling: the network is operating under different ownership than production and sales, thus there is no encompassing holding and no shared operational activities.

Table 4.3 Transmission networks ownership unbundling status (2006)

Member States	Gas	Electricity	Priority*
Austria	N	N	--
Belgium	N	N	--
Czech Republic	N	N	--
Denmark	Y	Y	(1)
Finland	N	Y	(2)
France	N	N	--
Germany	N	N	--
Hungary	Y	N	(3)
Ireland	N	N	--
Italy	N	Y	(2)
Netherlands	Y	Y	(1)
Poland	Y	N	(3)
Portugal	Y	Y	(1)
Slovakia	N	Y	(2)
Slovenia	N	Y	(2)
Spain	Y	Y	(1)
Sweden	Y	Y	(1)
UK	Y	Y	(1)

Notes: Priority*
(1) Now – Next 6 Months
(2) 6 Months – 12 Months
(3) 12 Months – 18 Months
Source: European Commission – Capgemini EEMO9

Financial conditions of TSOs vary greatly according to local and historical conditions

Investment levels depend on historical factors and severe climatic conditions

As seen in Table 4.4, most of the TSOs have increased their investment in the network during the last three years. The European average is approximately €10,000/km.

There are great differences in investment levels according to local conditions:

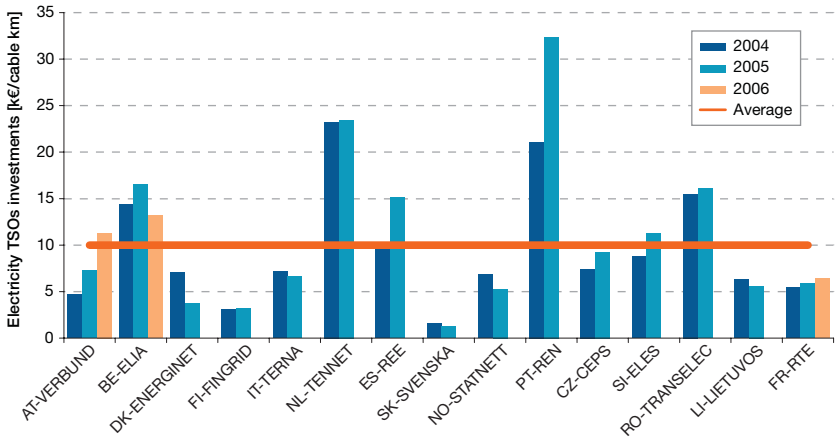
- Nordic TSOs seem to be in a very low cycle of investment;
- Growing markets such as Portugal and eastern Europe have greater investment levels;
- The largest stable TSOs, such as RTE and Terna, have similar levels of investment;
- Difficult climate conditions put stress on assets and lead to conjectural spending (RTE / 1999 storm, Fingrid / 2006 ice storm, RWE / November 2005 ice storm).

Tariff levels show great discrepancies, mostly due to market and regulatory arrangements

The tariffs vary greatly within the EU (see Table 4.5) according to:

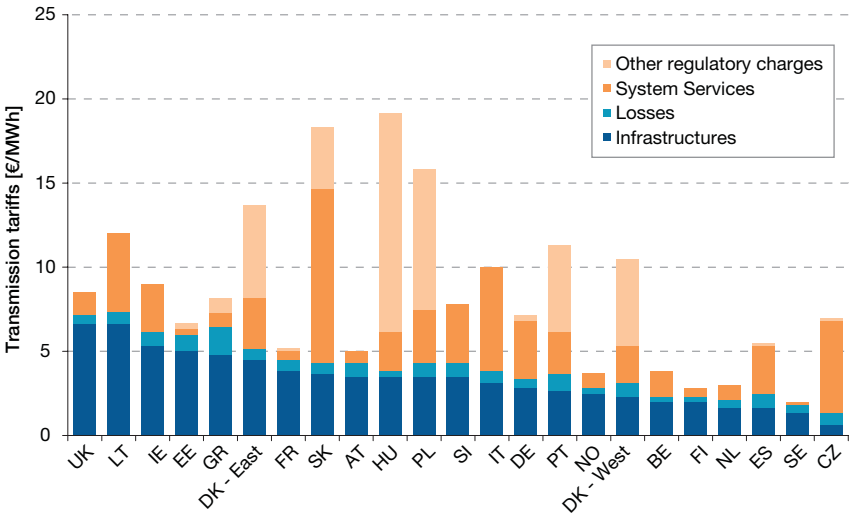
- Historical technical design of the network;
- Loss purchasing arrangement (market-based vs. internal arrangement within vertically integrated players);
- Ancillary services arrangement;
- Pressure from the regulators to lower the transmission tariff to the benefit of the end customer.

Table 4.4 Electricity TSOs investments, in k€/cable km (2006)



Source: TSOs websites – Capgemini EEMO9

Table 4.5 Components of transmission tariffs (2006)



Source: ETSO – Capgemini EEMO9

Distribution Electricity

- A very heterogeneous situation among countries;
- Unbundling is seen as a way forward for enhancing mass market competition;
- Significant differences remain on the regulation methods.

A very heterogeneous situation for distribution activity throughout Europe

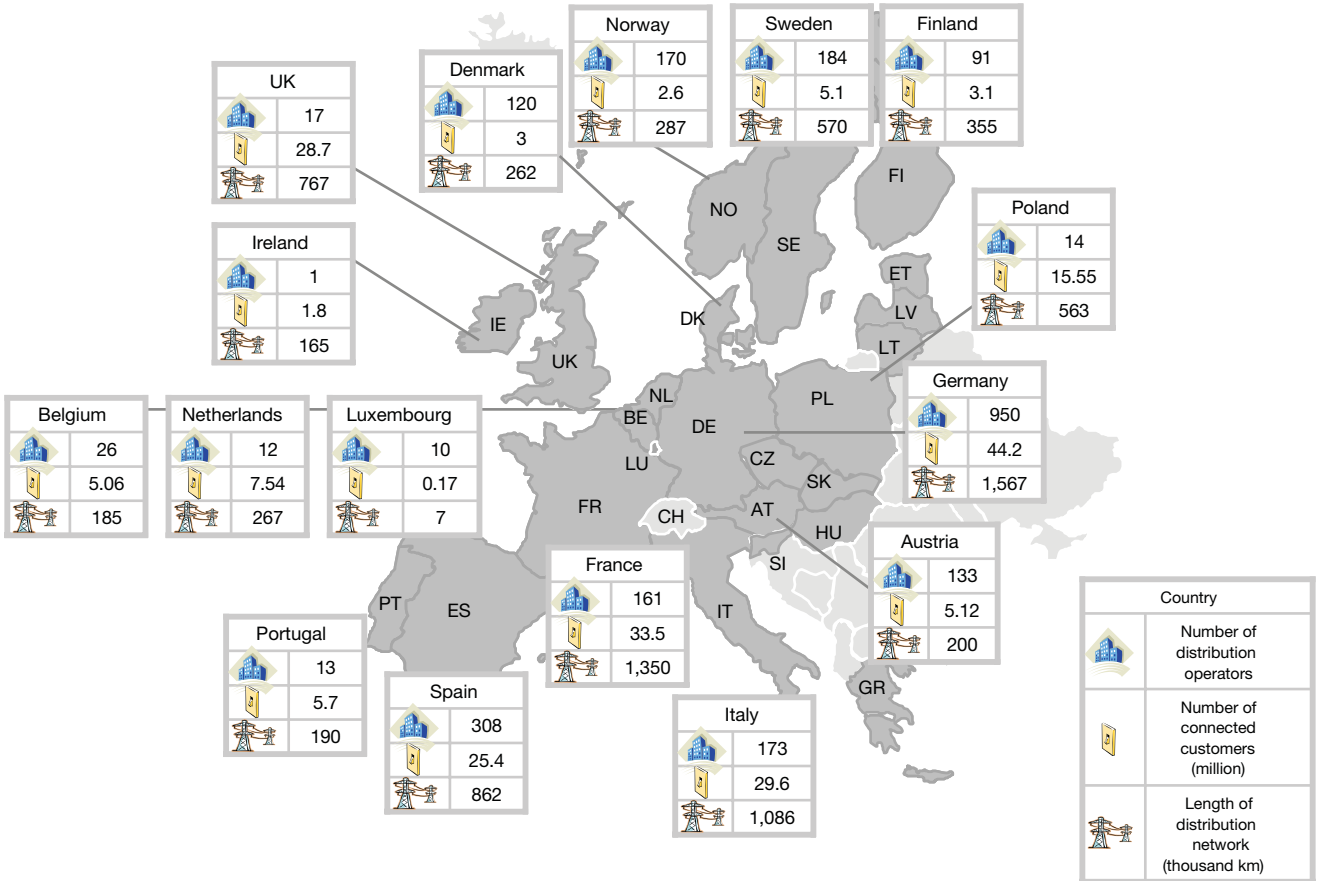
Distribution activities are managed by:

- Large entities belonging to incumbent players;
- Numerous small to very small entities belonging to local communities.

Unbundling is seen as a way for enabling mass market competition

Full market opening requires distribution companies to ensure fair access to networks to all market players and to manage efficient switching processes whilst preserving data confidentiality. However, the country reviews performed during the sector inquiry led by the EU Commission reveal that this is often not yet the case. There are many concerns about the incidence of cross subsidies, discrimination in the way information is handled, as well as problems with switching procedures and load profiling, including the

Table 4.6 Electricity DSOs, physical infrastructures (2006)



Source: Eurelectric – Capgemini EEMO9

interaction with balancing rules. Many of these difficulties can be attributed to the insufficiently clear unbundling of network companies from supply businesses.

Therefore, in order to ensure to all energy retailers a non-discriminatory access to networks, Directive 2003/54/EC defines an unbundling process between DSOs and vertically integrated companies on three main streams:

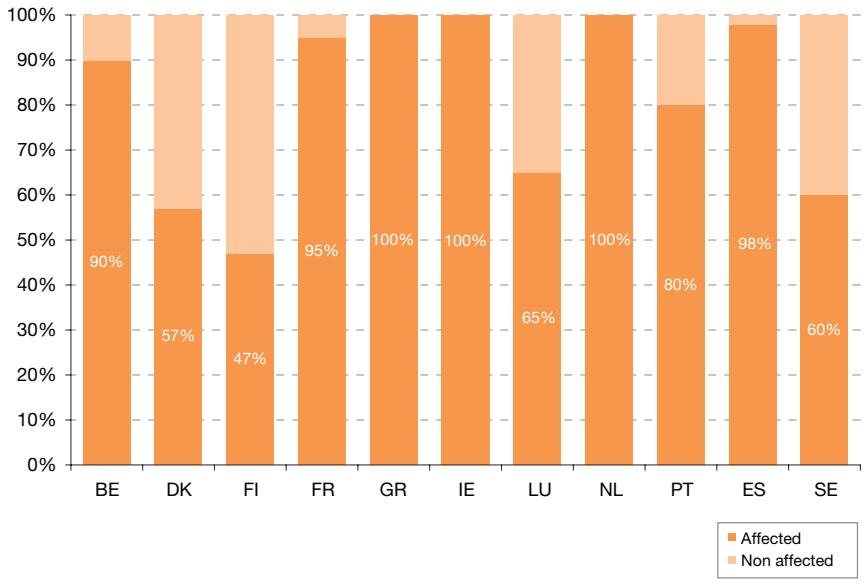
- Accounting: publication of separate financial statements;
- Functional: management of the DSO is not involved in any competitive business (generation, sales, etc.);
- Legal: establishing a legally separate entity for the DSO;
- Ownership unbundling: the network is operating under different ownership than generation and sales.

Some exemptions were accepted by the EU from the principles described above for both legal and functional unbundling:

- Smaller DSOs (serving less than 100,000 customers) can be exempted from the requirements of both legal and functional unbundling. This possibility of exemption is not time-limited;
- With regard to larger DSOs (serving more than 100,000 customers), the requirement of legal unbundling was fixed on July 1, 2007, which was the date of full market opening.

Due to these possible exceptions, the requirements of functional unbundling are applicable without being coupled with legal unbundling.

Table 4.7 Proportion of DSOs affected by EU Directive on unbundling in selected Member States (2006)



Source: European Commission, Eurelectric – Capgemini EEMO9

Table 4.8 Regulatory formulae used by country regulators (2006)

Price Cap	Rate of Return	Combination of above models
Portugal	Denmark	France
Spain	Finland	Hungary
UK	Greece	Poland
Netherlands	Ireland	Czech Republic
Sweden	Portugal	Italy
	Germany	Belgium

Source: Eurelectric – Capgemini EEMO9

For the moment, most of the unbundling requirements are fulfilled:

- In accounting, most of the concerned DSOs have separate financial statements, and even if a small percentage do not prepare complete financial statements, the accounting challenge is reached;
- Concerning the functional unbundling, a large majority of DSOs (93% according to an Eurelectric study) comply with the EU Directive;
- The legal unbundling is by far the least advanced unbundling scenario because many Member States had a wide interpretation of the exemption rules concerning large DSOs. Many DSOs will be legally unbundled at the end of 2007.

Significant differences remain on the regulation methods

There are two main approaches to preventing monopolistic infrastructure companies from charging excessively high prices: price cap regulation and rate-of-return regulation (see Table 4.8 on previous page). The rate-of-return approach is used in many countries where regulatory agencies fix the rate of return that a utility can earn on its assets. They set the price the utility can charge so as to allow it to earn a specified rate of return – and no more. The regulated price can be adjusted upward if the utility starts making a lower rate of return, and it will be adjusted downward if the utility makes a higher rate.

EMIX

Quality deficiencies in the change of supplier process and of other information exchange processes between distributors and retailers have been identified as an industry problem in Sweden. This has resulted in very low customer satisfaction and trust for the industry as a whole and has been viewed as one of the barriers to increased customer switching. Currently some 170 distribution companies communicate, directly or indirectly, with approximately 120 retailers. Furthermore, they also communicate with 30 balance providers and the TSO. Information quality has also suffered, since the current rules for standardised messaging did leave some space for interpretation.

The EMIX (Energy Market Information eXchange) initiative has been made by the industry organisation Swedenergy. They view the initiative as the vehicle with which to move the industry from the old fashioned technology inherited from the last century into a modern electronic and automated reality that is up to date with the rest of society.

The vision is that EMIX will be the Swedish electricity industry's common communication hub that facilitates a cost-effective, fast and reliable exchange of information between all the actors in the industry and at the same time provides quality assurance, audit trails and logs of all messages.

The ongoing EMIX project is at the start of its development phase, which represents an investment of approximately €3 million. The system should be in production no later than early 2009, well in advance of the metering reform set for July 1, 2009. By then EMIX should support the common processes in the Swedish electricity market and should be available 24/7. All messages will be quality-assured before they are distributed to the receivers, nearly in real time.

Given that the external systems are on-line, the EMIX hub will then automatically facilitate:

Ability for energy suppliers to check data quality before signing contracts;

- Helping grid companies to receiving orders for customer switching; informing the previous supplier and monitoring the entire chain of commission, including reporting of beginning and end measurements;
- Monitoring of timely reporting of measurements and reminding responsible players of delays;
- Monitoring structural messages between actors, such as changing measurement devices and change in facilities.

Transmission Gas

Since last year, several initiatives have been undertaken in order to progress on key issues for gas transmission operators:

- Ensuring non-discriminatory access to networks through unbundling (fully unbundled TSOs, separate system operators without ownership unbundling);
- Improving regulation of network access at the national and EU levels (enhancing the role of national regulators, coordination of regulators at the EU level);
- Reducing the scope for unfair competition (transparency);
- Coordination between transmission system operators, providing a clear framework for investment in transmission infrastructure.

Congestions and many other obstacles still remain for the creation of a single liquid gas market

The free flow of gas all across Europe is mandatory in order to support a unified market.

A survey published by N-NW Gas ERGEG Regional Initiative at the beginning of 2007 ranked the largest barriers:

- Lack of access to primary capacity to and from hubs;
- Lack of access to secondary capacity to and from hubs;
- Lack of liquidity (lack of sellers/buyers).

Another obstacle comes from the cross-border transmission capacity, which is a very crucial resource.

The objective is to reach a situation in which a maximum of unused capacity is reallocated on a secondary market. This should create additional capacity from which all shippers could benefit. And finally, this could lead to the issuing of transparent signals for deciding (in a timely manner) investments at the congested border points.

Gas flows mainly from North to South and from East to West. The networks have been designed for that. New transmission capacity has to now be provided in order to support new directions allowed by LNG terminals (mainly West and South).

The European Council of March 2006 called for the adoption of the Priority Interconnection Plan as part of the Strategic European Energy Review. The EU will need to invest at least €19 billion into gas pipelines before 2013 in order to fully meet requirements.

A new formal TSO body (GTE+) has been established since early 2007. Among its key roles, the coordination of investment and network planning should provide a very high value for the existing complex decision process involving TSOs, national regulatory regimes, ERGEG and EC. GTE+ should contribute to the improvement of the image of TSOs, which have previously been perceived as being slow to increase cross-border capacity. In addition to this role, GTE+ has to review and develop existing access conditions, to define network operational rules and to establish a single transparency platform that would enable users to have a complete picture of transmission systems in Europe. But who will provide and manage this platform? In April 2007, GTE published a first set of investment principles. One of the objectives is to "foster a positive and stable regulatory climate for investment across Europe."

TSOs are working actively to make more capacity available to market players

Increasing available transmission capacity is a strategic orientation for numerous TSOs in Europe for two main reasons:

- Domestic consumption: to follow growth of gas usages (particularly true for countries with a high gas to power market ratio);
- Transit: countries which are at the intersection of several routes, such as Belgium, the Netherlands and Germany, will have to extend their interconnection capacities.

In parallel, an intense marketing activity has been noticeable around the development of new capacity offerings:

- Short-term versus long-term capacity: only a small proportion of capacity is traded today in a short period of time. The optimization of the use of physical pipes would require more sophisticated offerings in order to cope with reserved but unused capacity or temporary unavailability;
- Market coupling for day-ahead capacity: enabling the purchase of gas and capacity at the same time or the purchase of exit and entry capacity on both sides of a border. To illustrate this, six TSOs (BEB, DONG, EGT, Energinet.dk, GTS, Wingas) are working together to design a common platform for selling capacity.

Transparency and harmonization of capacity access rules are instrumental to the development of liquidity in the market

A majority of TSOs are now supporting the "entry/exit" model where capacity is allocated to a zone or region and not to a particular physical pipe. The most illustrative example of a change in access rules is seen in Germany where various entry/exit rules, as well as a simplification of trading zones, were offered, starting in 2006. Furthermore, due to pressure from the regulator, BEB and Ontras are looking at building a common balancing group.

In general, the allocation of transmission capacity is based on a primary allocation (primary market) and on congestion management procedures. Primary allocation is very often based on a "first-come-first-served" method.

Globally, mechanisms and rules strongly need to be harmonized according to shippers acting in several countries across Europe. In addition, a relative lack of stability leads to the implementation of new sets of rules every year.

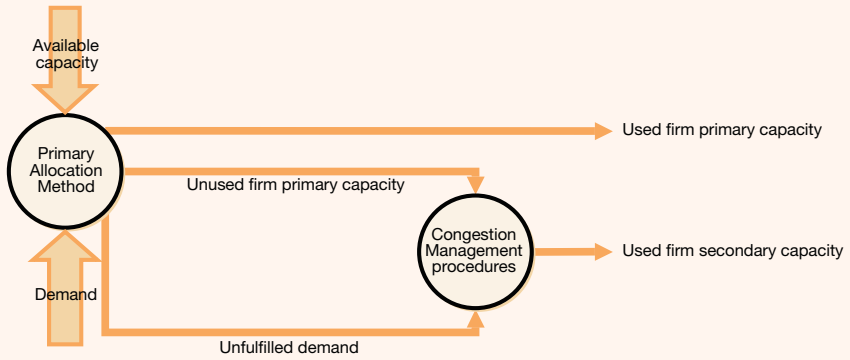
A harmonization in that domain allows:

- Information on market players in order to take effective business decisions based on accurate data;
- Non-discriminatory mechanisms for overcoming short-term congestions;
- Long-term plans for solving physical congestions.

Congestion management

Numerous TSOs reported "contractual congestion", which is a shortage of capacity rights on the primary market, even if there is no lack of physical capacity. The picture below describes how capacity allocation may be used to solve congestion problems.

Capacity allocation for congestion management



Source: ERGEG – Capgemini EEMO9

Several methods are used in Europe to solve congestions (see EU Gas Regulation 1775/2005/EC):

- Firm and long-term UIOLI (use-it-or-loose-it): the TSO may take capacity rights back from a shipper and re-offer it as firm capacity on the primary market;
- Interruptible and short-term UIOLI: the TSO may re-offer the capacity just before utilization time (if not nominated) as being primary interruptible capacity because the initial right holder may decide to eventually use it;
- Secondary market for capacity: primary capacity rights holders may sell their unused capacity to other market participants.

An important need for additional transparency of gas regulation remains necessary as confirmed by the survey initiated in January and April 2007 by ERGEG. Nevertheless, at present, TSOs provide varying levels of information, leading to some gas markets being more opaque than others to enter. Furthermore, half of the TSOs did not recognize the linkage between efficiency of markets and transparency on capacity situation at critical points on the network.

According to the ERGEG Transparency Monitoring Survey 2007, the main areas of non- or weak compliance are:

- Capacities;
- Publication of technical information;
- Balancing mechanisms;
- TPA services.

And to a lesser extent:

- Capacity allocation and congestion management;
- Modification to service conditions.

Gas transmission tariffs greatly vary from country to country

A report published by ERGEG in July 2007 compares gas transmission tariffs for six European TSOs: Fluxys (Belgium), GTS (The Netherlands), Energinet.dk (Denmark), MOL (Hungary), TIGF (France) and GRTgaz (France).

This benchmark compares tariffs for several distances (from 60 to 350 km) and ten shipper profiles. Table 4.9 (on the following page) illustrates variations observed among the different operators (average = 100).

Key issues in Denmark

Security of supply drives huge investments in gas and electricity interconnection infrastructure: the state-owned TSO, Energinet.dk, holds responsibility for cross-border connections into neighbouring countries. Collaborating with Nordic partners, Energinet.dk plans a gas pipeline, Skanled, connecting Denmark and Sweden with Norwegian reserves. This pipeline is to be inaugurated by 2012.

Moreover, Energinet.dk will upgrade its power network to Norway and Sweden before 2012 and to Germany. The Western part of Denmark is connected to continental Europe (UCTE) and Eastern Denmark is connected to Nordel. A connection is being planned between the East and West by 2010, in order to ensure the supply of electricity.

The distribution companies have put a focus on burying their overhead lines (10kV) following outages caused by storms in 1999 and 2005. They have taken advantage of the cable path to roll out fibre networks to all private homes and to become a new telecom player. The Utilities have used this fibre opportunity to expand their Smart Grid operations and to secure a higher level of supply.

Global players are expected into the Danish market following the IPO of DONG Energy: In 2006, DONG Energy became the major Danish energy player after the merger of six energy companies. Its activities cover the whole value chain within gas, power and renewable energy generation. Its privatisation is expected to be completed in 2007-2008. The state will still hold 51% of the shares until 2017 and 27% of the shares are already owned by other parties today.

Electricity retail markets evolve slowly: The high proportion of taxes and distribution costs in the total household electricity bill prevent customers from benefiting from retail competition when changing suppliers. Smart Metering may provide the customer with a flexible pricing system since it reflects actual tariff variations in the final billing. Pilot projects are ongoing where Smart Metering has been introduced locally. The Danish market for Smart Metering is unregulated despite inquiries at the political level for the implementation of regulation.

Wholesale gas releases coming up: DONG Energy held its first annual gas release auction in 2006, offering 400 mcm in return for corresponding deliveries of gas from the UK, Belgium and Germany. Another auction was held in May 2007 as part of a 10 year programme to fix consistent gas supply in a truly liberalised market.

Entry-exit systems – compared to transmission systems with distance-based tariffs – appear to be more expensive for short distances and less expensive for large distances.

Balancing penalties (when shippers do not make good forecasts, they create imbalances between their injections and off take which go beyond the tolerance band) are also very heterogeneous. See Table 4.10 for all profiles, all types of imbalance (positive, negative) and different levels of imbalances.

This analysis also reports significant differences about how different customers are charged.

All of this probably results from different costs and efficiency for TSOs. However, to some extent, these results could be explained by differences in the design of entry-exit systems, technical and geographical aspects and market conditions.

The development of new gas usages, such as CCGT, may impact transmission systems

Spain and France plan to develop additional gas power plants (CCGT). One of the drivers is the lack of energy during peak time. Gas turbines require a large amount of gas for a short period of time. When such CCGT are used for serving the electricity balancing markets, the lead time to nominate gas quantities may be too short for non-hourly balanced gas TSOs, particularly if gas has to come from the borders. New mechanisms might be needed in order to improve synchronisation between gas and electricity TSOs.

EU Commission's proposals for transmission unbundling split EU-25 into two camps

The recent directive enforces legal unbundling between the transmission networks and the unregulated activities (generation, wholesale market operations and trading and retail). It is generally acknowledged that legal unbundling has improved TPA. But, according to the Commission, the conflict of interest within vertically integrated Utilities explains the lack of investment in the needed cross-border interconnections. The EU commissioner for Energy released the new European energy legislation framework on September 19, 2007.

This 3rd directive includes the options that the EU Commission is considering which spans from an ownership unbundling of transmission, to the Independent System Operator (ISO) model used in several parts of the North American market.

The EU Members States are split in their view on the way forward. While a group of seven countries led by Denmark, and including the UK, sent a supporting letter on July 22, 2007 to the EU Commission for ownership unbundling, a group of eight other countries led by France, and including Germany, have clearly opposed the notion of ownership unbundling.

Table 4.9 Average tariffs and spread scheme used by a sample of gas TSOs (2006)

Country	France		Belgium	Denmark	Hungary	Netherlands
Sample of TSOs	GRTgaz	TIGF	Fluxys	Energinet.dk	MOL	GTS
Average tariff, Avg. = 100	86	73	96	149	125	76
Spread	78-95	66-81	90-105	129-163	105-139	54-115

Source: ERGEG – Capgemini EEMO9

Table 4.10 Average balancing penalties for all profiles and types of imbalances and at different levels of imbalances (2006)

€/1,000 cm	France		Belgium	Denmark	Hungary		Netherlands
Sample of TSOs	GRTgaz	TIGF	Fluxys	Energinet.dk	MOL 1	MOL 2	GTS
Imbalance							
2%	0	0	2,488	0	0	193	1,251
5%	0	0	12,138	0	156	881	8,857
8%	9,565	10,009	22,238	2,876	533	1,580	17,055
12%	25,074	26,239	36,399	6,711	1,164	2,518	28,055
18%	49,142	51,424	58,401	15,535	2,113	3,925	44,790

Source: ERGEG – Capgemini EEMO9

Gas storage

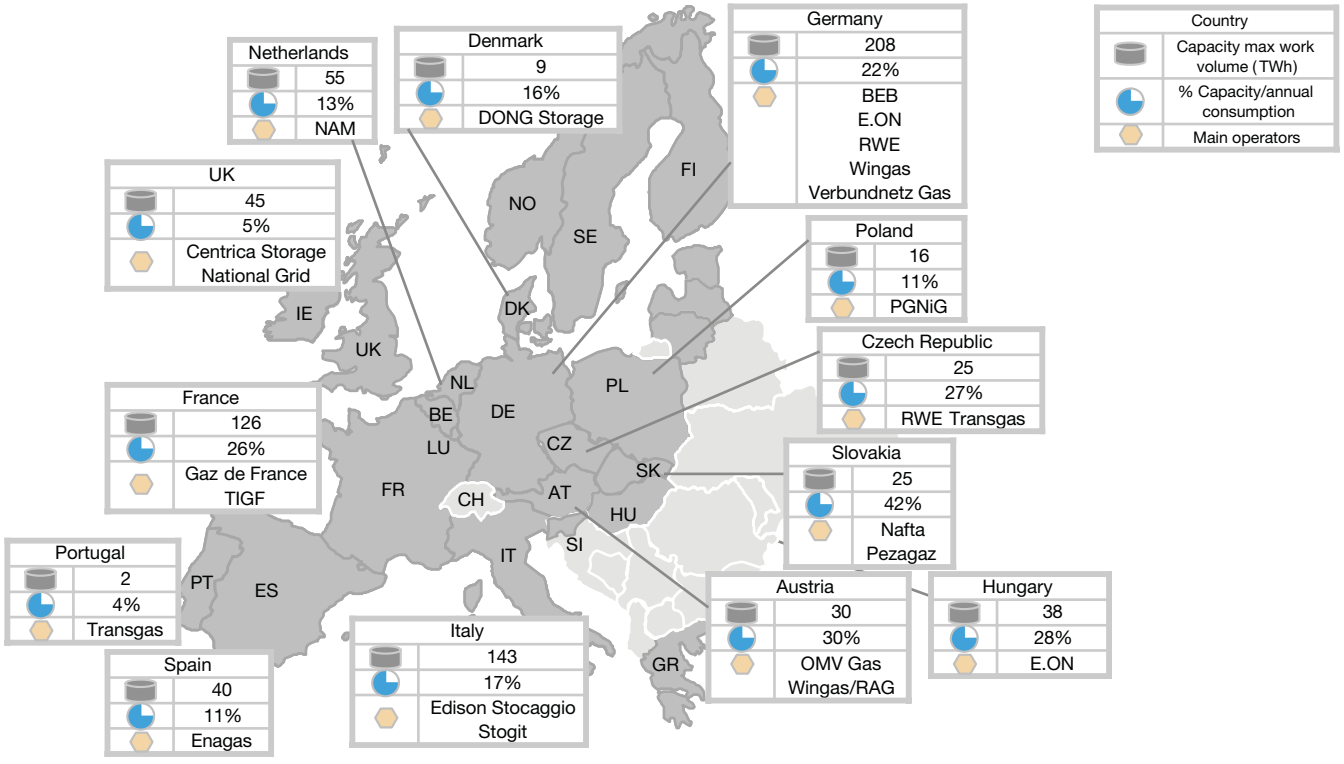
Natural gas storage slowly emerges as a strategic asset to gas markets

Storage activities have become increasingly critical for competitive gas markets. Related to short-term security of supply and the development of the gas market itself, it has become evident that investments in gas storage have to increase. The EU's plans on strategic security of supply and related plans on emergency gas stocks (strategic reserves) put further pressure on the demand for storage capacity.

Given the significant European seasonal swing (~35% average) there is an important need for flexibility. Historically, seasonal flexibility has been delivered through production flexibility and imported flexibility, along with storage. Production flexibility is declining fast (e.g. in the UK, from 93 bcm [1,000 TWh] in 2005 to 9 bcm [97 TWh] in 2030), and the large Groningen field in the Netherlands is losing its flexibility role as well.

New storage is therefore needed at a fast speed. The current working gas volume (WGV) in North-West Europe is around 45 bcm (484 TWh), with 15-18 new projects underway of around 16 bcm (172 TWh) of new capacity. However, based on current gas demand, the WGV need in NWE alone is around 80 bcm (860 TWh) (based on a WGV/consumption ratio of 25%).

Table 4.11 Map of gas storage (2006)



Source: GIE gse, BP statistical review of world energy 2007, SSO annual report 2006 – Capgemini EEMO9

Regulators must enforce strict regulation on Third Party Access

Regulators must enforce strict regulation on TPA, given the fact that the progress is slow on implementing the Good Practice for gas Storage System Operators (GGPSSO) as agreed upon in 2005.

The market for storage has been either fully regulated (35% of European storage capacity) or has negotiated third party access (nTPA) with exemption contracts. Given the growing strategic role of gas storage, it is questionable if nTPA will work in the long run. The wholesale gas market is already dominated by large national market incumbents, and new entrants have only recently started their own storage investments.

The legislative framework regarding transmission models introduced in September 19, 2007 will have an impact as well on the gas storage market. The creation of independent TSOs either through ownership unbundling or ISOs will open the market for independent (or TSO-aligned) SSOs (Storage System Operators) as well. It is expected that the most radical model, ownership unbundling, will create an investment-driven market, as well as increase third party access to storage facilities.

Key issues in Italy

The gas incumbents still own the main infrastructure: Eni, the main Italian gas operator, still has a majority stake in Snam Rete Gas and fully owns Stogit, the main storage operator. Eni is obliged to decrease the equity stake in Snam to 20% by 2008, but there is no such obligation for the storage and for the import pipelines. Ownership unbundling is instead effective in the electricity sector. Enel participation in Terna, the electricity TSO, is at 5.12%.

The modest development of gas infrastructure is arguably a tool of Eni to preserve its dominant position.

Generation capacity is now sufficient but local interconnections must be developed: peak reserve is now sufficient after the development of 11 GW between 2002 and 2006 (either new capacity or re-powering of obsolete power plants). An additional 13 GW are planned for the coming years. The overcapacity condition, however, could favour the establishment of cartels among operators that retain capacity to increase prices. The regulator could intervene and oblige the generators to always offer all available capacity.

Still, the southern regions suffer from lack of generation and local congestions. Terna has launched a €2.7 billion plan to develop connections between islands and import lines.

High-consuming segments and other value chain activities subsidise supply to the household clients: In 2006, Italian residential clients have enjoyed energy prices in line with the European average. High consuming clients have instead paid higher than average prices for electricity and gas. The main reason for this imbalance is that residential clients are protected by a favourable tariff system. Supply companies do need to raise prices to the big consumers in order to compensate for the poor profitability of households supply. Also, in vertically integrated companies, profitable activities subsidise the supply activity through non-market based transfer systems. This is particularly true for the electricity market, where distribution and supply to the household segment are not yet unbundled. They are now, in 2007, and non-integrated suppliers are most likely going to suffer from the separation.

Security level targets require more investments in storage capacities…

At the European level, the storage that ensures a level of safety corresponding to 16% of the yearly consumption is 57 days of average consumption (see Table 4.12).

It is clear that, among the large consumers, the UK is insufficiently provided with storage. Other countries with low consumption or large capacities are in a position to export their storage.

The need for new storage capacities at the European level will grow towards a staggering 60 bcm (645 TWh). When considering all current European projects in aggregate, there is a development pipeline of storage capacity of almost 37 bcm (398 TWh) underway. This is a huge amount, but it is still not enough to satisfy the strategic demand for storage.

Table 4.13 illustrates the dynamism of countries to increase the storage capacities in order to be at a good security level (as in the UK) or to become a regional storage hub (as in Italy).

Gas storage projects require large investments, and the regulatory and market climate is uncertain. Gas Infrastructures Europe (GIE) plans to set up an internal Investment work group to identify, share and publicise

best regulatory practice in creating a "conductive investment climate". GIE also plans to work with the EU Commission on its priority EU interconnection plan, and to highlight Investment issues in the ERGEG regional gas initiatives, which started this year.

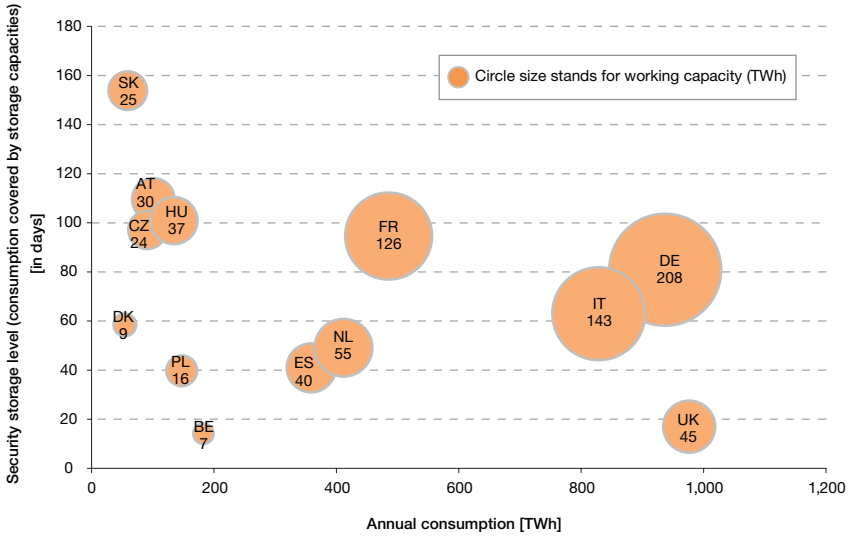
… although opinions diverge on the necessity of strategic storages in a fully liquid gas market

GIE also doubted the value of emergency gas stocks, an idea previously proposed by the EU Commission that now has support in some EU Member States. It is reported that emergency gas stocks could be "extremely expensive" and could distort the open commercial gas markets and that consumers could be better protected from supply shocks by creating a well connected and integrated market and diversifying supply sources, both geographically and technologically.

While the European dependency on gas imports is increasing, the discussion on strategic reserves becomes increasingly a European issue on security of supply. Taking a 10% strategic reserve on gas imports, our demand for additional storage then could grow with another 30 bcm (323 TWh) in the EU-15 countries alone.

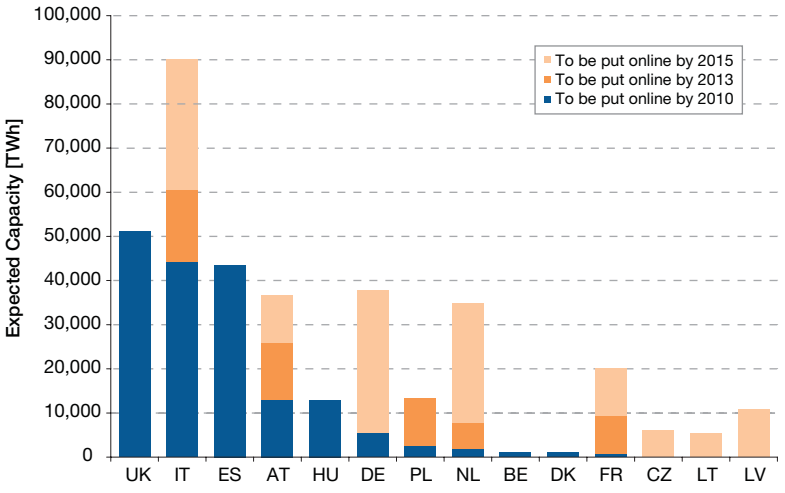
On top of an already stressed investment market for gas storage, this would put even more pressure on the realisation of storage capacity.

Table 4.12 Gas storage capacities (2006)



Source: GIE gse, BP statistical review of world energy 2007 – Capgemini EEMO9

Table 4.13 Storage facilities projects



Source: GIE gse – Capgemini EEMO9

Sustainable Development

2007 is the year of "political restart", in contrast with 2006, which was the year without clear political will:

Scientific expertise (International Panel on Climate Change – IPCC's fourth report) has confirmed the human cause and strength of climate warming;

- G8 has taken into account global warming and Angela Merkel led the US to agree to negotiate about the issue within the UN frame;
- Europe has set up the perspective after 2012, with its "three times 20%" vision 2020 for Europe;
- The NAP II has sent a right message, resulting in correct CO_2 prices for 2008;
- Investments in the Green business quickly growing;
- Meanwhile energy consumption has continued to increase despite efforts to improve energy efficiency.

Climate Change is on the top of global agendas

In Europe, objectives have been defined in order to avoid an increase of the Earth's temperature beyond two to three degrees, in line with the Kyoto protocol and the G8 agreements. At the same time economic implications from climate change are forecasted, as suggested, for example, by the Stern report. In March 2007, the European Union Ministers asked Member States to commit to reductions of 20% of energy consumption and Green House Gases[20] (GHG), as well as to achieve 20% of renewable energies in their energy production. The deadline for this "three times 20% objective" is 2020. The underlying assumption is of course an improved security of energy (and electricity) supplies, as well as a growing European economy with sustained industrial employment.

The "three times 20% objective" is very challenging since the final energy consumption increased continuously in 2006 (see Tables 5.1) despite current efforts to improve energy efficiency. Public awareness about climate change has increased dramatically, and the global media has had an increasing focus on the issue. The pinnacle of this last year was the blockbuster documentary film "An Inconvenient Truth" by former US vice-president Al Gore, together with the severe weather situation linked to environmental exhaustion (the last 12 years have included the 11 warmest years on record).

To achieve the European vision by 2020, three indicators in particular have been selected:

- European Emission Trading System (ETS) for CO_2 emissions including National Allocation Plans (NAPs);
- Progress of renewable energies (green business);
- Increased efforts for energy efficiency (white certificates).

European Emission Trading System – NAP I and II are too generous to meet Kyoto commitments

The EU Commission is clear in its aim to create a stable EU carbon market with trustworthy CO_2 prices. The first period of the ETS (2005-2007), covered by NAP I, gave the target quantity of CO_2 emissions that industrial installations were allowed to emit for "free" in Europe. These targets were proposed by each EU-25 Member State in order to meet European Kyoto protocol objectives. It is clear now that the NAP I schemes were too generous as many countries did not use all of their emission rights, whilst the overall Kyoto protocol commitments were very difficult to reach. In May 2006, when the real 2005 emissions for the different EU countries were reported, the traded carbon price dropped in a few days from more than €30/t CO_2 to around €10/t CO_2.

The current mechanisms prevent the operators from carrying their excess of Emission rights forward beyond 2007, the end of the first allocation period ("banking"). The excess of CO_2 rights and these "banking" rules explain why the CO_2 spot price is today extremely low (around €0.50/t CO_2). As a consequence, this price level does not provide incentives for Utilities to abate CO_2 emissions, e.g. by switching their energy mix towards less carbon intensive generation.

The ETS markets worked well: markets reacted logically to the available information and volumes traded in Europe increased by 242%, up to 1,101 Mt CO_2 in 2006.

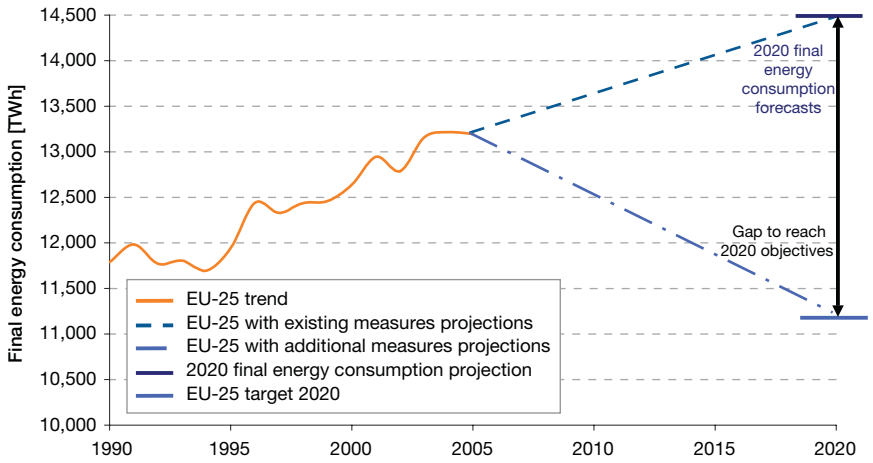
NAPs II are more restrictive (2008-2012). The total allowances were 5.8% under the 2005 real emissions. However there is no guarantee that they will be sufficient to meet the Kyoto protocol criteria (see Table 5.2 on page 80). For instance, the Italian NAP II allocates 4 Mt CO_2 less than the first Italian NAP, but it is still 7 Mt CO_2 short of the Kyoto objectives. During the second period, banking from one period to the other will be allowed, and the NAP have been extended to a further number of installations and to aviation for intra- and extra-EU-bound flights by 2011 and 2012. Eight Member States (Lithuania, Malta, Poland, Hungary, the Czech Republic, Slovakia, Estonia and Latvia) are

[20] To make this document easier to read we will refer to CO_2 emissions, generally encompassing all the GHG.

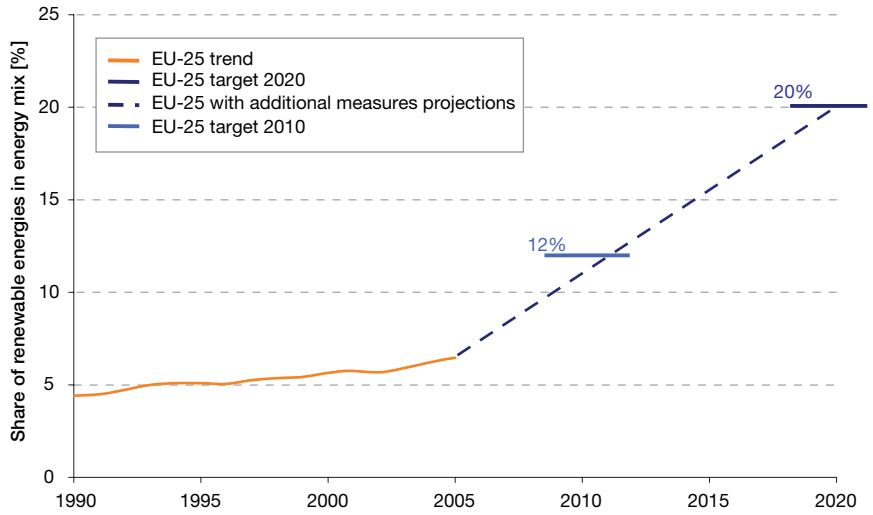
C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0091-8_6,

Table 5.1 2020 EU climate change targets

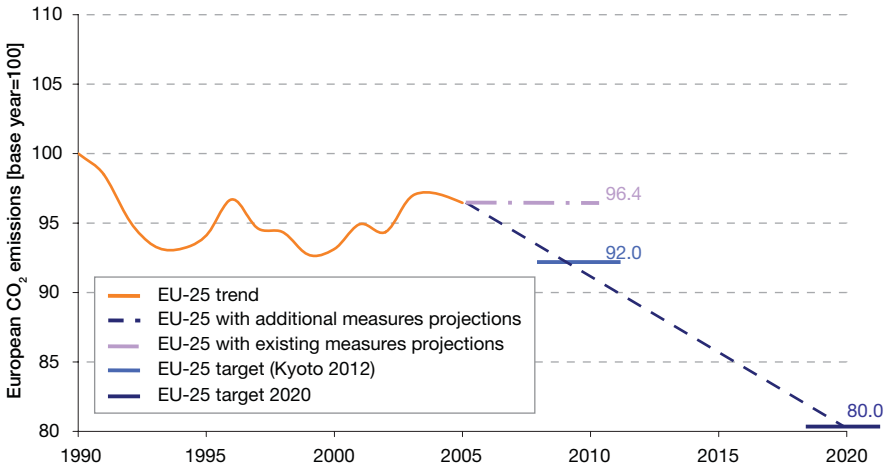
Final energy consumption
(+20% energy efficiency)



Renewable energies
(+20% in the energy mix)



CO_2 emissions
(-20% CO_2 emissions)



Source: Eurostat, European Commission, UNFCCC – Capgemini EEMO9

challenging the EU's ETS and are threatening the Commission with legal action, following its decision to slash the amount of carbon allowances allocated to companies. They argue that the strict limits imposed by the EU are too harsh and will hurt their economies at a time when they are "catching-up" with the rest of the EU.

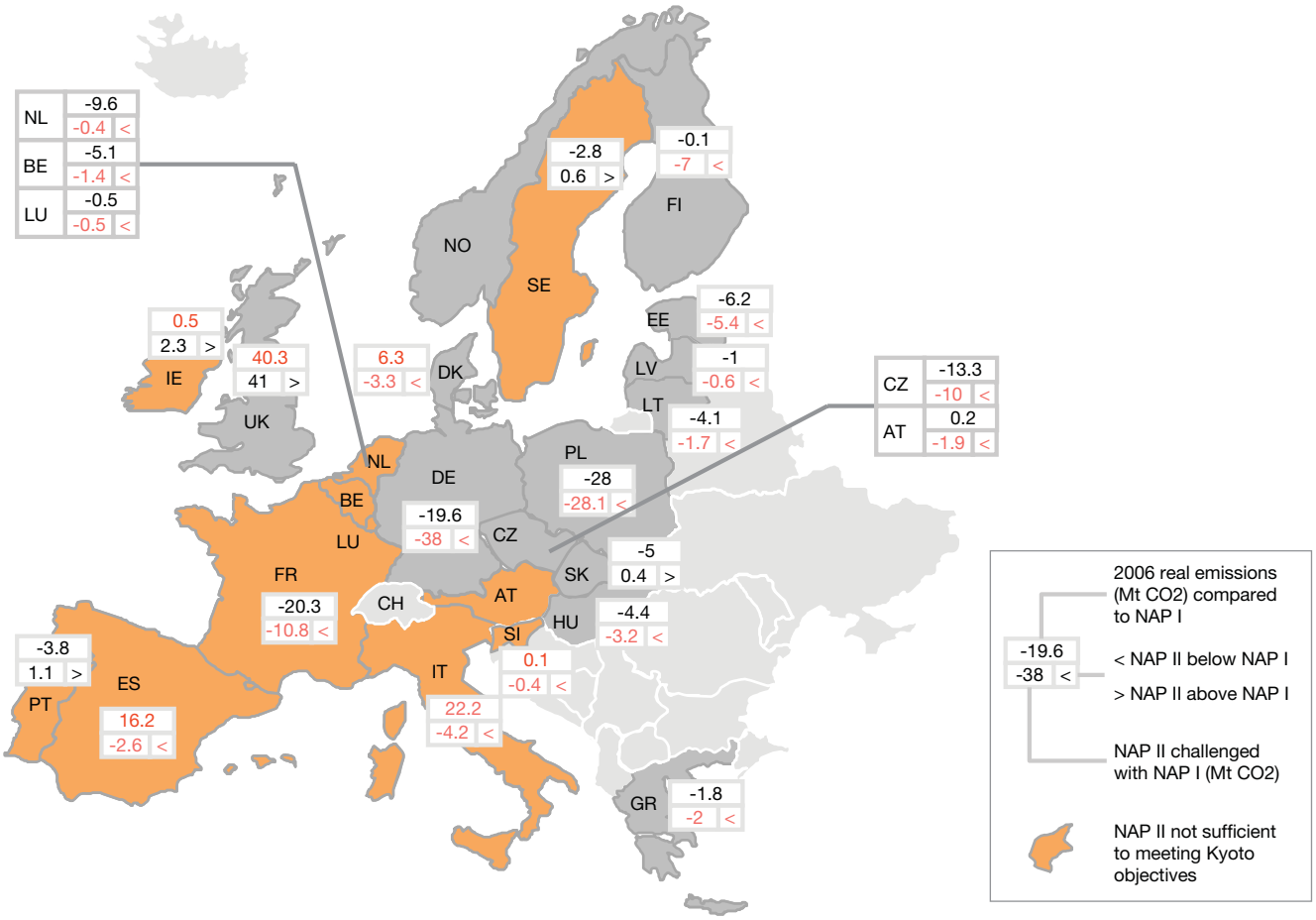
Clean development mechanisms (CDM): a very active global market

The Clean Development Mechanism enables companies to buy "cheap external project credits" by investing in projects whose objectives are to reduce GHG emissions in developing countries. For example, Finland put in place several CDM pilot projects to reduce GHG emissions in China by supporting the use of renewable energies. This project will help Finland to obtain emission reductions. This program enables countries to have a wider range of tools to meet Kyoto objectives. However, the countries could invest a large amount of money in CDM projects to purchase emission reductions and could make fewer efforts regarding the restrictive measures of CO_2 emissions. This possibility is the reason why the EU Commission has limited these programs to a specific percentage of emissions for each Member State. The CDM market increased by 31% up to 450 Mt CO_2 exchanged in 2006, with half of the available credits worldwide being bought by Japan in 2005 and by the UK in 2006. According to the IETA, investments in CDM activities jumped from €5 billion worldwide in 2005 to €20 billion in 2006.

Green Businesses – Despite a strong growth, Renewable Energies represent only a small share of generation capacity

Renewable energy is an integral part of the EU's commitment to meet the Kyoto objectives to reduce GHG emissions, and several objectives are

Table 5.2 Countries real emissions, compliance to ETS and Kyoto (2006)



Source: EEA, UNFCCC, Caisse des Dépôts – Capgemini EEMO9

set. The share of renewable energy in primary energy consumption has to reach 12% by 2010 and 20% by 2020. In addition, the share of electricity produced from renewable sources has to reach 21% by 2010.

Today, these objectives appear distant: the share of renewables in primary energy consumption rose from 6.2% in 2004 to 6.4% in 2005, and the share of renewable electricity is stable between 2004 and 2005 at 13.6%.

Evolution of power generated through wind, solar and biomass has a small but politically important part in the objectives. However, as the installed capacity of wind increases, it introduces specific grid and peak load management challenges. Furthermore, there is the challenge of decentralised production of renewable energy, especially private initiatives in the household and industrial sectors.

Increasing build out of wind power

Wind-generated power has a leading part in the objectives for low CO_2-emitting electricity generation. Several political initiatives are boosting the rapid development and many major investment plans have been initiated. The EU installed wind power capacity increased from 41 GW in 2005 to 48 GW (20% increase) at the end of 2006 (see Table 5.3 on page 82).

In Germany, the government has made the decision to increase the subsidies for wind power and to develop offshore wind parks in the North Sea and Baltic. The overall objective is to increase the subsidies (feed-in tariffs) for renewable energies by 30-40% until 2020.

In Greece, the objective for 2010 is to achieve a level of 20% of electricity produced coming from renewable energies. To reach this target, a project managed by Iberdrola plans to build 1,600 MW of capacity on the Aegan islands. But this project faces protests from environmentalists and inhabitants who claim it spoils the beauty of the islands. In addition, costly submarine cables must be installed to connect with the mainland grid.

Despite the positive progress of wind technology, there are some objections to their development. This leads to the so-called "Not In My Back Yard" (NIMBY) complaints that windmills spoil the landscape. In part, the NIMBY view is supported by the fact that the early versions of windmills were prone to make noise.

New power capacities and Carbon Capture Technology

Electricity consumption continues to increase on a steady pace (EU-25: +1.8% per year since 2005). This means there is a need for continued power generation capacity build out. Already, coal generation represents more than 600 TWh, which accounts for a large part of the European CO_2 emissions. To reach a carbon-neutral electricity generation by 2050, Carbon Capture and Storage (CCS) must be taken into account even if the technology is still at a development stage.

According to the IEA, today's costs for CCS range between €40-90 per ton of CO_2 captured and stored, depending on the power plant fuel and the technology use, and by 2030, costs could fall to below €25. Using CCS with new power plants would hence increase electricity production costs by €0.02-0.03/kWh.

The EU Commission stated in 2007 that by 2015, 12 large-scale experimental projects should be launched for coal and gas-fired power plants, and by 2020, all new coal-fired plants should include CCS technology. Existing plants would be 'retrofitted' subsequently. Additionally, on a national level, the UK government has plans to subsidise some CCS projects. This is a response from the market since around €1.5 billion in government subsidies has been requested by the industry to complete the experiments.

Regarding ongoing projects, oil and gas companies focus on sequestration projects, while Utilities launch capture projects and "clean" coal-fired power plants. Capgemini has identified a long list of significant development projects, of which some examples are described below:

- Vattenfall should have finished building a 30 MW (€40 million) lignite plant based on oxyfuel combustion technology for carbon capture by mid-2008. This pilot should give way to a 300 MW demonstration unit;
- Naturkraft in Norway wants to build a 450 MW gas power plant with chemical adsorption capture of CO_2 by 2009;
- In the UK, Progressive Energy expects to commission an 800 MW clean coal gasification power plant (€1.5 billion) by 2010, with a 5 Mt CO_2 per year CCS;
- E.ON UK plans to commission a 450 MW clean coal-fired power station that would be carbon capture ready by 2012 in Killingholme;
- RWE seeks to launch in Germany "the world's first large scale power station with integrated coal gasification" by 2014, with CO_2 separation and storage (450 MW, €1 billion);
- Total is investing €50 million in the construction of a pilot CO_2 capture at Lacq in southwest France, with an annual CO_2 capacity of 75,000 tons.

Wind generation causes challenges for grid management. As the energy produced by wind mills is not permanent (they cannot be used with winds less than 10 km/h), other flexible production facilities (based on diesel and coal) have to be built in some countries in order to compensate and balance the grid. For example, in France the nuclear plants have a reaction time too long to adapt to the variations of wind power, and hence CO_2-emitting power sources are being built to compensate the gaps in wind generation.

The progress of rapid expansion of wind parks is further hampered by constraints in the supply of the technology. There is a worldwide shortage of wind turbines due to an increasing demand from China and the US. Five companies have 75% of the global market share, and they sold equipment to produce 8,900 MW in 2005.

Biomass and biofuels

Biomass usage for electricity generation steadily increases (+23%, up to 34 TWh) in Europe but also in CDM projects. Elsewhere, the increase in biomass for primary and thermal uses, as well as in district heating is rather stable at +6%, up to 644 TWh.

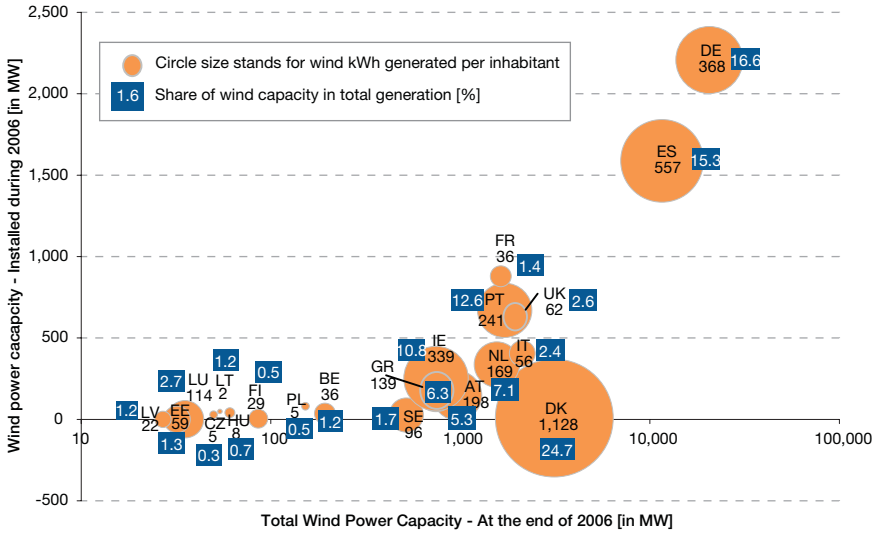
An EU Biomass Action Plan has been developed. The objective is to double the share of biomass in primary energy up to 8% by 2010. Each Member State is required to present a National Biomass Action Plan, and Germany, the UK and the Netherlands are preparing the EU document. The benefits expected are the reduction of dependency on fossil fuels, reduction of the GHG emissions and the creation of jobs in the agriculture and the forestry sectors.

Solar panels

The capacity of solar energy by photovoltaic panels is limited due to the current shortage of silicon. The installed capacity of solar panels in the EU increased between 2005 and 2006 by 36% which represents a total capacity in 2006 of 1,245 MWh.

Germany is the leader with 85.8% of the EU installed capacity, and Spain is attempting to follow this development. Germany is developing "organic photovoltaic panels" constituted by transparent cells which can be placed on windows or devices to be self-sufficient in energy as well as cheaper to manufacture. An important problem is the environmental impact of the silicon and chemical components of the cells, which are not able to be recycled.

Table 5.3 Wind capacity (2006)



Source: EurObserv'ER – Capgemini EEMO9

Energy Efficiency (White certificates) is a clear but very challenging route to rapid change in energy consumption patterns

Increased consumption persists despite political and public awareness of the need to save energy

In 2005, the EU Commission drew up a "Green Paper" on energy efficiency with recommendations to save 20% in energy consumption by 2020 compared to 2020 projections. The main sectors concerned by these measures are housing and transport. Actions are introduced over a six-year period and deal with the change of customer behaviour, tax incentives and development policy.

Key issues in the UK

In its May 2007 White Paper, the UK Government has acknowledged the challenges facing their country in **providing a secure supply of electricity whilst managing reductions in CO_2 emissions.** These challenges come from a number of factors, notably:

- The bulk of UK coal-fired and nuclear generation plants will close in the near future, contributing to **a need for 30 to 35 GW of new capacity over the next 20 years** (>60% of this by 2020);
- The significance of gas as a UK generation fuel gives **concerns for security of supply**, given the depletion of North Sea gas fields, and given that Russia has shown that it is prepared to use its gas assets for political means;
- With **large UK coal reserves** and an open international market for coal, coal-fired generation looks attractive for security of supply but results in higher levels of CO_2 emissions than other forms of generation.

Government response to this has been to investigate the Business Case for **"Smart Metering" as a way to reduce energy consumption** and for a diverse mix of generation fuels as a way to minimise the risks to security of supply. Specific elements of this response are:

An expectation that within 10 years all domestic energy customers will have smart meters, with suppliers rolling out those meters as they become cost-effective;

- Encouraging the building of LNG terminals to give the UK more options in the procurement of gas. This will reduce the political threat to security from supply that arises from over-reliance on Russian gas;
- Subsidising the building of coal-fired Carbon Capture and Storage (CCS) scheme plants. Any subsidy will be released following a competition between competing CCS schemes – with that competition to be launched in November 2007;
- Actively considering the building of new nuclear plants. The UK issued a consultation paper on nuclear generation policy in May 2007, and it is widely expected that the policy will change to accommodate the building and operation of nuclear power stations by private companies. Despite this move, it is viewed that new-build nuclear is unlikely to come on-stream ahead of 2020 – given likely delays in gaining design approval (even for designs approved elsewhere in Europe) and navigating public enquiries;
- Continuing to provide incentives for the build of renewable generation by committing to continue the current Renewables Obligation on retailers of electricity. Whilst a good move for potential investors, the extended scheme remains uncertain regarding the extent to which different renewable technologies will be able to meet the obligation;
- Encouraging small-scale generation located close to demand (distributed generation).

Energy consumption in the residential sector (~11% of total energy consumption) continued to increase in 2007 despite the efforts made to improve energy efficiency. General economic growth is one reason, explained by the increase in house sizes and increase in single family housing, with high energy-consuming lifestyles to match. For example, there has been an increasing use of the 'stand-by' feature (which represents a loss of 94 billion kWh in 2000 in EU-15) and of new technologies such as plasma screen TVs (which consume 30 times more than older TV technology). A directive on energy end-use efficiency and an Energy Efficiency Action Plan have been taken by the EC.

Smart meters represent one practical (technical) solution to manage energy consumption through better customer information and Time-Of-Use pricing. The awareness is thought to be a trigger to change habits regarding energy use.

The market-based approach is seen as an easy implementation of efficiency measures

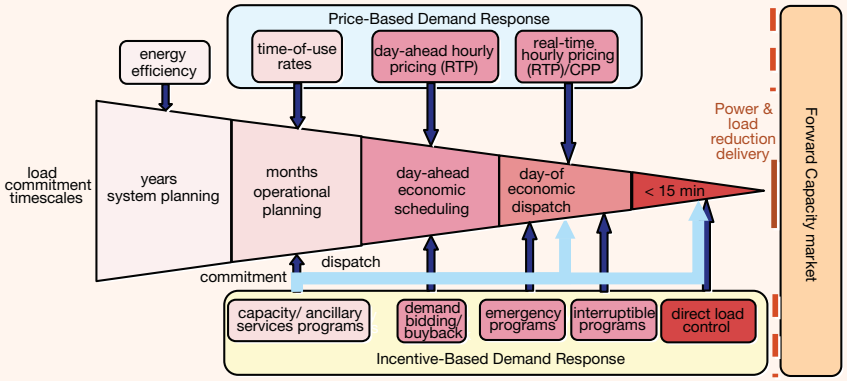
Several energy efficiency projects were put in place in Europe during 2006. These projects could reveal the potential of Europe to implement a Tradable White Certificate (TWC) system between European countries. The projects serve to estimate the quantity and price of certificates

available in European countries. EuroWhiteCert is the European project which is at the foundation of the development of tradable white certificates. It studies the opportunity to integrate this system with other trading schemes such as EU ETS. Examples of hands-on applications include the energy efficiency improvement of street lighting in Bulgaria, which represents an energy audit, and the installation of adapted lighting fixtures. A similar project has been started in Austria where the use of new technology is implemented to save energy in public lighting.

During the first quarter of 2007, the UK's white certificates system achieved its three-year objective (130 TWh of energy savings) one year in advance. This objective had been doubled compared to the first period, and it may be doubled again for the next period (EEC3, 2009-2011). The UK government has proposed to extend the EEC scope to include, in addition to energy efficiency measures, micro-generation and other measures for reducing the consumption of supplied energy. It proposes to introduce new approaches for innovation and flexibility and to maintain a focus on low-income consumers.

In Italy, the white certificates system also achieved good results, with 185% of the first-year objective being achieved. Energy Service Companies (ESCOs) accounted for the largest part of issued certificates.

Demand Side Management in Europe



Source: C. Goldman, Lawrence Berkerley National Laboratory – Capgemini EEMO9

DMS can be decomposed into two theoretical categories: price-based demand response and incentive-based demand response. In most European countries, incentive-based demand response has historically been a part of the I&C contracts. Deregulation often led to the loss of most of the interruptible capacities.

On the residential market, the application of DMS is still at a very early stage in Europe, with some of the best examples being incentive-based demand response in the Nordics, the Netherlands, Ireland and France (Tempo tariff scheme).

Initiatives for a price-based demand response for the residential market are the main driver behind all Smart Metering initiatives in the US, Canada and Australia. This should develop in a similar manner in Europe. Under these schemes, customers are expected to change their consumption according to price signals (mostly Time-Of-Use), which in theory reflect the real costs.

Direct load control (DLC) seems to be very promising as it allows the system operator to directly control a customer's load. In the US, 234 DLC programs for the residential mass market are under operation, directly and remotely controlling more than five million devices (e.g. pool pumps, AC equipment, heating, etc.) In Europe, only a few pilots of price-based demand response for the residential market have been launched in the last few years. More recently, retailers in several markets (France, the Netherlands, etc.) announced the introduction of a "powerbox" (smart meter combined with control devices) to offer DLC.

Strategy and Finance*

- Sharp growth turnover;
- Pending decisions concerning unbundling are set to prompt radical changes in the sector structure;
- Margins are to be maintained above 20%;
- Investment spending is set to resume;
- The utilities sector: hefty financial rerating;
- Financial operations: as in 2005, faultless support;
- 2006-2007, the first signs of change?

As in previous years, the main companies in the European energy market (electricity and gas) have been analysed this year from a strategic and financial perspective. Several changes have been made to the panel this year. As of 2007, Scottish Power has been integrated into the Spanish group Iberdrola. The panel also now includes three Belgian companies (Fluxys, Elia and Distrigaz), six Dutch companies (GasTerra, Essent, Nuon, Eneco, Gasunie, TenneT – none of which are listed) and one Danish company (Dong). Thus, the panel now comprises 32 companies. The analysis period is 2006, but key evolutions that took place in 2007 are also considered.

Sharp growth in 2006 sales

Total sales at the 32 companies in the panel (see Table 6.1 on the following page) represent €464 billion, or around 90% of total utilities sales in Europe. The top five players represent 49% of total sales, which confirm the increased high degree of sector concentration. In sales terms, the top five players are E.ON, EDF, Suez, RWE and Enel. It is worth noting that two heavyweights, Suez and RWE, are also present in environmental services. Overall growth in 2006 sales remained steady at 13%, which was well ahead of the 7% growth posted in the previous year. The pace of growth was extremely strong at the gas companies (Gaz de France, Centrica, Gas Natural and Distrigaz) at more than 20% a year. There were some instances of wide variation from these trends. For instance, sales at Iberdrola went down by 7%, primarily due to accounting changes and a slight fall in domestic business. Also, the highest growth stemmed from the UK group Drax Power, exclusively positioned in electricity production and on wholesale markets. It posted a 49% increase in sales, primarily on the back of the bullish wholesale electricity market in 2006. These companies serve 486 million customers in Europe.

Decisions on unbundling are set to prompt radical changes in the sector structure.

Certain countries such as the UK, Belgium and Spain have already imposed the legal separation of these businesses and specialised companies have been created in gas and electricity transport. A number of these companies are even listed on the stock market (see Table 6.2 on page 87).

Whatever the outcome of this "unbundling battle", major groups that are currently vertically integrated benefit from a source of recurring revenues and earnings, as well as from a stable valuation base and long-term visibility prompted by these regulated assets. For the natural monopolies (transport and distribution of electricity and gas), that are regulated, tariffs are set over a three/five-year period by the

* This Chapter was written in collaboration with Société Générale Equity Research

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0091-8_7,

Table 6.1 Companies on the Panel and Their Main Characteristics (2006)

				Sales 2006 (€m)	Sales 2005 (€m)	Change	Customers (in million)	% historical mkt in sales	Installed capacity (in MW)	% in nuclear
Electric and Gas Utilities										
E.ON	Germany	Electricity & Gas	Integrated company	64,091	56,399	14%	55.7	61%	53,542	21%
EDF	France	Electricity & Gas	Integrated company	58,932	51,051	15%	37.8	63%	128,200	52%
Suez	France	Electricity & Gas	Integrated company	44,289	41,489	7%	200.0	85%	59,099	12%
RWE	Germany	Electricity & Gas	Integrated company	44,256	41,819	6%	30.0	55%	43,434	15%
Enel	Italy	Electricity & Gas	Integrated company	38,513	35,865	7%	34.0	95%	50,776	5%
Gaz de France	France	Electricity & Gas	Integrated company	28,562	22,730	26%	13.9	92%	2,650	0%
Centrica	UK	Electricity & Gas	Wholesale gas	24,552	20,072	22%	17.0	90%	3,420	0%
Endesa	Spain	Electricity & Gas	Integrated company	19,637	17,508	12%	22.7	55%	47,113	7%
Gasterra	Netherlands	Electricity & Gas	Wholesale gas	18,400	14,737	25%	-	100%	0	0%
Scottish & Southern Energy	UK	Electricity & Gas	Integrated company	17,712	15,142	17%	7.8	10%	10,017	0%
Vattenfall	Sweden	Electricity & Gas	Integrated company	15,715	13,697	15%	5.7	32%	32,448	23%
EnBW	Germany	Electricity & Gas	Integrated company	13,219	11,849	12%	5.0	100%	14,811	33%
Iberdrola	Spain	Electricity & Gas	Integrated company	11,426	12,235	-7%	23.8	20%	30,384	13%
Gas Natural	Spain	Electricity & Gas	Wholesale gas	10,348	8,527	21%	10.6	60%	3,169	0%
Essent	Netherlands	Electricity & Gas	Integrated company	6,442	5,890	9%	2.2	33%	3600	6%
Union Fenosa	Spain	Electricity & Gas	Integrated company	6,057	5,985	1%	8.7	15%	10,289	10%
Nuon	Netherlands	Electricity & Gas	Integrated company	5,598	5,017	12%	2.1	31%	4000	0%
DONG	Denmark	Electricity & Gas	Integrated Company	4,819	2,642	82%	1.1	35%	5,700	0%
Distrigaz	Belgium	Electricity & Gas	Wholesale gas	4,626	3,803	22%	-	92%	0	0%
Fortum	Finland	Electricity & Gas	Integrated company	4,491	3,877	16%	1.5	31%	10,768	56%
British Energy	UK	Electricity & Gas	Wholesale electricity	4,430	3,830	16%	-	100%	11,910	84%
Eneco	Netherlands	Electricity & Gas	Integrated company	4,288	3,692	16%	2.1	31%	200	0%
Verbund	Austria	Electricity & Gas	Integrated company	2,878	2,507	15%	-	55%	7,237	0%
MVV Energie AG	Germany	Electricity & Gas	Integrated company	2,276	1,958	16%	1.3	100%	2,545	0%
EVN	Austria	Electricity & Gas	Integrated company	2,072	1,610	29%	3.3	10%	1,693	0%
Drax Power	UK	Electricity & Gas	Wholesale electricity	2,070	1,386	49%	-	100%	4,000	0%
Total/Average				**459,699**	**405,315**	**13%**	**486.3**	**60%**	**541,005**	**13%**
Networks										
Gasunie	Netherlands	Gas	TSO	1,251	1,277	-2%	-	100%	-	0%
Elia	Belgium	Electricity	TSO	696	694	0%	-	100%	-	0%
Fluxys	Belgium	Gas	TSO	436	423	3%	-	100%	-	0%
Enagas	Spain	Gas	TSO	733	653	12%	-	100%	-	0%
Red Electrica	Spain	Electricity	TSO	954	866	10%	-	100%	-	0%
Tennet	Netherlands	Electricity	TSO	417	418	0%	-	100%	-	0%
Total/Average				**4,487**	**4,331**	**4%**	**-**	**100%**	**-**	**0%**

Source: SG Equity Research – Capgemini EEMO9

Table 6.2 Main Electricity and Gas TSOs (2006)

	Electricity	Gas	Listed
Germany	Vertically integrated		No
	EnBW, Transportnetze, E.ON Netz, RWE Transportnetze Strom, VE Transmission	BEB, E.ON Gastransport, RWE Transportnetzgas, VNG, Wingas	
UK	National Grid Transco		Yes
Austria	Vertically integrated		No
	Verbund APG, TIWAG-Netz, VKW-Netz	OMV gas	
Belgium	Elia	Fluxys	Yes
Spain	Red Electrica de Esp.	Enagas	Yes
Finland	Fingrid	Gasum Oy	No
France	Vertically integrated		No
	RTE	GRTgaz	
Italy	Terna	Snam Rete Gas	Yes
Sweden	Svenska Kraftnät	—	No
The Netherlands	Tennet	Gasunie	No

Source: SG Equity Research – Capgemini EEMO9

regulator during regulatory reviews. The very widely adopted principal for fixing these tariffs is the price cap method, which sets a maximum level for return on investment (see further details in the Infrastructures Chapter).

Margins maintained at more than 20%

Earnings Before Interest, Tax, Depreciation and Amortisation (EBITDA) at these companies represented some €93 billion in 2006, equating to a margin of 20% on average (see Table 6.3 on page 89). Growth in 2006 EBITDA was identical to that in sales, namely 13%, and this reflected the efficiency of cost control plans despite higher coal and CO_2 prices and staff costs, which rose 1.8% in 2006 compared with 2005.

The top five players only account for 49% of the total EBITDA of the stocks mentioned (percentage identical to that in sales). The five companies are not the same as for sales, as Suez has been replaced on the panel by Spanish group Endesa. Endesa is soon due to be merged into Italian group Enel. Since the Franco-Belgian group is only partially exposed to the energy market, its other businesses prove less profitable. This explains why the group's management aims to consolidate the positions taken in the energy market (Gaz de France) in order to appear among the major players, as judged by sales.

In the gas segment, companies showed narrowing margins due to the difficulties encountered in

The profitable and complex way to continuous improvement

In the current competitive and regulatory context, Utilities are confronted with the challenge of increasing their performance levels. Instead of resorting to massive capital expenditures or to classic performance improvement projects, some of them have adopted continuous improvement programs to address their performance issues. This is the case of RWE in Germany, with the Immer Besser program, and Enel in Italy, with the Prometeo program.

Continuous improvement programs (CIP) target the progressive improvement of business performance through a company-diffused system of improvement initiatives. The ownership of the program by the company employees and the change in the daily working paradigm are significant elements that set CIPs apart from any other performance improvement project. The resulting cultural change is probably the main non-monetary benefit that is derived from a CIP.

Typical areas of improvement in the utility sector comprise Overall Equipment Effectiveness (OEE), operation and maintenance costs, energy imbalances, safety management, procurement savings, and others.

Solutions do not require major investments since they address performance issues of simple day-to-day activities. They often relate to the information flow and the collaboration among employees. For example, a way to avoid energy imbalance is to keep the plant staff aligned with the planning staff and to require them to work together when scheduling.

Sometime solutions address asset efficiency and hence produce better ways to manage technical processes. For example, a way for reducing plant downtime is to define detailed maintenance programs and teams and to implement incentive and penalty systems for the third party suppliers involved.

Results vary considerably, depending on the seniority of programs or the degree of company involvement. For example, a power generation company has reduced energy imbalance from 4% to 3%. Another has reduced annual downtime from 42 to 38 days. Overall, profitability improvements of some percentage points are not unusual to a CIP in this industrial sector.

Probably the most relevant success factor to a CIP is the correct mindset of people. Some of the staff may not be used to the key principles of continuous improvement and may be reluctant to embrace them in the first instance. But if implemented well, CIPs can bring about precisely the change in the working paradigm that represents the most relevant benefit of the programs.

passing on higher commodities prices to consumer selling prices. In France for example, the government has deliberately limited the rise of prices, whereas in the UK market, fierce competition has tended to limit the repercussions of price hikes (at the risk of rapidly being sanctioned via market share losses).

Finally, the opening of European markets to competition (gas and electricity) on July 1, 2007 could take a toll on margins and reduce earnings in the coming years.

In networks, margins improved slightly largely due to the increase in volumes transported (Enagas in Spain). EBITDA at these regulated companies may seem high, but it is aimed at financing investments in the maintenance and renewal of gas and electricity networks.

Confirmation of resumed investment spending

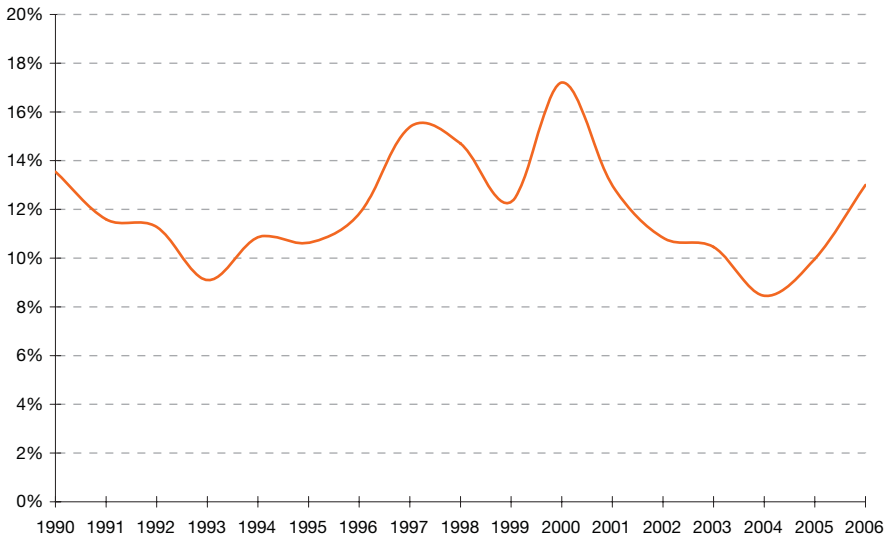
Investments rose by 7.5% in 2006 to reach a total amount of almost €35 billion for the companies that are affected by this publication. In 2006, this spending accounted for 13.5% of sales (see Table 6.4 on page 90), which was ahead of the historical average level of 12%. The rise in investment spending is confirmed over the past three years, after the bottom was reached in 2004. Analysis of investment type shows a predominant share in generation at 48% of total investments, with 24% in distribution and just 15% in transport. The remainder corresponds to other various types of spending (IT systems, bolstering call centres etc.).

Table 6.3 Profitability evolution (2006)

	Rank 2006	Rank 2005	Sales 2006 (in €m)	EBITDA 2006 (in €m)	EBITDA margin 2006	EBITDA margin 2005	
Electric and gas utilities							
EDF	1	1	58,932	13,930	23.6%	25.5%	-
E.ON	2	2	64,091	11,789	18.4%	18.2%	=
Enel	3	4	38,513	8,019	20.8%	21.6%	-
RWE	4	3	44,256	7,861	17.8%	19.9%	-
Endesa	5	5	19,637	7,136	36.3%	34.4%	+
Suez	6	6	44,289	6,199	14.0%	13.5%	+
Gaz de France	7	8	28,562	5,149	18.0%	18.6%	-
Vattenfall	8	7	15,715	4,652	28.1%	33.4%	-
Iberdrola	9	9	11,426	3,890	34.0%	27.6%	+
Centrica	10	10	24,552	2,994	12.2%	15.7%	-
EnBW	11	11	13,219	2,308	17.5%	19.1%	-
Scottish & Southern Energy	12	16	17,712	2,063	11.6%	8.2%	+
Union Fenosa	13	14	6,057	1,907	31.5%	24.8%	+
Fortum	14	12	4,491	1,884	42.0%	45.2%	-
Gas Natural	15	13	10,348	1,855	17.9%	17.5%	=
British Energy	16	26	4,430	1,803	40.7%	0.6%	+
Essent	17	15	6,442	1,501	23.3%	22.7%	=
Verbund	18	18	2,878	984	34.2%	28.2%	+
Nuon	19	17	5,598	849	15.2%	20.2%	-
Drax Power	20	22	2,070	803	38.8%	25.7%	+
DONG	21	20	4,819	791	16.4%	22.2%	-
Eneco	22	19	4,288	769	17.9%	19.6%	-
Distrigaz	23	21	4,626	424	9.2%	10.2%	-
EVN	24	23	2,072	398	19.2%	20.8%	-
MVV Energie AG	25	24	2,276	377	16.6%	14.3%	+
Gasterra	26	25	18,400	49	0.3%	0.3%	=
Total/Average			**459,699**	**90,382**	**22.1%**	**20.3%**	
Networks							
Red Electrica	1bis	1bis	954	652	68.3%	68.3%	=
Gasunie	2bis	2bis	1,251	574	45.9%	50.9%	-
Enagas	3bis	3bis	733	564	76.9%	73.3%	+
Elia	4bis	4bis	696	293	42.0%	42.6%	-
Fluxys	5bis	5bis	436	172	39.4%	39.5%	=
Tennet	7bis	7bis	417	91	21.8%	16.0%	+
Total/Average			**4,487**	**2,345**	**49.1%**	**48.4%**	

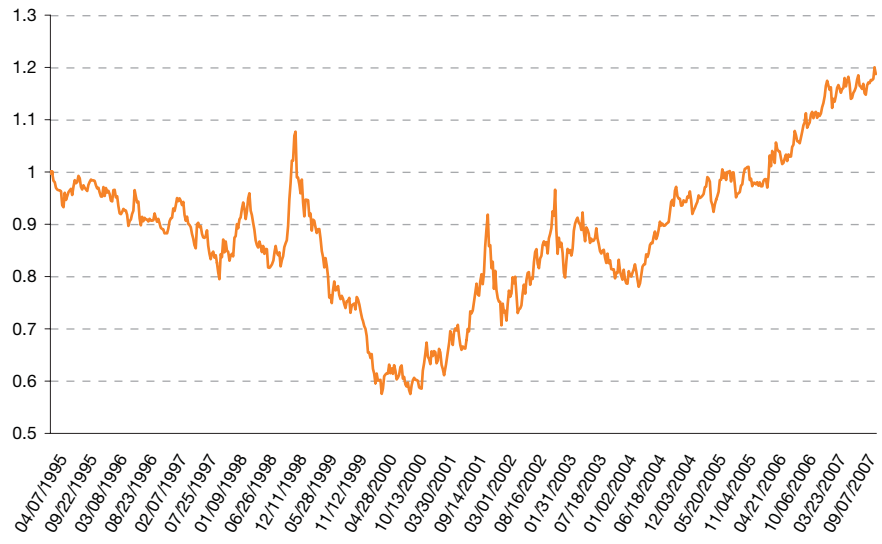
Source: SG Equity Research – Capgemini EEMO9

Table 6.4 Total investment as a % of sales (1990-2006)



Source: SG Equity Research – Capgemini EEMO9

Table 6.5 Utilities sector compared with the European equity index (base 1 on Jan 1st, 1995)



Source: SG Equity Research – Capgemini EEMO9

Within the investments in generation, announcements have been made for the construction of more than 190GW of power capacity due to come online in or around 2010 (announced period 2007-2015). In value terms, these investments represent some €155 billion (announced). More than 40% are thought to be for gas plants and 10% for wind mills. The remaining constructions concern coal-fired plants, as well as small hydroelectric plants, solar plants and the prototype for the EPR nuclear plant in France (2% of total investments programmed).

The Utilities sector: hefty financial rerating

Throughout 2006, the sector enjoyed a hefty rerating, gaining 18% relative to the DJ EuroStoxx50 (see Table 6.5) after rising 25% already in 2005. It is worth noting that this trend started in 2003 and has continued regularly ever since.

The factors underpinning this rerating were:

- The surge in oil prices, a massive underlying factor for gas prices and hence, for electricity prices;
- A continued robust demand;
- Financial possibilities of players and forthcoming M&A deals.

The average sector P/E (price/earnings) was 18.2x in 2006 for an EV (market capitalisation + debt – cash)/sales multiple of 2.18x and a net yield (dividend per share/share price) of 3.9% (as such it would take 25 years for paid dividends to match the current share price). In comparison, the net yield on the DJ Stoxx 600 stood at 2.48%, and it would take 40 years to recuperate an investment.

Table 6.6 Sector Performance (2006)

September 1st, 2007	Market cap (in €m)	Stock price (in€)	Performance since January 1st (%)	12 months relative perf. (%)	2006 PE (X)	Market cap/Sales (X)	2006 net yield (%)
Electric and Gas Utilities							
EDF	135,059	74.1	34.3	49.2	32.0	2.29	1.56
E.ON	85,220	123.2	19.8	11.0	17.3	1.33	2.72
Suez	54,124	41.7	6.4	11.8	22.8	1.22	2.87
Iberdrola	50,811	40.7	22.9	25.5	20.1	4.45	2.56
Enel	46,859	7.58	-3.0	-2.8	15.4	1.22	6.51
RWE	43,202	82.5	-1.2	3.1	18.8	0.98	4.24
Endesa	42,234	39.9	11.3	31.3	14.2	2.15	4.11
Gaz de France	36,206	36.8	5.6	13.2	15.8	1.27	2.99
Fortum	21,645	24.3	12.6	3.3	20.0	4.82	5.19
Centrica	21,160	3.86	8.7	16.8	19.9	0.86	2.98
Scottish & Southern Energy	18,330	14.2	-8.8	5.3	14.7	1.03	2.81
Gas Natural	17,499	39.1	30.3	33.7	28.0	1.69	2.51
EnBW	12,595	50.4	-0.3		10.6	0.95	1.95
Union Fenosa	12,221	40.1	7.0	5.1	19.2	2.02	2.59
Verbund	11,228	36.4	-9.9	-17.2	26.2	3.90	2.06
British Energy	7,256	4.64	-14.6	-38.2	5.7	1.10	2.93
Drax Power	3,498	6.65	-18.5	-34.0	5.3	1.69	23.66
EVN	3,532	86.4	-2.9	-10.1	15.9	1.71	1.62
Distrigaz	3,094	4,401	1.7	2.8	10.0	0.67	3.20
MVV Energie AG	1,578	28.3	8.9	12.4	23.3	0.69	2.83
Total/Average	**627,351**				**17.8**	**1.80**	**4.09**
Networks							
Red Electrica	4,467	33.0	1.6	-2.1	22.3	4.68	2.72
Enagas	3,987	16.7	-5.2	-16.1	17.7	5.44	2.83
Fluxys	1,773	2,523	-8.3	-4.8	22.8	4.06	1.72
Elia	1,409	29.3	-2.0	-11.5	18.5	2.02	4.37
Total/Average	**11,635**				**20.3**	**4.05**	**2.91**

Source: SG Equity Research – Capgemini EEMO9

Table 6.7 War chests 2006 vs. 2005

in €bn	3X EBITDA 2006	3X EBITDA 2005		Warchest 2006	Warchest 2005
Electric and Gas Utilities					
E.ON	35.5	33.5	+	51.4	51.4
RWE	28.3	13.9	+	18.8	2.1
EDF	26.9	20.4	+	9.9	1.6
Enel	12.4	10.9	=	8.4	9.0
Gaz de France	12.0	9.7	+	13.2	11.8
Suez	8.2	2.6	+	12.2	4.9
Vattenfall	7.9	6.3	+	6.3	2.8
British Energy	6.5	4.1	+	3.2	2.1
Centrica	5.9	6.5	-	-0.6	1.2
Essent	4.5	4.0	+	2.4	2.0
EnBW	3.7	2.9	=	1.2	0.6
Nuon	3.5	3.3	=	5.1	3.8
Drax Power	3.1	0.7	+	0.5	-0.4
Scottish & Southern Energy	2.9	0.8	=	0.5	0.5
Endesa	2.7	1.6	=	-1.2	-1.2
Gas Natural	2.6	0.9	+	3.0	2.0
Gasunie	2.6	2.3	+	5.4	5.2
DONG	2.4	1.8	+	3.3	3.6
Distrigaz	2.1	2.0	=	1.9	0.3
Tennet	1.6	1.4	=	1.4	1.2
Verbund	1.3	0.3	+	0.7	0.2
Fortum	1.3	2.1	-	3.8	4.3
Eneco	0.8	1.2	=	1.3	1.5
Fluxys	0.8	0.9	=	1.5	1.5
Union Fenosa	0.7	-3.0	+	0.6	-2.4
Gasterra	0.3	0.3	=	0.4	0.4
EVN	0.2	0.2	=	1.7	1.5
MVV Energie AG	-0.2	-0.3	=	-0.5	-0.3
Enagas	-0.2	-0.1	=	-0.6	-0.4
Red Electrica	-0.9	-1.0	=	-1.8	-1.9
Elia	-1.2	-1.2	=	-0.8	-0.8
Iberdrola	-3.2	-2.8	=	-4.3	-4.3
Total	**174.9**	**126.1**		**148.3**	**103.6**

Source: SG Equity Research – Capgemini EEMO9

The sector P/E was higher in 2005 at 21.45x. The change in the ratio does not reflect deterioration in the sector, but instead indicates a higher increase in profits than in the change in valuation levels (see Table 6.6 on previous page).

Volatility of share prices of the listed companies increased with the introduction of the market for trading CO_2 certificates (see Electricity Wholesale Markets Chapter for changes in the price of CO_2 certificates).

Implicitly, the certificate price is included in the kWh cost price and the wholesale market price (marginal cost of production). A high certificate price benefits companies exposed to wholesale market prices and which produce their electricity on the basis of non-fossil fuels. EDF, Verbund, Fortum and Vattenfall are companies that are extremely well positioned to benefit from this quota-based market. In contrast, the companies most exposed to production based on fossil fuels (RWE, Enel, EnBW) benefited less from this market given their high need for emission certificates in order to offset actual CO_2 emissions.

The total market capitalisation of the stocks mentioned above totalled €639 billion, compared with just €500 billion at the end of 2005. Changes in the capitalisation of these companies have been very different.

Among the positive changes, for instance, the groups whose market capitalisation rose the most were EDF, which gained €52 billion over one year (valuing the hefty potential in earnings terms harboured in the abandonment of the regulated tariff system), followed by Iberdrola, but which created shares in exchange for the Scottish Power shares owned by shareholders of the UK group during

Table 6.8 Major European Utilities (2006)

	Market Cap	War chest	Sales	EBE
1	EDF	E.ON	E.ON	EDF
2	E.ON	RWE	EDF	E.ON
3	Iberdrola	EDF	Suez	Enel
4	Suez	Enel	RWE	RWE
5	Enel	Suez	Enel	Endesa

Source: SG Equity Research – Capgemini EEMO9

the friendly takeover/share swap offer (+€24 billion). Finally, Endesa's market capitalisation rose by €13 billion, following the bid by Enel, while E.ON's climbed €12 billion following the roll-out of its near €60 billion investment plan.

Among the negative performances, British Energy, for instance, saw its market capitalisation drop by 40%, despite a 40% increase in EBITDA. The sudden halt to the group's reactors put it in a fairly delicate position given the decline in sales combined with steady structural costs.

Financial operations: as during 2005, faultless support

Total financial operations announced in 2006 were estimated at €137 billion compared with €85 billion in 2005. For the current year, the movements in the sector are set to prompt around €100 billion in financial operations, barring a major deal. Adjusted for the aborted bid by E.ON for Endesa, the estimated amounts are fairly similar in both 2006 and 2007.

The political sphere is highly present in the Utilities sector. In France, Spain, Germany and Italy, politicians are highly involved or become so under pressure from lobbyists, in order to defend national interests, in increasingly strong opposition with the positions defended by the EC.

It nevertheless seems inevitable that major actions will continue, if only due to the extent of the war chests existing in the sector. The overall amount works out to €150 billion based on equity (debt equivalent to 1x equity). However, banks also take into account EBITDA levels to verify the solvency ratios of their corporate clients. A multiple of 3x EBITDA is fairly generally accepted. On this basis, the war chest totals €175 billion, up 40% compared with. 2005 (see Table 6.7).

The companies that made the most progress in this field between 2005 and 2006 were RWE, EDF, Suez and to a lesser extent Vattenfall.

2006-2007, the first signs of change?

As indicated in our previous report, 2006 was indeed a year of announcements concerning takeover bids in the utilities sector. M&A activity is a major source of support and is now set to enter a concrete phase of materialisation. Indeed, little impact has actually been felt since the various announcements:

- Gas Natural failed before E.ON also failed in its bid for Endesa, which was won in the end by Enel, which was also obliged to take on the support of a local partner;
- The Gaz de France/Suez deal was completed under the auspices of the French President who requested that Suez refocus on the energy sector;
- RWE has yet to complete the disposal of its water division, which could finally materialise towards the end of 2007.

The end to this year and early 2008 could see a number of factors in play that are likely to change the sector landscape. The major changes have not yet fully materialised.

According to opinions often held by European managers, Europe is set to see the emergence of a number of very large energy players in the coming years. While EDF, E.ON, Enel and GDF Suez would seem to be likely candidates for the top four slots, the fifth ranked position seems somewhat more delicate. Two groups are competing for this spot, namely RWE and Iberdrola (see Table 6.8).

Secondly, a number of companies may be faced with the need to dispose of their electricity and gas transport network assets. This development would change the perception of investors relative to certain companies: the presumed solidity of EDF, E.ON and RWE is also based on the fact that they own their gas and electricity networks and not only on their generation.

Glossary

AMI
Advanced Meter Infrastructure. AMI designates the set of advanced metering components and technical architecture that allow AMM operation

AMM
Automated Meter Management. AMM is AMR plus complementary services. It involved automation of manual technical services in connection with metering (activation, change of authorised power, etc.). The device allows two-way communication between the meter and the operator of the metering solution

AMR
Automated Meter Reading. AMR is automated telemetering. The device allows the uploading of information from the meter to the operator of the metering solution

Base load
The minimum amount of electricity delivered or required over a given period, at a constant rate

Bilateral contracts
A contractual system between a buyer and a seller agreed directly without using a third party (exchanges, etc.)

Black Certificates
Exchangeable or tradable CO2 allowances or quotas within the European Trading Scheme and Kyoto protocol (see EUA)

CCGT
Combined Cycle Gas Turbine (see Combined cycle power plant)

CDM
Clean Development Mechanisms, a mechanism under the Kyoto Protocol through which developed countries may finance greenhouse-gas emission reduction or removal projects in developing countries, and receive credits for doing so which they may apply towards meeting mandatory limits on their own emissions

CEER
Council of the European Energy Regulators

Churn
See Switching

CHP
Combined Heat and Power (see Cogeneration)

Clean Coal
New technologies and processes allowing to generate electricity from coal while lowering CO2 emissions

Clearing
Administrative and financial settlement of a contract

Clearing house
Organisation that clears contracts on behalf of contractual parties. Generally a service offered by exchanges or banks

Cogeneration
System of simultaneous generation of electricity and heat. The output from cogeneration plants is substantially better than it would be if they produced only electricity

Combined cycle power plant
Thermal power plant, usually running on gas-fired turbines, where electricity is generated at two consecutive levels: firstly by gas combustion in the turbines, and secondly by using energy from the product of the gas combustion process in boilers, which supply heat to steam turbogenerators. This process provides high levels of thermal output (55 to 60%, compared with just 33 to 35% for conventional thermal power plants)

Decentralised generation
High efficiency production of electricity near the point of use, irrespective of size and technology, capacity and energy sources

Demand-side management
The planning, implementation, and monitoring of utility activities designed to encourage consumers to modify patterns of electricity usage, including the timing and level of electricity demand

DG Competition
European Union's Directorate General for Competition which role is to enforce the competition rules of the Community Treaties, in order to ensure that competition in the EU market is not distorted and that markets operate as efficiently as possible, thereby contributing to the welfare of consumers and to the competitiveness of the European economy

DG TREN
European Union's Directorate General for Transport & Energy that develops EU policies in the energy and transport sectors

Distributed generation
Any technology that provides electricity closer to an end-user's site, like a home or business. It may involve a small on-site generating plant or fuel cell technology

DSO
Distribution System Operator

EBIT
Earnings Before Interest and Taxes

EBITDA
Earnings Before Interest, Taxes, Depreciation and Amortization

ECJ
European Court of Justice, one of the key European institutions that ensures compliance with the law in the interpretation and application of the founding Treaties

EFET
European Federation of Energy Traders

Eligible customer
Electricity or gas consumer authorised for the purposes of supplying one of his sites or retailing energy, to turn to one or more electricity or gas suppliers of his choice

EP
European Parliament, the assembly of the representatives of the Union citizens

ERGEG
European Regulators Group for Electricity and Gas

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0091-8,

ETS
Emissions Trading Scheme. The European regulatory frame for greenhouse gases management. It is focused on the main power and industrial sites of each country. It encompasses only CO2 emissions for the first phase

ETSO
European Transmission System Operators

EUA
European Union Allowances. The official name for the CO2 allowance units distributed through the NAP (within the ETS)

Eurelectric
Professional association which represents the common interests of the Electricity industry at pan-European level

European Commission
European Commission, a governing body of the European Union that oversees the organization's treaties, recommends actions under the treaties, and issues independent decisions on EU matters

European Council
A body formed when the heads of state or government of European Union member states meet. Held at least twice a year, these meetings determine the major guidelines for the EU's future development

EWEA
European Wind Energy Association
Forwards
A forward is a commodity bought and sold for delivery at some specific time in the future. It is differentiated from futures by the fact that a forward contract is customized, non exchange traded, and a non-regulated hedging mechanism

Futures
Tradable contract for supply at a given moment in the future, whereby the clearing is done via a clearing house

GIE
Gas Infrastructure Europe. GIE is the association representing gas transmission companies, storage system operators and LNG terminal operators in Europe

Green Certificates
A Guarantee of Origin certificate associated with renewable targets fixed by national governments. Green Certificates are often tradable

Greenhouse effect
The warming of the atmosphere caused by the build up of 'greenhouse' gases, which allow sunlight to heat the earth while absorbing the infrared radiation returning to space, preventing the heat from escaping. Excessive human emissions including carbon dioxide, methane and other gases contribute to climate change

GSOO
Europe's Gas Storage Operators' Organisation

Guarantee of Origin
A certificate stating a volume of electricity that was generated from renewable sources. In this way the quality of the electricity is decoupled from the actual physical volume. It can be used within feed in tariffs or Green Certificate systems

Hub (gas)
Physical or virtual entry/exit points for natural Gas

Hub (retail)
Inter Company Data Exchange platform primarily enabling Suppliers and Distribution companies to exchange client related data and making supplier's switching more reliable

Installed capacity
The installed capacity represents the maximum potential net generating capacity of electric utility companies and auto-producers in the countries concerned

JI
Joint Implementation, a mechanism under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment to invest in emission reducing projects in another industrialised country as an alternative to emission reductions in their own countries

Kyoto Protocol
The United Nations regulatory frame for greenhouse gases management. It encompasses 6 greenhouse gases: CO2, CH4, N2O, HFC, PFC, SF6

Market coupling/Market splitting
Market coupling links together separate markets in a region, whereas market splitting divides a regional market into prices zones. Market coupling minimises prices differences and makes them converging wherever transmission capacity is sufficient. Cross-border market coupling also drives better use of interconnection capacity

Metering
Measurement of the various characteristics of electricity or gas in order to determine the amount of energy produced or consumed

NAP
National Allocation Plan. List of selected industrial and power installations with their specific emissions allowance for the first phase. NAPs must be submitted to the European Commission approval (within the ETS).

Nordel
Organisation for Nordic power co-operation.

NTC
Net Transfer Capacity. NTC is the expected maximal electrical generation power that can be transported through the tie lines of two systems without any bottlenecks appearing in any system, taking some uncertainties of the future network state into account

Off-peak
Off-peak energy is the electric energy supplied during periods of relatively low system demands as specified by the supplier

On-peak
On-peak energy is electric energy supplied during periods of relatively high system demand as specified by the supplier

OTC
Over The Counter, bilateral markets

PE
Price / Earning ratio

Peak load
The highest electrical level of demand within a particular period of time

Peak shaving
Reduction of peak demand for natural gas or electricity

Real margin at peak load
This value is obtained by deducting the system services reserve, outages, overhauls and non usable capacity from the installed capacity and is compared with the peak load. Yearly values are an average of monthly real margin at peak load

RES
Renewable Energy Sources. Energy (electricity or heat) produced using wind, sun, wood, biomass, hydro and geothermal. Their exploitation generates little or no waste or pollutant emissions

Spot contract
Short-term contract, generally a day ahead

Spread (spark, dark…)
Price difference between two commodities (gas/electricity; coal/electricity…)

SSO
Storage System Operator

Switching
Free (by choice) movement of a customer from one supplier to another

Take-or-pay contract
Contract whereby the agreed consumption has to be paid for, irrespective of whether the consumption has actually taken place

Theoretical capacity margin
This value is obtained by deducting the peak load from the installed capacity

TPA
Third Party Access
Recognised right of each user (eligible customer, distributor, and producer) to access transmission or distribution systems in exchange for payment of access rights

TPSA
Third Party Storage Access

TSO
Transmission System Operator (High Voltage distribution network)

UCTE
Union for the Co-ordination of Transmission of Electricity. European organisation of network coordination gathering network operators

UGS
Underground Gas Storage

Unbundling
Separation of roles according to the value chain segment (generation, transmission, distribution, retail) required by European Directives for enabling fair competition rules

VPP
Virtual Power Plant

White Certificate
A certificate stating a volume of engaged energy savings (electricity, gas, fuel, …) at end-users' site, like a home or a business. They are tradable or not

Country Abbreviations

Electricity and Gas Related Operators and Bodies

Countries	Abbreviation	Energy Ministries	Regulators	Electricity Transmission System Operators	Gas Transmission System Operators
Europe			CEER, ERGEG	ETSO, UCTE, CENTREL, NORDEL	GIE
Austria	AT	BMWA	E-control	TIWAG-Netz, VERBUND APG, VKW-Netz	OMV Gas
Belgium	BE	FPS-E-Se-E	CREG	ELIA	Fluxys
Czech Republic	CZ	MPO	ERU	CEPS	RWE Transgas
Denmark	DK	ENS	DERA	Energinet.dk	Energinet.dk
Estonia	EE	MKM	EMI	OÜ Põhivõrk	Eesti Gaas
Finland	FI	KTM	EMV	FINGRID	Gasum
France	FR	MEFI	CRE	RTE	GRTgaz, TIGF
Germany	DE	BMWA	BNetzA	EnBW, Transportnetze, E.ON Netz, RWE Tr. Netz Strom, VE Transmission	BEB, E.ON Gastransport, RWE Transportnetzgas, VNG, Wingas
Greece	GR	MoD	RAE	HTSO	DEPA
Hungary	HU	GKM	MEH	MAVIR ZRt.	MOL
Ireland	IE	DCMNR	CER	EirGrid	Bord Gais
Italy	IT	MAP	AEEG	TERNA	Snam Rete Gas
Latvia	LV	EM	SPRK	Augstsprieguma tïkls	Latvijas Gaze
Lithuania	LT	UKMIN	NCC	Lietuvos Energija	Lietuvos Dujos
Luxemburg	LU	ILR	ILR	CEGEDEL Net	SOTEG
Netherlands	NL	MINEZ	DTe	TenneT	Gas transport services, Zebra
Norway	NO	OED	NVE	STATNETT	Gassco
Poland	PL	MG	URE	PSE-Operator SA	PGNiG, Gaz system
Portugal	PT	ME-DGE	ERSE	REN	REN
Slovakia	SK	MHSR	URSO	SEPS	Nafta, SPP
Slovenia	SI	MOP	AGEN	ELES	Geoplin
Spain	ES	MINECO	CNE	REE	Enagas, BBG
Sweden	SE	MSD	STEM	SVENSKA KRAFTNÄT	Nova Naturgas
Switzerland	CH	BFE		swissgrid	swissgas
United Kingdom	UK	DTI	OFGEM, OFREG	National Grid, SONI, SSE, Transmission	National Grid, Interconnector

European Energy Markets Observatory team

Research Leader

Philippe David
+33 1 49 00 22 11
philippe.david@capgemini.com

Core Team

Philippe Coquet
+33 1 49 00 22 09
philippe.coquet@capgemini.com

Oskar Almen
+46 8 5368 4249
oskar.almen@capgemini.com

Sopha Ang
+33 1 49 00 22 30
sopha.ang@capgemini.com

Towards a European Energy Policy

Céline Alléaume
+33 1 49 00 54 67
celine.alleaume@capgemini.com

Mr Christophe Barthélémy
+33 1 42 68 60 00
christophe.barthelemy@twobirds.com

Competitive Power

Generation
Emmanuel Austruy
+33 1 49 00 22 36
emmanuel.austruy@capgemini.com

Ana-Maria Popa
+33 1 49 67 98 52
ana-maria.popa@capgemini.com

Electricity Wholesale Markets
Jérôme Natali
+33 1 49 67 99 93
Jerome.natali@capgemini.com

Electricity Retail Markets
Philippe Coquet
+33 1 49 00 22 09
philippe.coquet@capgemini.com

Dr Philip Lewis
+358 40 529 5852
philip.lewis@vaasaett.com

Competitive Gas

Upstream Gas
Florent Andrillon
+33 1 49 67 20 73
florent.andrillon@capgemini.com

LNG
Christian Sgard
+33 1 49 67 42 44
christian.sgard@capgemini.com

Gas Wholesale Markets
Aurélie Lemercier
+33 1 49 67 40 93
aurelie.lemercier@capgemini.com

Yves Rousseau
+33 1 49 00 22 24
yves.rousseau@capgemini.com

Gas Retail Markets
Antonio Michelon
+39 2 4149 31
antonio.michelon@capgemini.com

Infrastructures and Regulated Activities

Electricity Transmission & Distribution
Andreas Schreiber
+33 1 49 67 42 89
andreas.schreiber@capgemini.com

Fabrice Catala
+33 1 49 67 42 21
fabrice.catala@capgemini.com

Gas Transmission
Alain Bourguignon
+33 1 49 00 22 04
alain.bourguignon@capgemini.co

Gas Storage
Christian Sgard
+33 1 49 67 42 44
christian.sgard@capgemini.com

Sustainable Development

Alain Chardon
+33 1 49 00 22 29
alain.chardon@capgemini.com

Oskar Almen
+46 8 5368 4249
oskar.almen@capgemini.com

Strategy and Finance

Yves Rousseau
+33 1 49 00 22 24
yves.rousseau@capgemini.com

John Honoré
+33 1 42 13 51 55
john.honore@sgcib.com

Adam Dickens
+33 1 42 13 51 23
adam.dickens@sgcib.com

Thierry Bros
+33 1 58 98 11 70
thierry.bros@sgcib.com

Regional Focus

Belgium
Pierre Lorquet
+32 2 708 13 95
pierre.lorquet@capgemini.com

Denmark
Bente Dahlgaard Mortensen
+45 7011 2200
bente-dahlgaard.mortensen@capgemini.com

Eastern Europe
Michael Trampert
+43 1 21163 8700
michael.trampert@capgemini.com

France
Philippe David
+33 1 49 00 22 11
philippe.david@capgemini.com

Germany/Switzerland
Andreas Hense
+49 (0) 221 9126 440
andreas.hense@capgemini.com

Michael Roesner
+49 (0) 30 88703 313
michael.roesner@capgemini.com

Italy
Antonio Michelon
+39 2 4149 31
antonio.michelon@capgemini.com

Netherlands
Mario van Essen
+31 30 689 54 60
mario.van.essen@capgemini.com

Nordic Countries
Anders Ryrfeldt
+46 8 5368 6244
anders.ryrfeldt@capgemini.com

Slovakia
Roman Vransky
+421 2 444 55 678
roman.vransky@capgemini.com

UK
Alistair Green
+44 870 366 0047
alistair.green@capgemini.com

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Bird & Bird is an international and rapidly growing law firm, which specifically unites its expertise in most areas of business and tax law with its operational knowledge and experience in a number of major economic sectors.

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VaasaETT's three areas of expertise are: Customer Value Development, Market Efficiency Development and Executive Search and Development, although the think-tank network has a broader expertise encompassing all energy market issues.

VaasaETT's state of the art expertise concerning the efficient management of the psychology and behaviour of customers in response to changes in their environment (e.g. prices, services, regulation, liberalization etc.) is arguably unrivalled around the world.

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