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Energy, Utilities and Chemicals | the way we see it

European Energy Markets Observatory

2007 and Winter 2007/2008 Data Set
Tenth Edition, November 2008

In collaboration with

SOCIETE GENERALE
Cross Asset Research

C/M/S/ Bureau Francis Lefebvre

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A strategic overview of the European energy markets

Editorial by Colette Lewiner

Before writing this editorial, I read again the one I wrote last year. It is a valuable exercise. I found that many predictions we made at that time turned out to be right. Most of the trends that we identified then continued to materialize in the past year, but we were too optimistic on security of supply improvement and competitiveness growth in the retail market.

We believe that the most striking event in the last 12 months was the oil price volatility

In our previous report we concluded: *"This overall situation is not rosy, and it is clear that unless the worldwide economy will experience a downturn, the (energy) supply and demand balance will be more and more difficult to reach with conventional oil."* and later *"oil spikes are not precluded in the following months."* This analysis has been proved right. Crude oil price increased from $70 per barrel in July 2007 to nearly $150 in July 2008. It stayed in the range of $90 to $150 during the first half of 2008.

These high oil prices reflect all the tensions that have been detailed in our previous reports between high growth in global demand, especially from emerging countries, and fears that oil output growth would not match the speed of rising demand. The bottleneck in output growth comes from various technical and economic problems:

- Inflation in raw material costs and a lack of skilled personnel have pushed up the cost of production from existing fields,
- Mature fields are depleting,
- Costs of new exploration projects are escalating,
- Newly discovered large fields[1] are very difficult to exploit and it will take years before oil can be produced from them.

Based on these underlying difficulties, "surface" problems became more acute. Nationalistic attitudes from producing countries grew stronger, therefore raising geopolitical tensions. The US dollar continued to depreciate against all major currencies thereby decreasing the actual purchasing power each barrel of oil can exchange. There have been active speculations. All these factors pushed oil prices up.

Recently, oil prices started to drop. First of all, demand pressure is reducing a little bit. In June 2008, to curb oil demand, some emerging countries decided to lower their domestic subsidies on gasoline. Prices increased 29% in Indonesia, 16% in China and 10% in India. People in the US and other western countries also started to react to high energy prices and fears of economic recession, by lowering their consumption. For example, oil consumption in the US decreased by 3.8% in the first half of 2008. These developments led the International Energy Agency (IEA) to revise downward its world demand growth forecast[2].

On the supply side, Saudi Arabia increased its production by 500,000 barrels per day in May and June 2008. In addition, the US dollar strengthened, and speculation decreased. Oil prices dropped to less than $70 in October, below its January 2008 level.

Central banks welcomed this oil price drop as it decreases inflation risks. In the context of the worsening credit crunch, central banks have to take quick decisions with two different objectives. On one side, they need to inject massive liquidities into the markets in order to avoid a total collapse of the financial system. On the other hand they have to control inflation to avoid longer term damage to general economies. Lower oil prices can provide maneuvering space for bolder decisions.

However, this round of oil price drop could be short-lived. IEA lowered its forecast on non-OPEC production growth for 2008 to 270 thousand barrels per day, which is less than a third of the one million barrels per day growth predicted at the start of the year. In its September conference, OPEC decided to decrease its overall oil production by 520,000 b/d. In its October monthly report, OPEC foresees in 2007, a 890,000 b/d oil consumption decrease in OECD countries. For 2009, the global demand should grow by 760,000 b/d (compared to 600,000 b/d in 2008). Hence, the oil price level for the next few months is difficult to predict.

What conclusions can we draw for the future?

- Long term investments in exploration projects require stability in oil prices. Price volatility increases investment risks,
- A big drop in oil price will render expensive projects no longer financially viable. According to one of the IOCs[3], $90 per barrel is about the threshold below which production from the extra heavy oil sand in Canada would not give a satisfactory Return on Investment. At the same time, this heavy oil is needed for the future, and investment needs to start now,
- Even if economies of Western countries slow down or even go into recession, pushing down their oil consumption, it will not be enough to offset the steady consumption growth in the developing world,
- Technical difficulties to replace current oil production with new discoveries will remain,
- Unfortunately, there is little hope that geopolitical tensions between some oil and gas producing countries, notably

[1] Last year's biggest discovery was the Tupi field in Rio bay in Brazil, containing an estimate of 5 to 8 billion barrels of oil. It is located more than 250 km off the coast. The oil is trapped around 7,000 meters below sea level; above it are 2,000 meters of water and up to 2,000 meters of hot high pressure volatile salt, among other factors.

[2] IEA forecast: In 2008 demand should reach 86.8 mb/d. It is 0.8% or 0.7 mb/d increase versus 2007, but it is 0.1 mb/d lower than previously estimated. Forecast for 2009 is 87.6 mb/d, which is 1.0% growth year on year and 0.14mb/d lower than previously estimated.

[3] IOC : International Oil Company (or Major)

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1_1,

Russia and Iran, and the western import countries, will ease soon.

With a stronger US dollar and a foreseeable economic recession, oil prices should decrease on the short term. On the longer term, the tensions described above will remain pushing again the prices up.

Limited progress on the crucial question: "How to respond to European energy demand, while decreasing CO_2 emissions?"

Huge investments in energy infrastructures are needed

In order to comply with the forecasted energy demand growth and replace aging infrastructure, huge investments are needed. At 2% global economic growth rate, the world would need about $22 trillion cumulative investments in energy (oil, gas and electricity) infrastructure between 2006 and 2030[4], half of them in developing countries.

In the previous EEMO editions, we estimated that €1 trillion investment is needed in electricity and gas infrastructures in Europe. Our report cautioned that without a vigorous construction program, security of energy supply would be threatened. Since then, raw material cost growth and difficulties in finding qualified human resources have pushed investment amounts up and delayed commissioning dates of some much needed plants, electrical grids and pipelines. We will come back on these points later on.

Building these infrastructures on time is already a huge challenge. It is made more complex because of the need to curb CO_2 emissions in order to fight climate change. So, it is not just any investment, but of the right kind, that is required.

Are we on the right track?

On CO_2 emission limitation, the European Union (EU) is a front runner with the Emission Trading System (ETS—a "cap and trade" system for CO_2 emissions) implemented since 2006. Many measures are taken based on this system. In March 2007, the Member States agreed to a 20% reduction in CO_2 emissions by 2020, together with a 20% reduction in energy consumption and a 20% share of renewable energies in the total consumption, all compared with the actual levels of 2005.

In early 2008, the ETS was reformed. It now allows full emission certificates banking from Phase II (2008-2012) to Phase III (2013-2020). This change is in line with what we suggested in our previous EEMO edition. Also, during the first half of 2008, all EU Member States agreed with the European Commission (EC) on more restrictive Phase II (2008-2012) National Allocation Plans on CO_2 emissions. It totals 2,082 million tons of CO_2 per year compared to 2,298 Mt/year during Phase I (2005 to 2007). The combined effect of all these measures have pushed the CO_2 Emission Certificate price up from €0.05/ton at the end of 2007 to around €23/ton in September 2008. However, we need to point out that even as the CO_2 price soared, no real switches from coal to gas generation have been observed so far.

These measures are on the right track, but will probably not be sufficient to meet the 2020 objectives.

This is why the EC has proposed a "Climate Package" in January 2008. It is viewed as a priority for the French European Presidency in the second half of 2008. This "Climate Package" includes plans during phase III (2013-2020) that will extend coverage from CO_2 to other greenhouse effect gases. It will impose very significant reductions of overall emissions, including from sectors that are currently out of the ETS scope. Also it will impose a big boost in renewable energy contribution to the total energy supply.

This package will also further reform ETS, by imposing the following changes:

- A phased reduction of the ETS cap on emission rights, from 2,082 Mt/y during Phase II (2008 to 2012) to 1,720 Mt/y by the end of Phase III (2013-2020),
- Starting from 2013, 100% of the Emission Rights will be auctioned to the power sector which currently gets most of them free of charge. This change will result in tens of billions of euros in extra cost for the Utilities which will certainly be passed onto the electricity prices. The auction revenue will be only partially reallocated on Climate Change related R&D projects,
- Over phase III, there will be much tighter control on emission certificates acquired through the Clean Development Mechanism[5] or Joint Implementation mechanism[6].

These "Climate Package" proposals have raised concerns and protests from certain industrial sectors as well as politicians. Oppositions argue that industries would outsource their production from Europe to countries with less stringent conditions, therefore resulting in job losses ("carbon leakage"). Moreover, certain Eastern European countries, notably Poland, are fighting against the plan on the basis that these measures would compromise their economic development.

No matter how, time will be very short to have this "Climate Package" adopted before the next European Parliament elections in June 2009.

[4] International Energy Agency Nov 2007 report

[5] The **Clean Development Mechanism (CDM)** is an arrangement under the Kyoto protocol allowing industrialized countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries, thus acquiring emission rights.

[6] The **Joint Implementation (JI)** mechanism is an arrangement under the Kyoto protocol allowing Annex 1 countries to earn emission reduction units from an emission-reduction project in another Annex 1 country.

Windfall profits: In many regional power markets in the European Union, the full price of ETS certificates is already reflected in the wholesale power market prices, despite the fact that many of these certificates are actually allocated to electricity generators free of charge. This is a clear windfall profit for those Utilities that are able to get free CO_2 certificates and charge them at full price to their customers.

The calculation of windfall profit depends on valuation methods and underlying assumptions, such as the percentage of free certificate allocation, ETS price, etc. For example, we estimate that the two biggest German Utilities, E.ON and RWE, had earned additional € 5 billion profits from free certificates in 2007 alone. Such huge profits have triggered taxation proposals from politicians in many European countries, notably in the UK and Belgium. These politicians are also alerted by increasing retail electricity prices, as household budgets are coming under more and more pressure from rising food, gasoline and home heating bills with an economic slowdown or even recession looming.

In Germany, the large electricity users' association VIK complained that German consumers paid € 5 billion in 2005 for an actual nine million tons of CO_2 emission reduction in Germany, or about € 550 per ton of CO_2 emission reduced, "the equivalent of € 10/MWh [extra price] that companies are taking from customers without any service in return." The debate is far from closed. It will only come to an end if the "Climate Package" is adopted, in which clearly rules will be set on CO_2 emission rights auctioning during phase III (2013-2020).

Where are we standing now?

Despite the existing and future regulations, it is disappointing to see that Europe is not on the right trajectory to meet its 2020 objectives. For example, CO_2 emissions in the EU were stable in 2007, whereas the objective was a decrease!

It is worse on a worldwide perspective[7]: CO_2 emission is expected to increase by 46% by 2030.

This worrying trend has to be reverted. Strong actions are needed to:

- Boost energy conservation,
- Develop sustained renewable energies,
- Make carbon capture and storage a reality,
- Sustain the current nuclear energy revival.

Energy conservation: In 2007, the EU countries had a mild average temperature in the summer and winter. However, electricity consumption continued to grow by 0.9% year-on-year, although this pace is slower than the previous years. Gas consumption decreased slightly by 1.6%. All forms of primary energy consumption in EU-25 decreased by a small 0.15%.

These figures show that for the first time in many years, the trend is reverting or at least energy demand growth has stopped. Barring the scenario of an abnormally cold winter, this tendency is likely to be confirmed in 2008 because energy demand decreases as a response to high prices and economic slowdown. Though we are on the right direction here, the target of 20% demand reduction is very ambitious.

We are in a critical situation but there are some reasons for hope:

- In the last year, some interesting actions were launched by politicians in various European countries. For example:
  - In August 2007, **German** ministers agreed on a 30-point program to reduce 35% of CO_2 emissions by 2020, compared to the 1990 level. Energy demand and CO_2 reduction should come from cars, industries, public buildings and private homes,
  - In **France**, a major debate took place around the "Grenelle de l'environnement" in October 2007. After this gathering, different measures are being adopted by the French Parliament to build insulation regulation and have incentives that switch towards less CO_2 emitting transportation means,
  - The **Danish** government reached a broad parliamentary agreement in February 2008 to have 20% gross energy consumption reduction by 2011, compared to the 2006 level. The government will provide energy technologies R&D funding of one billion Denmark Kroner (€ 135 million) by 2010,
  - In September 2008, the **UK** Prime Minister revealed a £1 billion (€ 1.26 billion) energy package funded by the "big 6" energy companies operating in the country. It is designed to help low income families make necessary renovations which will bring long term benefits by reducing energy consumption and therefore energy bills. Among the measures, insulation funding is a prominent one.
- Individuals are more and more sensitive to **sustainable development**. People are starting to change their behavior. For example, smaller hybrid cars and electrical cars are becoming increasingly popular,
- The same is true for **company executives** who now rank sustainable development among their top priorities. They should start taking actions[8],
- **Innovative devices** are being developed and marketed to limit energy consumption and thus CO_2 emissions. For example, Light Emitting Diodes consume a fraction of the electricity used by equivalent incandescent lights,

[7] International Energy Agency November 2007 report

[8] http://www.us.capgemini.com/PlattsStudy/

- Some Utilities are launching **Demand Response programs**, incentivizing their customers to reduce their consumption. These programs, enabled by innovative devices such as smart meters, can save significant amounts of energy and CO_2 emissions[9].

However, these positive signs are not enough. Tougher measures should be taken in developed countries in order to conserve energy. Also, more funds need to be allocated to fundamental and applied energy research such as solar energy, CO_2 capture and storage, second generation bio-fuel, fourth generation nuclear plants, etc.

Adapted measures, including energy efficiency improvements, need to be designed for developing countries, keeping in mind that their energy consumption and CO_2 emissions per capita are still very low and they want, rightfully, to reach better standards of living. They should take advantage of new technologies and innovation to limit their CO_2 emission growth.

Fighting climate change is a global challenge. If big CO_2 emitting countries such as the US, Russia, Japan, India and China don't curb their emissions, the EU efforts will be like a drop of water in the ocean, and at the same time jeopardize Europe's economic competitiveness.

Growth in renewable energies: The pace of investment into renewable and sustainable energy is increasing fast. Worldwide, it attracted $112 billion investments[10] in 2007. This is a 41% increase compared to 2006. Wind energy continues to be the industry's favorite, with 20 GW of new capacity installed in 2007. Solar technology continues to grow fast, albeit on a small scale. Estimates suggest a global investment of around $20 billion during 2007.

In Europe, RES (Renewable Energy Sources), particularly wind, contributed to generation capacity increase by adding 8.3 GW in 2007. RES now represents 9% of European generation capacity.

Today, the cost of electricity generated by wind farms is much higher than that of many existing energy sources. In France, it is estimated to be twice as expensive as nuclear energy. Solar electricity has a significant higher cost than wind power. This is why the development of these two new forms of energy is strongly linked to financial incentives. Countries such as Spain, Denmark and Germany, with a large share of RES in their electrical generation capacity, have established long term regulations with incentives, for example, obliging Utilities to buy RES electricity at higher prices. In turn, the Utilities will pass this extra cost to their end customers.

While allocating seed money for innovative equipment is well understandable, subsidizing costly energies on a long term basis is questionable. It is not a sustainable business model because government policies could change. So, even if wind power continues to develop in the next few years, it is not obvious that it will be sustained in the long term. The case for solar energy is different.

Though today solar power is more costly that wind power, it has a much bigger potential for improvement, both in terms of energy efficiency with different photovoltaic cells matrices, and in terms of the manufacturing process and technologies. Both wind and solar energies are not schedulable; therefore pose many problems to grid operators both on grid development and on instantaneous balance of electricity supply and demand. Also, grid operators cannot rely on these "theoretical" installed capacities to provide electricity needed on peak load days. If there is no wind, there will be no electricity output.

Clean Coal technologies' first industrial steps: Carbon capture and storage is a process by which carbon dioxide is separated at power plants, transported and then buried underground. It has long been seen by the energy industry as a means to make coal a climate-friendly fuel.

Many Utility companies have plans to build carbon capture technology enabled coal plants. In September 2008, Vattenfall fired up a 30 megawatts carbon capture plant in eastern Germany. It sees this €70 million project as an important milestone on the road towards widespread use of carbon capture and storage technology. Others, such as E.ON and Enel, have investment plans totaling hundreds of millions of euros for this technology.

However, the experience at British Petroleum has underscored the complexity of these projects. In May, BP abandoned plans for a plant in Australia after it discovered that geological problems made the long term storage of CO_2 unfeasible.

Today, CO_2 capture equipments installed at coal plants significantly decrease production efficiency, thereby roughly doubling electricity generation cost. CO_2 transportation and storage would increase the cost even more. More research work is needed on finding reliable CO_2 storage technologies. It is clear that only very high and sustained CO_2 emission prices could render these projects economically viable. In the meantime, Utility companies have plans to retrofit their coal fired plants which can increase efficiency up to 50%.

Nuclear revival: Having been out in the cold for many years, nuclear is now once again being embraced as an important energy source. There are 439 reactors in operation, 34 under construction and around 320 new nuclear projects planned all over the world. The IAEA[11] expects global nuclear power capacity in 2030 to range from a low-case scenario of 473 GW, 27% higher than today's 372 GW, to a high-case scenario of 748 GW.

There is an appetite for nuclear power in

[9] Capgemini "Demand Response" study, in collaboration with VaasaETT and Enerdata, shows if these programs are implemented actively, they could achieve 25 to 50% of the EU's 2020 energy savings and CO_2 emission reductions targets.

[10] Source: EFI and New Energy finance report

[11] IAEA: International Atomic Energy Agency

"old" nuclear countries as well as in new ones, in developed countries as well as in the developing world, in countries with experienced nuclear authorities and in those were they don't yet exist, and finally, countries with savvy nuclear operators as well as those with non-experienced ones. There are prerequisites for this nuclear energy "renaissance" to sustain and turn into a success.

As with other large scale industrial projects, nuclear plants construction carries multidimensional risks related to technical difficulties, contractual and environmental concerns, regulatory complexity, skilled human resource scarcity and local communities' opposition. All these factors can lead to construction delays and cost overruns that have to be borne by the various stakeholders including the end customers.

In addition, the nuclear industry has some unique and especially stringent requirements to comply with. Capabilities to meet these requirements are paramount prerequisites for the industry to succeed. The most important ones are[12]:

- Nuclear non proliferation control,
- Safety management over a nuclear plant's entire lifetime, from design, construction, operation, radioactive waste treatment to decommissioning,
- Mastering the exceptionally long project lifetime and large investment: Lead construction time and plant operation lifetime combined is well in excess of half a century. €4 to 5 billion are needed for a 1,600 MW plant,
- Long term financial competitiveness based on stable environmental regulatory frameworks and sound business models,
- Smooth industrial ramp up in the face of this sudden and big revival, including revamping the entire supply chain as well as attracting competent human resources,
- Public acceptance is a specially sensitive and difficult point.

In existing nuclear countries as well as in "new" countries, governments, local authorities, financial institutions and mainly the whole value chain of the nuclear industry has to get organized quickly in order to make this nuclear renaissance a long standing success.

Security of supply

We have already pointed out that it is imperative to quickly invest significant amounts on energy infrastructures in Europe. In this respect, it is encouraging to see that since the low point in 2005, Utilities have started to invest again on infrastructures.

However their energy mix choices raise concerns. The majority (58%) of the planned generation plants in Europe will be fossil fuelled, dominantly gas fired, and thus CO_2 emitters. Moreover, investments on RES whose outputs are not schedulable do not contribute much to guarantee peak hour generation capacities.

These unfavorable energy mix choices, combined with long plant construction times, delays in plant commissioning and lower availability of the French nuclear plants due to maintenances, explain why despite increased investments, the overall electricity security of supply actually deteriorated in 2007.

Electricity security of supply deteriorated

Despite the mild weather, the real generating margins in the UCTE[13] perimeter, taking into account non-usable and unavailable generation capacities, dropped from 7.6% in 2006 to 5.3% in 2007. Some worrying signs can be noticed:

- In France the real margin is at -5.7%. In the UK it is down from 7.9% to 2.2% compared with 2006. In Germany it is down from 4.4% to 2.0%,
- Central and Eastern European (CEE) countries have low margins: Hungary (-8.3%), Slovakia (-11.2%), Slovenia (-21.5%) and Latvia (-25.9%). CEE countries struggled with supply shortages due to big plant maintenance in Bulgaria and Slovakia, as well as generation capacity drop.

Some countries kept their real generation margin high, such as Austria (+26.3%), Norway (+11.8%) and Lithuania (+17.1%).

We can notice that although theoretical generation margins increased, the real margins did not follow. This is partly due—as explained earlier—to the increased share of wind power in the installed capacity.

*This new deterioration of electricity security of supply, after improvements seen in 2006, reinforces our message on the need to speed up investments in infrastructures and to choose the **right** energy mix!*

Gas security of supply: Last year's trends continued to materialize

In last year's editorial, we wrote, *"One can easily predict that the EU/Russia battle for gas supply and value chain control is only starting."* This is a hot issue as the share of Russian gas in total European gas supply should reach 50% in 2030, with varying dependency levels from one European country to another. Finland and many Eastern European countries will be more than 80% dependent.

As in the year before, this battle notably continues through the control of transportation and local pipelines:

- Russia successfully signed more partnership commitments to the South Stream pipeline project which was launched in 2006 between Gazprom and Eni (Italy),
- Gazprom recently agreed with Kazakhstan and Turkmenistan to construct a new pipeline along the Black Sea coast.

All these agreements are undermining the European sponsored Nabucco project, which could end up with not having enough gas to transport. In addition:

[12] Point of View « How to sustain the nuclear renaissance », by Colette Lewiner and Alva Qian, Capgemini

[13] UCTE: Union for the Co-ordination of Transmission of Electricity

- Gazprom took joint control of local pipeline companies in Serbia and Belarus,
- Also Gazprom has increased its presence all along the value chain by strengthening its retail operations in many European countries, such as Germany, the UK, Italy and France.

While Gazprom is increasing its control on cross border pipelines, it seems that its grip on the Russian gas industry is weakening. Russian State regulators said that Gazprom would be fined for restricting an independent gas producer from accessing its vast pipeline network. In view of the same, will networks unbundling happen in Russia before Europe?

More worrying is the recent war in Georgia that is compromising the stability in the Caucasus region. Large populations of the Russian minority are living in countries like Georgia, Kazakhstan, Ukraine and Moldavia, and this unstable political situation is threatening gas security of supply because numerous oil and gas pipelines run across this sensitive region.

All these facts analyzed above reinforce our last year's message: *"Europe needs to decrease its dependence on Russian gas supply."*

To have better control over the situation and to improve its security of gas supply, Europe should take the following measures:

- Increase its gas storage capacities: In 2007, gas storage capacity in Europe increased by roughly 7% reaching almost 80 bcm. Over 59 bcm of additional storage capacity can be expected by 2015,
- Develop greater fluidity within the European market to enable more efficient pooling of resources among different countries in the event of supply crisis,
- Diversify supply sources by importing larger quantities of Liquefied Natural Gas (LNG), which currently accounts for only 7% of European gas consumption. It is estimated that LNG could represent 15% to 18% of European gas supply by 2020.

We observed the same movement in the US and in Asia, where LNG demand is also growing to bridge the gap between gas demand and supply. This trend will lead to a tight LNG market in the 2015[14] timeframe.

The LNG market is increasingly dominated by the LNG producers because there are now much less technical or have contractual obstacles to LNG cargo arbitrage between destinations. According to a study on LNG regasification terminals commissioned by the French Regulatory Authorities (CRE), the major challenge for Europe is how to attract LNG supply into terminals located in Europe rather than to those in US or Asia.[15]

Over the period, progress was made towards a common electricity market in Europe

In last year's editorial, we briefly analyzed the then freshly announced EC Third Package and especially the ownership unbundling proposal for electrical grids and gas pipelines. We concluded that *"unbundling alone is not enough (to create a truly liberalized energy market) and other measures would also need to be implemented to achieve that objective."*

In fact, the Third Package was not adopted. On June 17 (for electricity) and July 8, 2008 (for gas), the European Parliament voted on different texts in lieu of the EC's compromise. On October 10, 2008, the Energy Council reached formal agreement on this Package. Now, co-ordinations and reconciliations between the Parliament texts and the Commission text need to take place before the term of the present Parliament that ends Easter 2009.

The political wrangling over ownership unbundling did not prevent the energy market actors (TSOs[16] and Power Exchanges) from entering into agreements enabling progress towards a common market. This is reflected in the increased convergence between wholesale electricity prices in different European markets.

- Consolidation in the power exchange business is accelerating:
  - December 2007, Powernext (France) and EEX (Germany) signed a cooperation deal regarding their spot and futures trading operations,
  - March 2007, OMEL (Spain) and OMIP (Portugal) agreed to implement a single Iberian power market (OMI) by the end of 2007,
  - Belpex, Europe's first project of market coupling started two years ago. In June 2007, a memorandum of understanding was signed to extend the Belpex market coupling to Luxembourg and Germany in 2009.
- Some major new infrastructure were commissioned in 2007/2008:
  - The 580 km 700 MW NorNed subsea power cable linking Norway and the Netherlands went into full operation in May 2008,
  - The 350 MW Estlink HVDC submarine cable between Estonia and Finland is the first interconnection between the Baltic and the Nordic electricity markets,
  - A new line between Romania and Hungary should be completed soon.
- Some other projects have also been agreed upon or proposed in 2008:
  - The long awaited interconnection reinforcement between France and Spain,
  - TenneT (The Netherlands) and National Grid (UK) agreed to build BritNed link interconnector,
  - Italy and Albania decided to build a new interconnector,
  - A new 550 MW connection cable between Finland and Sweden (Fenno skan 2) and a 600 MW power cable between Denmark and Norway (new Skagerrak cable) have been submitted

[14] 2015 corresponds to the commissioning of many planned LNG regasification infrastructures.

[15] http://gttm.cre.fr/

[16] TSO : Transmission System Operator

for government approval,

- In Ireland, the second interconnector to the UK has been approved,
- RTE (France) and National Grid (UK) have launched consultations for the construction of a second interconnection between the two countries.

- Three (E.ON, RWE and Vattenfall) out of the four German network operators are presently discussing to create a unique German transmission electrical grid unbundled from the incumbent Utilities,
- TSOs have significant investment plans: According to a recent UCTE study[17], TSOs plan to invest € 17 billion on their national grids and on interconnections in the next five years.

This demonstrates that even without the Third Package, the players are voluntarily pushing towards a liberalized fluid electricity market and they have plans to invest!

Changes in the Utilities landscape

Market consolidation

Mergers and Acquisitions continued during the period. The long awaited Gaz de France/Suez and Enel/Endesa mergers were finalized. Both cases took almost two years to complete, during which the Utilities had to struggle with governments' nationalistic attitudes, convince their own personnel and bow to EC requests for divestments.

These divested assets were acquired by other Utilities: Eni took Distrigas and Centrica took SPE, both in Belgium. To comply with the EU anti-trust legislation, Enel had to sell its assets in France, Italy and Poland to E.ON.

After this long and difficult gestation, GDF Suez emerged as one of the largest convergent (gas and electricity) players with big ambitions. It has announced a € 30 billion investment plan over the next three years and is actively acquiring electricity and gas assets all over the world.

Most recently, EDF took over British Energy at £12.4 billion. It will give EDF almost all the UK's nuclear power stations and control over most of the best sites for building new nuclear plants, giving it a dominant position in the planned revival of the UK's nuclear industry.

We could expect other mergers and acquisition in the year to come, notably the Gas Natural/Unión Fenosa merger which is expected to be completed in the first half of 2009.

How will the market look like in the coming years?

Impact of the present financial and economic crisis

It is probably too early to evaluate the full extent and impact of the present financial and economic crisis. We believe that the Utility sector will surely be much more resilient than many others, but this does not mean that it is immune to the current turbulences.

Governments confronted with financial and economic crisis will have less tax revenues, and therefore will have to limit their spending, for example, by reducing financial subsidies to renewable energies. The Spanish government has started by limiting its incentives to solar development. As renewable energies need subsidies to be financially competitive, such decisions could jeopardize their growth, especially as far as wind power and solar energy are concerned.

Traded companies could suffer from significant stock price falls due to negative analyst assessments or credit rating downgrade. In the present hectic financial environment, sudden and large share price drops can quickly turn into a matter of survival. This is what happened with Constellation Energy, which, after experiencing a 70% share price drop in one day, concluded a purchase agreement with Warren Buffet owned MidAmerican Energy. The negotiated price was $4.7 billion, less than half of what Florida Power and Light offered just two years ago. However, EDF that owns 9.5% of Constellation shares is preparing together with investment funds a counter offer.

More generally, this financial crisis should trigger more M&A activities (e.g. the announced Exelon/NGR Energy merger in the US). Companies with weak balance sheets (notably new entrants) will be especially vulnerable.

Longer term view

In a recent statement, GDF Suez's chairman split the current European power Utility sector into three categories:

- The very big players and ultimate consolidators, including EDF, GDF Suez and E.ON,
- The second tier, which includes Iberdrola, RWE and Enel. All three have the

[17] UCTE Transmission Development Plan, edition 2008

necessary size to also become consolidators,

- The third tier is made up of a whole range of smaller Utilities that will need either to forge a partnership with one of the bigger players or will be consolidated.

Utilities have to accelerate their business model changes

In the past period, Utilities have benefited from high electricity prices and sometimes received big windfall profits linked to the CO_2 Emission Trading System. They have started to spend their war chest on internal or external investments.

In the near future, with a looming economic slowdown, pressures will mount on Utilities to reduce electricity prices. Customer associations will complain more and more on the electricity retail prices surge that is eroding purchasing power of household customers. Politicians could react by imposing price caps or taxes. Competition from existing rivals or new entrants will increase.

Utilities have to adapt to this new landscape by thriving towards operational excellence. This means that they will have to streamline their internal processes, simplify their organizations and increase their reactivity while continuously benchmarking their results with the "best in class."

Some parts of the value chain are particularly urged to move fast. For example:

- The profitability of Utility retail, once unbundled from distribution, is usually quite low or in some cases even incurring losses. The "cost to serve" is high due to ineffective processes and high customer contact ratios. Our experiences indicate that to be competitive, the incumbent Utility retailer should drive down their cost to serve by 30-50%,
- Our recent Distribution Network Operators (DNO)[18] Benchmark Study, shows big discrepancies among European DNOs on key performance indicators such as:
  - Cost per customer,
  - Average access time to connect a new customer,
  - Time commitment for responding to supply failure,
  - Average time for meter reading.

As analyzed in this benchmarking study, there are many reasons to explain these differences in performance levels. Nevertheless, there is often large room for improvement for Utilities to progress towards "best in class."

And the customers?

The situation is not rosy for the customers:

Prices have continued to go up: Electricity retail prices have skyrocketed in most European geographies since last winter, with year-on-year increases between 5 and 40%. Compared to 2006 levels, gas retail prices in all consuming segments have remained substantially stable in 2007 but have increased dramatically since the beginning of 2008, reflecting the delayed effect[19] from the oil price surge. As oil prices declined in the second half of 2008, retail gas prices should also decrease in 2009.

Competition in newly deregulated countries did not significantly increase, while the footprint of large incumbents has steadily grown across Europe. **Innovation** in energy retail markets is progressing slowly, focusing primarily on energy efficiency and billing schemes. And finally, as discussed earlier, **security of energy supply** has not improved.

In the future, customers should become more active players that are conscious of energy conservation and perhaps also become energy generators, thanks to solar photovoltaic technologies.

The relationship between Utilities and their customers would change radically. Utilities will become energy and CO_2 savings advisors and no longer thriving for constant sales increase. This would be a kind of revolution, triggering thorough changes in the Utility retail business, calling for a new set of mission statements, objectives, organizations and IT systems.

Now, it is my pleasure to introduce the 10th edition of the European Energy Markets Observatory (EEMO), in which we continue to monitor the main indicators within the European 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 (CMS Bureau Francis Lefebvre), on customer switch and behavior in electricity retail markets (VaasaETT) and on financial performances and strategies of the main Utility companies (Société Générale Equity Research).

Again, throughout the report, the main energy issues for key European markets (Belgium, Denmark, Eastern Europe, France, Germany, Italy, the Netherlands, Spain, Switzerland, Sweden and the UK) are embedded in various 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.

Paris, October 20, 2008

Colette Lewiner

Global Leader of Energy,
Utilities and Chemicals Sector at Capgemini

[18] Capgemini European distribution benchmarking survey 2008.

[19] There is usually a delay of six to nine months for oil price fluctuation to be reflected on gas prices, mainly due to long term gas supply contracts.

Competitive Power

Generation

A rise in construction and mild weather loosen the tension on the short term demand and supply balance

Limited growth of generation capacity despite an encouraging rhythm of construction in 2007

Total European generation capacity increased by 20 GW in 2007, which represents an increase of 2.6%, slightly more than the 2.2% rate of 2006. The rise of the annual capacity growth rate is due to the remarkable boom of Renewable Energy Sources (RES) and gas plants construction. These two technologies manage to meet current capacity needs of countries such as Italy, Spain and Germany.

Nevertheless, significant differences exist when comparing growth of capacities between European countries as in 2006 (see Table 1.1). Two different patterns can be noticed:

- Mediterranean countries (Spain with an outstanding +8.2%, Italy and Portugal), Ireland (+13.1%), Germany, Norway and Romania have all recorded above +3% increase in their generation capacity and contributed greatly to the capacity growth in Europe overall,
- Other countries located in Central and Eastern Europe such as Bulgaria (-7.8%) or Slovakia (-9.6%), have faced a major decrease in their capacity generation due to nuclear shutdowns, as a condition of their entry to the EU.

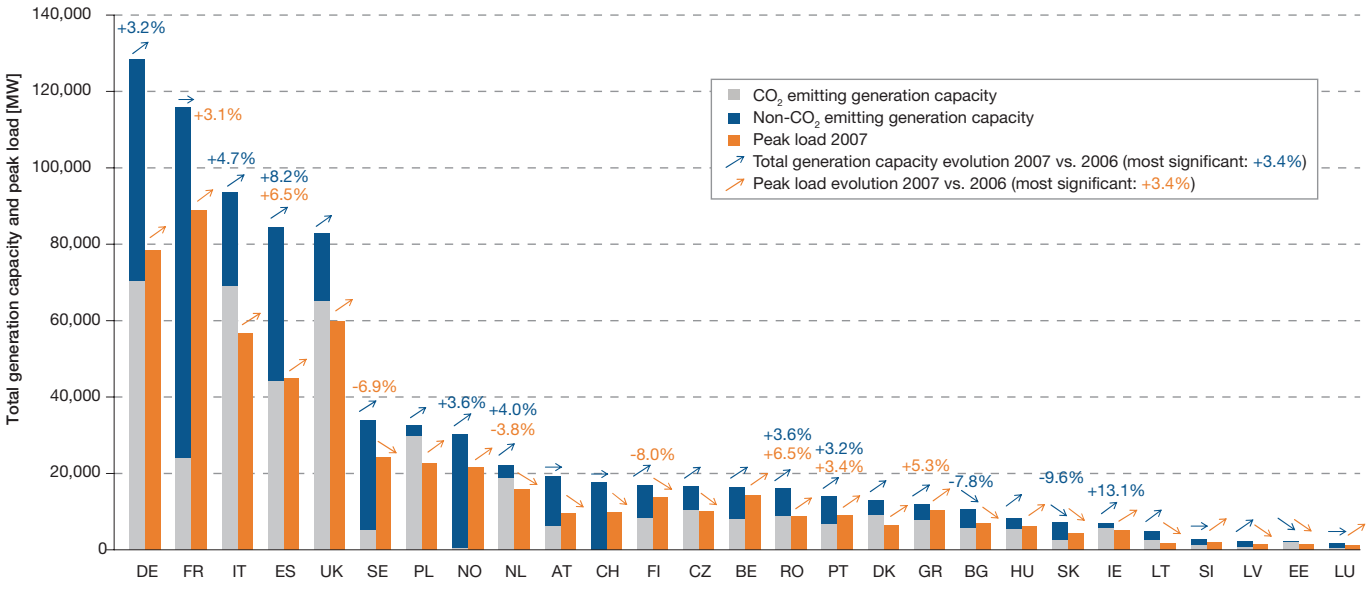
The trend towards more gas and wind constructions started in 2006 and was confirmed in 2007, especially in Mediterranean countries which are at the forefront of the gas and wind construction wave. Gas has now reached 27% of total European generation capacity (an addition of 8.5 GW is reported for the UCTE countries only). The rhythm of construction accelerated in the Mediterranean countries (Italy added 2.8 GW and Spain 5.4 GW).

RES contributed to the capacity generation increase, with wind power playing a major role, adding +8.3 GW in 2007. RES now represents 9% of European generation capacity:

- Wind power generation amounted to 17.2% of total German generation capacity and more than 15% of Portugal (slightly more than 2 GW) and Spain (15.1 GW), where wind constructions are growing the fastest in Europe at +30% (+3.5 GW),
- The RES fever reached France where 0.7 GW was added, totaling its wind generation capacity to 2.2 GW.

Denmark was the only country to see a decline because of the shutdown of 18 wind turbines.

Table 1.1 Peak load, generation capacity and electricity mix (2007)



Source: UCTE, Nordel, BALTSO, EirGrid, National Grid – Capgemini analysis, EEMO10

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1_2,

In 2007, nuclear generation capacity passed through a series of difficulties due to management problems in nuclear plants:

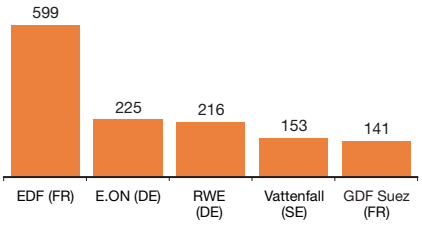
- Nuclear plant outages in Germany in summer—Brunsbüttel (806 MW), Krümmel (1,316 MW) and Biblis A and B (1,225 and 1,300 MW respectively)—pushed spot prices up in the German market,
- Low availability of nuclear plants in France (due to change in maintenance procedures) led to 8.9 GW of unavailable capacity at the end of 2007,
- The UK had up to 5 nuclear reactors offline at the end of October.

The European generation mix remained globally unchanged in 2007 with fossil fuel (52%) and nuclear (17%), still accounting for more than two thirds of the European total generation capacity in 2007.

Mild weather kept consumption low

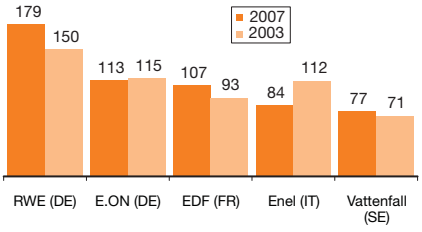
Confirming the trend observed for the last three years, the annual electricity consumption in Europe 2007 grew reasonably at +0.9%, favored by mild weather both in summer and winter periods. As usual, two opposite situations appear:

Top 5 - 2007 Total Electricity Generation (TWh)



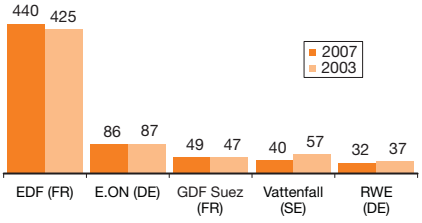
Source: Companies' annual reports - Capgemini analysis, EEMO10

Top 5 - Fossil-fueled Generation



Source: Companies' annual reports - Capgemini analysis, EEMO10

Top 5 - Nuclear Generation (TWh)



Source: Companies' annual reports - Capgemini analysis, EEMO10

Key issues in the UK

The UK is facing an imminent need for new power stations with around 20 GW of plant capacity to close by 2015 (one fourth of the current installed generation capacity). Policy makers are concerned to ensure that the new generation gets built by the private sector, and is consistent with objectives of reducing Greenhouse Gas (GHG) emissions. Developments of note are:

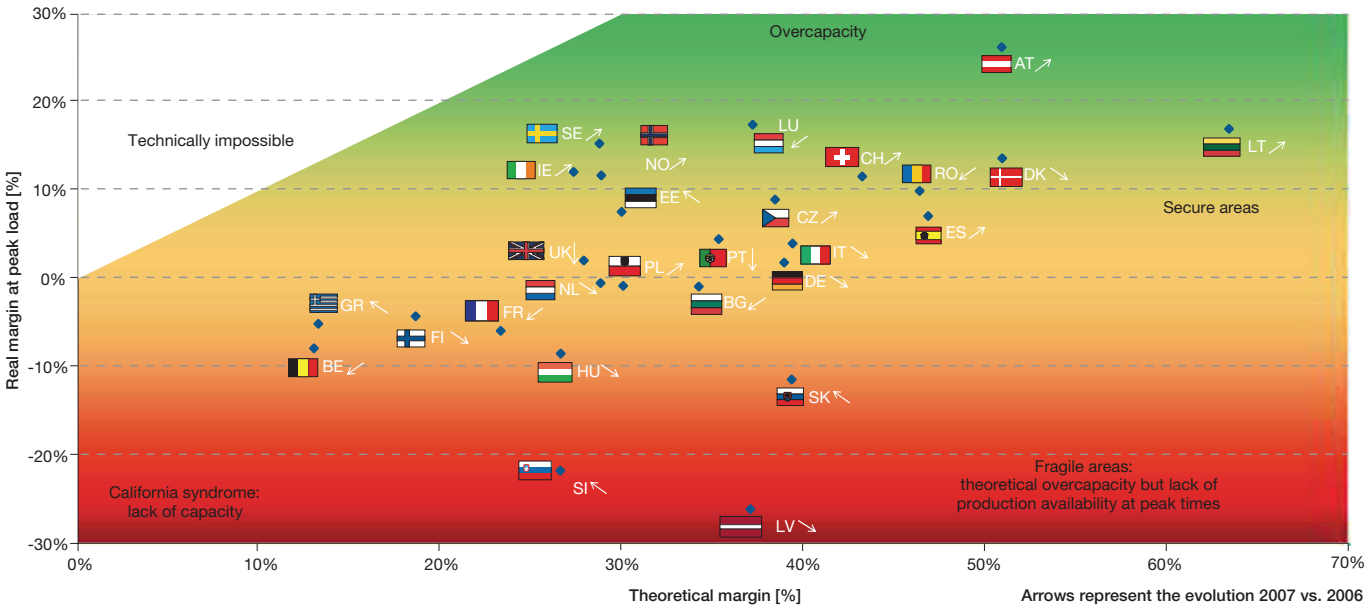
- **Nuclear:** The UK Government is exploring the details of how to make private company operation of nuclear plants work, with a specific focus on ensuring companies cannot avoid decommissioning costs at the end of a stations life,
- **Carbon Capture and Storage (CCS):** The UK has launched a competition to select a new power station to be subsidized as a demonstration of CCS.

UK policy is becoming more favorable to smart metering, but is still evolving. A mandatory roll-out of smart meters to all customers now looks likely. The Government is understood to be considering how to establish a regulatory framework for smart meters that is consistent with current competitive provision of meters, yet maximizes the benefits for energy retailing, energy efficiency and network operations.

Retail prices for both electricity and gas have risen significantly over the past year. Some claim this represents a failure of competition, with the "big 6" retailers (E.ON UK, Centrica, RWE n-power, EDF Energy, Scottish Power, and Scottish and Southern) failing to compete to keep prices down. This has been subject to a major investigation by the Competition Commission, which could have significant implications for future UK energy policy. The UK wants the private sector to build new power stations, which implies that the price paid by customers must be sufficient to cover the costs of building and operating those stations.

In September 2008, two months after a first aborted attempt, EDF finally succeeded in its takeover of British Energy. This €15.7 billion deal will make EDF the leading UK Utility company with 20% of the generation market. It will also position EDF in a dominant position for the planned revival of the UK's nuclear industry, which includes the possible new build of four third generation EPR power plants.

Table 1.2 Real margin vs. theoretical margin (2007)



Source: UCTE, Nordel, BALTSO, EirGrid, National Grid – Capgemini analysis, EEMO10

- On the one hand, Eastern and Southern European countries like Poland (+4.2%) or Greece (+3.1%) continued to record high consumption growth,
- On the other hand, countries like Belgium, Switzerland, Austria and the UK, experienced a decrease in their consumption growth rate, mainly due to increased concern on energy efficiency by the industries and the general population.

The trend for higher consumption growth in the summer revealed in the previous years continued, especially in Greece, Bulgaria and Poland which registered a significant increase in their summer growth rate (above 5%). On average, the summer consumption growth rate reached +1.3%, which represents 0.6% more than the winter growth rate but is still far away from its last year's record.

Nonetheless, in most countries, peak loads are growing faster than consumption. All national peak loads were still met on December 17-18-19, during the cold wave that hit Europe starting late November, except for Greece where the annual peak load was recorded on the 23rd of July (10 GW). Romania and Spain set up a national historical peak load with 6.5% more consumption than the year before. They were followed by Portugal and France with +3.4% and +3.1% respectively.

Demand-Offer equilibrium could be put at risk as soon as weather conditions become unfavorable

The theoretical margin in Europe slightly progressed at 34% in 2007:

- Northern countries like Finland (+9%) or Sweden (+5.8%) saw a significant rise in their theoretical margin mainly due to lower peak loads, while Netherlands (+5.8%) experienced a combination of rise in generating capacity (+4%) and peak load decrease (-3.8%),
- The countries that had a significant decrease in their generating capacity saw their theoretical margin drop (Bulgaria, Slovenia and Estonia), while countries like Greece, France, Romania and Belgium experienced a decrease in their theoretical margin due to a rise in the peak load.

We can still see very disparate situations in terms of theoretical margins (see Table 1.2). Belgium and Greece have theoretical margins of 13%, Finland 19%, France 23%, while countries like Spain, Austria, Romania, Denmark and Lithuania kept theoretical margins of more than 45%.

Nevertheless, the real margin which integrates non-usable and unavailable generation capacities, dropped to 5.3% (vs. 7.6% in 2006) in the UCTE perimeter, despite mild weather. Some worrying situations can be noticed:

- In France (real margin at -5.7%), the availability of nuclear plants has been very low at the end of 2007 due to maintenance work. There exists a similar situation in the UK (real margin reduced from 7.9 to 2.2% compared to 2006) and Germany (real margin reduced from 4.4 to 2.0% compared to 2006), which both experienced outages,
- Central and Eastern European countries (CEE) like Hungary (-8.3%), Slovakia (-11.2%), Slovenia (-21.5%) or Latvia (-25.9%) struggled with supply shortages due to overhauls (notably in countries like Bulgaria and Slovakia) and generation capacity drop as previously mentioned.

On the contrary, Austria (+26.3%), Norway (+11.8%) and Lithuania (+17.1%) kept their real margin high.

We can notice that although theoretical margins increase, the real margins don't follow. This is partly due to the fact that much investment was in intermittent generation (such as wind) that cannot be guaranteed to run when wanted. Indeed, the load factors are between 15% and 30% of the installed capacity and there is little control on the production schedule.

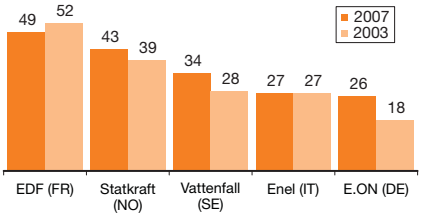
Local climatic and hydraulic conditions led to stiff price variations and even blackouts

Mild temperatures in the winter were experienced across Europe in early 2007, which obviously led to a flat power balance.

In the summer however, as soon as the thermometer displayed an increase of temperatures coupled with poor wind conditions (June and July), the electricity demand sharply increased and put pressure on electricity markets. Countries such as Poland or Greece had to cope with power balance problems caused by their higher use of air-conditioning devices. Greece even suffered drought with temperatures above 40°C in the end of July and an increased use of air conditioning. It led to partial blackouts in the north of the country which spread in the Balkans.

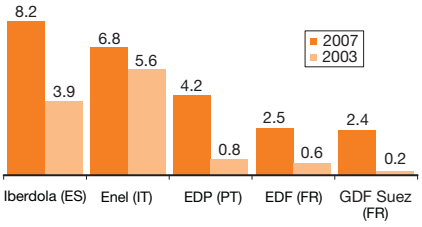
In Italy, in addition to an all-time supply record in July, lack of rainfall through the spring meant that levels in the River Po sank to historic lows. This led to cooling water problems for large thermal stations. The lack of available capacity pushed the day-ahead Italian prices to the top level, peaking during the last week of July (€85/MWh). Subsequently, mild weather and rain softened the tension and day-ahead prices in August fell. August day-ahead prices were the lowest in years, most notably in Germany (€28.5/MWh – €14.9/MWh compared to August 2006)

Top 5 - Hydro Generation (TWh)



Source: Companies' annual reports - Capgemini analysis, EEMO10

Top 5 - Other Renewables Generation (TWh)



Source: Companies' annual reports - Capgemini analysis, EEMO10

Coal: hype or reality?

In the past years, the question of gas versus coal was mainly treated by Utilities from an economic point of view: spark versus dark spread. Spark spread used to be more attractive than dark spread, but the difference between the two has been decreasing lately, although coal prices have almost doubled year-on-year surpassing $220/ton in July 2008.

In the last year, the debate evolved as Utilities and governments are facing security of supply issues. **After the wave of gas construction in the past years, they are searching for a more balanced mix in order to reduce their dependency on one fuel (gas). Indeed, the coal market is more diversified than the gas one and most European countries still have high ore reserves.**

As a consequence, 2007 was marked by several talks about coal projects. **But the impression conveyed by highly debated projects in Germany and the UK suggests that coal is coming back to the fore hides another reality: little real construction and even plans being delayed.** The best example is Germany where not less than 20 projects have been announced for a total of 28 GW but nine projects have already been delayed or cancelled (6 GW).

There are various reasons for this hold on coal investments:

- **Construction prices were driven up by tremendous demand from India and China**, making business plans less attractive and even putting small players faced with the impossibility of financing a coal project,
- **CO_2 quotas weigh heavily in the economic case**: For the moment, CCS pilot projects have been launched in several countries to tackle CO_2 issues but the technology still appears too costly and needs carbon prices above €40/ton to be economically viable. Massive new builds of coal-fired power plants with 50 years lifespan would definitely make EC CO_2 reduction targets more difficult to achieve,
- **Political and environmental oppositions**: Examples are many. In Germany, the population rejected a new build project in Ensdorf. In Lubmin, Dong's project of a 1,600-MW coal plant was jeopardized after members of the SPD government in Mecklenburg-Vorpommern have threatened to resign if construction goes ahead.

Coal though could benefit both from the need to balance current gas investments and strengthen baseload. **Carbon price is likely to trigger clean coal and make the future for coal brighter**. But the case for coal is not yet strong enough for Utilities and governments to move forward with it in a bold way, given the resistance from the public.

and Spain (€34.94/MWh, compared to August 2006's average price of €49.88/MWh).

In autumn and winter 2007, the same trend continued until a cold wave hit Europe in late November. In addition to the increase in demand, nuclear outages in the UK and Germany and a tight supply situation in France provoked a panic move in most electricity markets. Indeed, France faced two major issues:

- Strikes in the power sector that caused the loss of 10 GW by the inactivity of gas plants and the block of the LNG terminal Fos-sur-Mer,
- Low availability of its nuclear plants.

Consequently, in the British and Dutch markets, day-ahead prices rose above €100/MWh in mid-November.

Tight supply was again experienced in mid-December when colder temperatures descended on Europe. In Spain, low wind output and an outage at the 1.1 GW Vandellos nuclear plant caused a rise in their day-ahead prices. During the last two weeks of December, the average day-ahead prices went above €60/MWh compared to last year's €35/MWh.

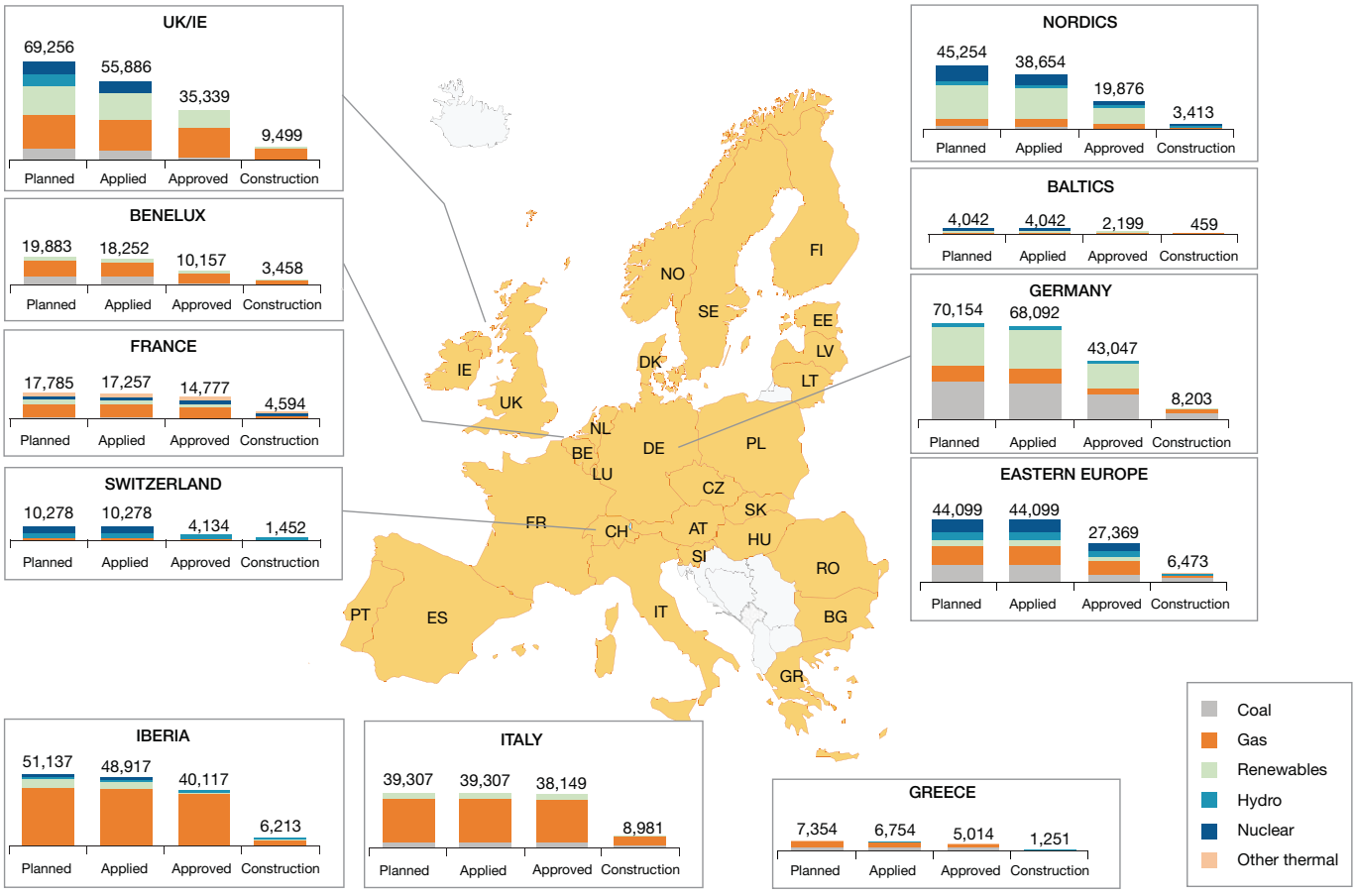
In the medium term, dash for gas and wind continues

Investments have notably increased compared to 2006, supported by the renewed gas and wind boom. Generation capacity increased strongly in Germany, with up to 68 GW planned and fewer closures than expected, and Spain (39 GW of gas planned including a 1.2 GW plant at Morata de Tajuña in Madrid), while the Netherlands should become net exporter in 2011.

Representing over 40% of construction projects (see Table 1.3), gas investments are still preferred to coal; spark spread is indeed more favorable than dark spread, undermined by high coal prices.

- Gas leads the construction boom in Southern Europe (Spain, Italy and Portugal) and also in the UK, Benelux and France,

Table 1.3 Projects of new generation capacities, in MW (2007)



Note: All projects above 5 MW are considered. Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia and the Baltics are added from the 2006 geographical perimeter
Source: Platt's PowerVision – Capgemini analysis, EEMO10

- Coal remains the primary choice for baseload generation instead of nuclear in Poland (including a 1,600 MV in Lublin) and Germany, which has more than 20 plants planned and experiences a strong push for lignite despite nine coal plant cancellations (6 GW total).

The dash for RES, especially wind power, is increasing with the development of offshore wind in the UK and Germany. The UK plans up to 33 GW of offshore wind electricity by 2020, and Germany 30 GW by 2030 on optimistic assumptions. Wind capacity is expected to reach 80 GW in Europe by 2010 since the wind boom is also extending to France, Ireland and Portugal. Major hydro plans have been launched in Austria through a planned investment of €8.4 billion by 2020, and €1.14 billion in Portugal for 10 new hydro plants.

Favored by the slowdown in coal construction, nuclear projects were preferred as baseload assets in many countries, and spread across Europe with reactors planned not only in Finland and France, but also in Eastern Europe (Bulgaria, Czech Republic, Romania and Slovakia), the UK, Sweden and Switzerland.

Investment climate threatened by rising plant costs and environmental and political uncertainties

Business cases for investments are highly challenged by the market conditions:

- Market volatility for electricity and fuels increases the risk of investments,
- Rising fuel costs (coal and gas) that contribute to diminishing the dark and spark spread, especially on the partially deregulated market,
- Strong increase in construction prices that lead to plant postponements and cancellations, like Dörpen and Mittelbüren in Germany. Construction prices rose about 30% at the beginning August 2007 and a total of nearly 90% since end 2005. Utilities are faced with equipment and skills shortages and consequently growing bargaining power from suppliers. Areva is no longer delivering tailor-made reactors but still offering standard models on catalog, and Siemens, overwhelmed by projects, stated it will be "more selective in acceptance of orders."

Small independents are struggling to cope with these problems and, for example, many municipals in Germany like Bremen had to cancel construction plans. The big players have reacted with new strategies. E.ON decided to centralize engineering, procurement and construction for 18 projects to reduce costs, and RWE has started building its first hard coal plant ever using a multi-contractor instead of turnkey approach.

Environmental regulation and costs will further weigh on investment through the 2008-2013 Emissions Trading Schemes (ETS) and National Allocation Plans, which are tougher on allocations. Depending on their generation mix and public sensitivity, the countries across Europe are pushing for different ways to cope with environmental challenges:

- Nuclear has been chosen by several countries to produce baseload energy with low carbon emissions like France, Finland and the UK,
- Countries where coal is important, like Germany and the UK, are investing in clean coal to comply with carbon legislation and satisfy baseload energy needs. They are thus exploring Carbon Capture and Storage (CCS) as a solution: Vattenfall participates in CCS tests in Mongstad like RWE in its Niederaussem lignite plant, and the UK is sponsoring a large scale CCS project. But concerns are high regarding the cost of this technology as adding CCS would raise the cost of electricity by 30 to 70%,
- For countries dependent on gas, cogeneration and CHP improve carbon balance and are increasingly being supported by legislation in Phase II NAP as in the Netherlands, Italy, Spain and Germany. For example, the German government aims at doubling the share of CHP to 25% of generation by 2020,
- Other cleaner technologies are being developed like fuel cells through partnerships between Ceramic Fuel Cells Limited (CFCL) and E.ON UK and CFCL and Nuon (Netherlands).

Investments have always been affected by politics because of the close links between national energy champions and governments. Lately, on the background of increased ecological consciousness, society also figures in energy policy decisions:

- Parliaments do not hesitate to oppose governments as in the case of Switzerland where the Parliament blocked the policy of using CCGT,
- Municipals, inhabitants and environmental associations are increasingly taking part in national and local energy policies and construction. Their opposition has led to many plant cancellations and postpones, especially in Germany, where as many as 70% of voters have said no to a coal plant in Ensdorf.

Market volatility, rising costs, as well as social, political and environmental concerns make investment more costly and risky, thus endangering investment prospects.

Pressure for greater competition in power generation intensifies but there is little result for the moment

European as well as national competition authorities gave a strong push for competition in generation this year. In France, Italy and Germany, incumbents accused of market-dominating positions were subject to successive measures and decisions to foster competition, such as expected phase out of regulated tariffs or the release of new Virtual Power Plant (VPP) auctions. Regulated tariffs are generally lower than open market ones and force new entrants out of market. New VPP auctions were also launched to facilitate access to market for new entrants:

- In France, the competition council pressured EDF to sell additional 1.5 GW capacity over 15 years to its current VPP auctions of 5.4 GW,
- Spanish Iberdrola and Endesa released Spain's first VPP auctions of up to 2 GW and the regulator CNE is pushing to free up further capacity,
- In Germany, E.ON decided to make an important move by conceding 4.8 GW of VPP auctions, and following a court decision, RWE was forced by the federal cartel office to offer 6.3 GW over four years,
- ESB has entered into negotiations to sell 20% of its generation capacity in order to avoid competition concerns.

Incumbents are adjusting to greater pressure for competition into their historical market by a geographical diversification:

- French Utilities Gaz de France and Suez acquired a 1,875 MW CCGT in Teesside (UK),
- Large Utilities are also going east for expansion: Enel, CEZ, E.ON and GDF Suez have submitted bids to build gas, lignite and nuclear capacity in Romania.

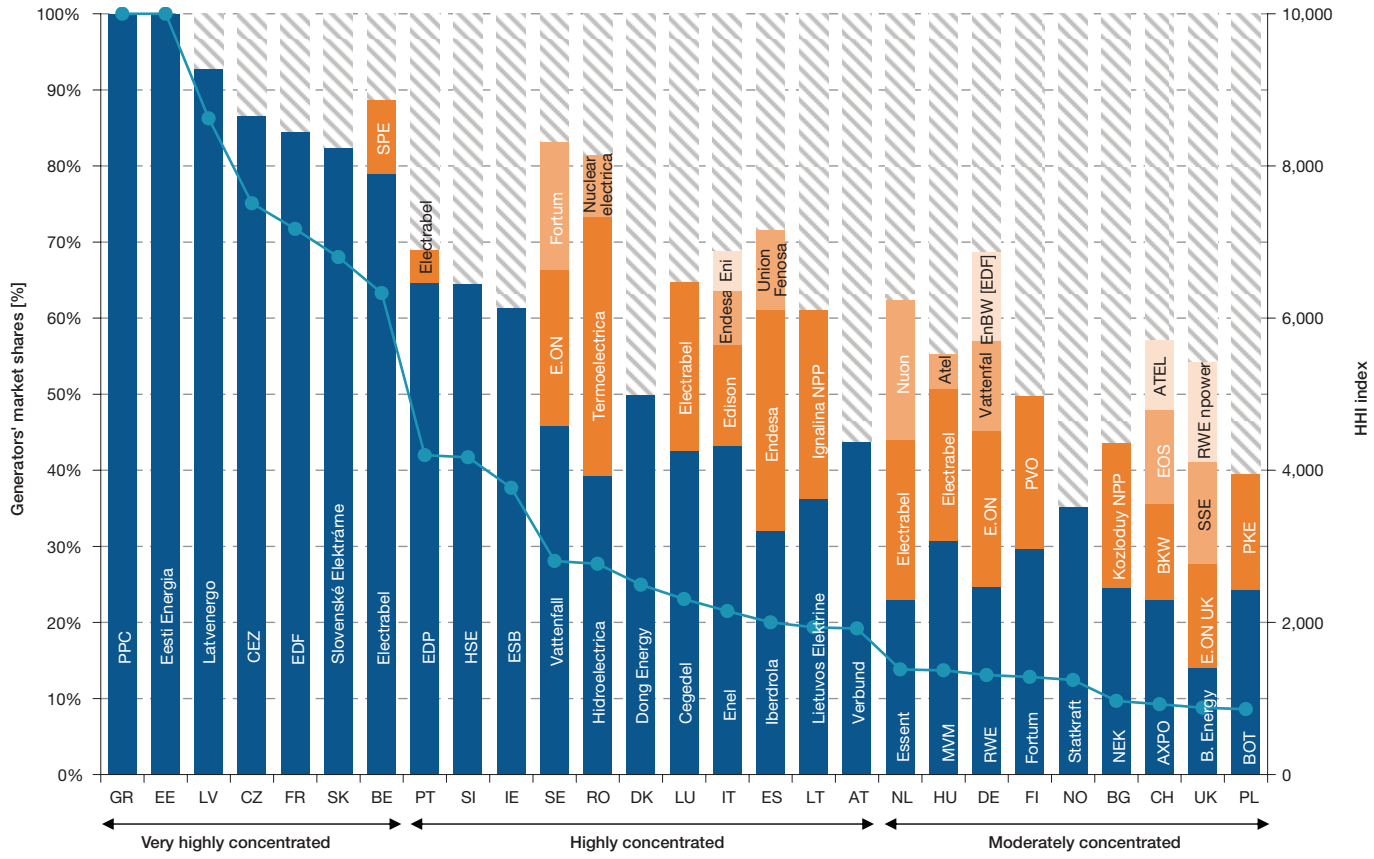
Furthermore, a wave of consolidation and cross-participation has come across Europe as the large Utilities are trying to adapt to the new rules:

- The Spanish Utility Acciona bought Endesa with Enel and a stake of 45% in Unión Fenosa. As part of Endesa's takeover, some Endesa assets were sold to E.ON for 13 GW, including 5 GW in Italy and three power plants in Spain which makes E.ON the fourth main producer in the country,
- Iberdrola invested in Scottish Power but was said to be a target for ACS (already its largest shareholder) and EDF, and subsequently for Gas Natural,
- French Utilities Suez and Gaz de France merged to become an energy giant.

Enel is a case in point of a new diversification strategy. Willing to remain the leader in Italy and boost its international growth, Enel intends to improve its fuel mix by investing in coal and nuclear in Eastern Europe, in coal, gas and RES in Italy, and in gas and RES in Spain and Portugal through the newly acquired Endesa.

Benefiting on the contrary from the pressures of competition, new entrants are

Table 1.4 Generation market concentration (2007)



Note: Herfindahl-Hirschman Index or HHI, is an indicator of competition among companies
Source: Companies' web sites, annual or sustainability reports, European Commission – Capgemini analysis, EEMO10

stepping up and increasingly building new capacities. The Swiss producer Advanced Power AG has multiple projects across Europe, mainly CCGT plants in Belgium at Bocholt and Spain at Merida. In France, Poweo has its first CCGT plant under construction in Pont-sur-Sambre. It is also collaborating with generator associations to make its voice heard in Germany where a 25-member association represents 3 GW of capacity. Despite these initiatives, their market share remains relatively low.

In the end, despite all the measures presented above, the generation markets remain highly concentrated (see Table 1.4). It seems that further and voluntary measures are needed in order to achieve real competition.

On the long term, energy challenges divide European countries

European countries have to cope with the important challenges of plant decommissioning, a phase that is only starting and will get significant over the next 25 years:

- The aging of plants, as most have been built in the 1960s,
- The Large Combustion Plant Directive 2001/80/EC (LCPD), which has imposed coal plants to either install flue gas desulphurization systems or limit operations to 20,000 hours between now and 2015,
- The consistent nuclear phase-out process in several countries due to political decisions to refuse the life extension of nuclear plants, like the forced shutdown of Brunsbüttel-771 MW reactor in Germany.

According to the International Energy Agency (IEA), European Utilities need to invest around €1 trillion over the next 25 years to guarantee supply while coping with the loss in baseload energy production and the continuous rise of energy demand. Countries have to face three main challenges when defining their long term strategy:

- The security of supply can only be reached through a diverse primary energy mix which avoids suffering from the variations in commodity prices or even shortages,
- Finding the adequate mix between baseload and peakload assets has proved to be difficult. For example, France has experienced for years excessive nuclear baseload, but a lack of peakload assets. Consequently, EDF has to invest €900 million in gas-fired generating capacity by 2010,
- The recent environmental policies on climate change are setting additional constraints on the power generation sector through the new carbon emission reduction targets and the tougher National Allocation Plans (NAP) set by the EC.

These challenges have brought nuclear to the forefront of European energy policies, as it is a common baseload generation fuel. However, heterogeneous energy policies have divided European states. Governments facing these challenges are influenced by historical trends, public opinion and lobby pressure groups (industrials, environmentalists, etc.). Nonetheless, two main groups of countries are emerging according to their long term energy orientation.

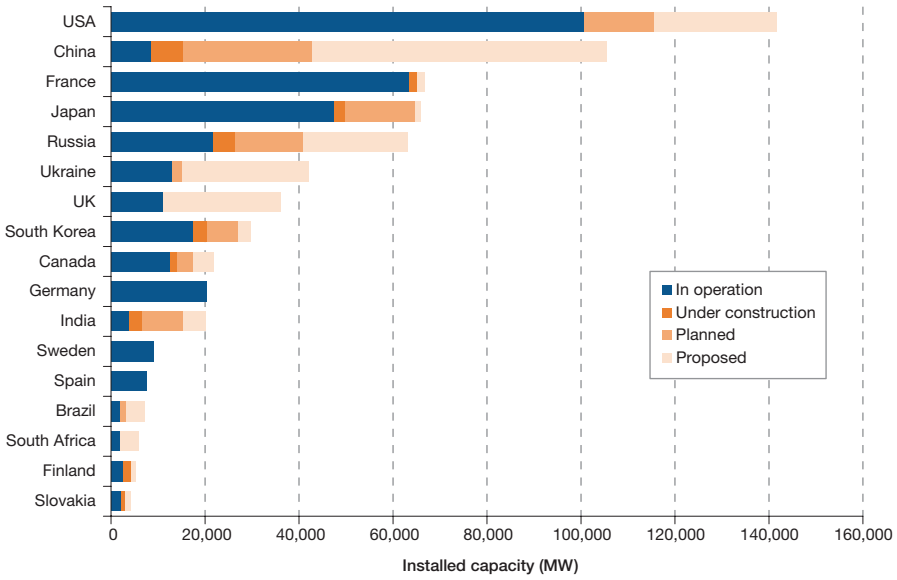
Many countries have expressed a clear and long term energy strategy which can be defined around their position toward nuclear (see Table 1.5).

Pro-nuclear countries are currently conducting nuclear projects or have officially expressed their commitment:[20]

- France and Finland are conducting EPR projects in Flamanville and Olkiluoto respectively,
- Eastern and Central European countries have launched construction plans: Romania, after commissioning a second 700 MW reactor in Cernovada in October 2007, will build two more reactors on the same site with the support of a consortium of six European companies,
- The UK has been inundated with proposals after the publication of the new Energy Bill in January facilitating nuclear constructions. As an illustration, EDF Energy announced its ambition to build between four and six reactors in the UK,
- In Switzerland, two 1,600 MW reactors are planned in Mühleberg. But even with a faster administration process, Switzerland will certainly face a major electricity shortage in the mid term. Additionally, CCGT constructions, seen as a short term solution by the government, are facing opposition of parliament.

Countries openly declared as anti-nuclear have opted for the development of renewable and/or gas-fired power stations:

Table 1.5 Overview of nuclear capacities (as of Sept. 2008)



Source: World Nuclear Association – Capgemini analysis, EEMO10

[20] See "How to sustain the nuclear renaissance" a Point of View by Colette Lewiner and Alva Qian, Capgemini, for a detailed overview of nuclear projects

Continuous Improvement Process: Flexible approach towards operational excellence

Stronger regulation, changed rules for allocation of CO_2 emission certificates, increasing fuel prices, increasing inflation and labor costs make today's list of threats for Utilities quite long. And so **is the challenge of increasing the performance level** across the entire Utilities value chain.

Although classical performance improvement and cost cutting projects can be observed in the industry, the renaissance of Continuous Improvement Programs (CIP) persists. Meanwhile, for example, three out of four German large Utilities have implemented or plan to implement a company wide CIP.

CIPs target the progressive improvement of business performance through a company-diffused system of improvement initiatives. The ownership of the program by the company's employees and the change in the daily working paradigm are significant elements that set CIPs apart from any other performance improvement project. In consequence, **the objectives of a CIP program are two-fold—cultural change and tangible performance improvement**, which is probably the key benefit that is derived from a CIP.

The two fold objective can be used to adjust content and results to tougher market conditions. Fostering the investment in people capabilities to apply improvement methods, increasing the capabilities of people to coach CIP teams, and increasing the share of management topics to be worked upon by CIP teams are proven approaches to strategically shift the program towards higher amount of tangible performance improvements.

Overall, profitability improvements of up to three to four percentage points in operating costs are achievable in the energy and Utilities sector without changing the management approach significantly.

- In Spain, the government has reaffirmed nuclear disengagement and the replacement with gas and renewable, and encouraged it by maintaining renewable subsidies. This incentive policy has been welcomed by Utilities such as Iberdrola who announced over €1.2 billion investment in wind power,
- Portugal has launched a massive hydro plan (10 plants for €1.14 billion) in order to achieve 45% of its electricity output from renewable sources by 2010,
- In Italy, the gas generation boom has created supply security fears. In order to lessen gas dependency, Enel signed a deal receiving access to Russia's upstream gas assets via auction (Yukos). Contrary to Spain, the legal and official anti-nuclear stance of Italy is currently challenged by the new government of Silvio Berlusconi and the industry confederation, the Cofindustria, which are in favor of a nuclear return.

Germany appears to be an exception as the long term strategy defined in favor of climate protection through gas and RES is constantly and widely challenged:

- The country is investing massively in wind power and gas. According to VDN, the German network operator's federation, renewable power is set to contribute up to 22% of German consumption. 60% will be sourced by wind turbines leading to high fluctuation on the network. Thus, transmission cost would rise as a consequence of expensive balancing of intermittent wind supply,
- No official stance has been taken on coal-fired generation plants but investments are high in coal as baseload energy. Coal is facing great opposition by green associations and increasingly by municipals and citizens. They accuse new energy laws to be too favorable to coal and lignite,
- A return to nuclear is not on the government's agenda, although large Utilities and industries keep on lobbying for it.

Other countries have not yet defined a long term energy strategy and particularly whether nuclear power should be part of their fuel mix:

- In the Netherlands, the Energy Council urged the government to take a decisive position as nuclear is being heavily lobbied by industries. However, no decision will be taken before the next elections in 2010,
- Political chaos has not allowed the Belgian government to take an official position towards nuclear. However, the 2003 phasing out-law could be revoked as the country might suffer severe electricity shortage on the medium term as in Switzerland.

Prerequisites for a successful new nuclear program are few[21]

Construction of the first EPR, Olkiluoto-3 in Finland, is nearly two years behind initial schedule and has far exceeded the initial budget. Such cost and time overruns underline two major issues facing nuclear programs:

First, the clear lack of skills in new generation plant building management is worrying both for Utilities and governments:

- If EDF nuclear plans are to become true (10 new EPRs in China, South Africa, the UK and France), EDF will need to hire 5,000 design and operating engineers in the next 10 years through intensive recruitments programs,
- Enel lost most of its competency after Italy phased out of its nuclear strategy. It is now growing expertise by acquiring stakes in EPR projects, with a 12.5% stake in Flamanville and the employment of its engineers on the project,
- In the Netherlands, EPZ, the joint venture of Delta and Essent, is working with universities in collaboration with the government to set up courses and masters programs in nuclear engineering.

The lack of nuclear engineers is due to the aging workforce and the incapability to

[21] For further details, see "How to sustain the nuclear renaissance", a Point of View by Colette Lewiner and Alva Qian, Capgemini

recruit fresh graduates. Indeed, most nuclear engineers are retiring baby boomers, while these past years have seen a general lack of student interest in nuclear studies.

Second, investors are challenged by the financing of nuclear programs. They are generally forming consortiums or joint ventures to build nuclear plants:

- In Switzerland, AXPO and BKW are founding a Joint Venture to build 2x1,600 MW reactors in Mühleberg and Beznau,
- In Bulgaria, NEK chose RWE against Electrabel for the sale of 49% stake in Belene power company.

Disparate decommissioning and waste management strategies across Europe have brought concerns at both European and state levels. Inadequate and inappropriate use of funding by the private industry and governments is the main cause of the increasing trepidation. In Germany, the Social Democrat Party in the Hesse state is accusing the "Big 4" (E.ON, RWE, Vattenfall, and EnBW) of misusing tax-free reserves amounting to €30 billion. A similar event happened in Belgium where a debate, pushed by the Walloon green party "Ecolo", is questioning Synatom's (a subsidiary of Electrabel) decommissioning funds management. The UK government, anticipating any kind of polemic, is to set a new independent advisory body. The Nuclear Liabilities Financing Assurance Board provides scrutiny on the suitability of decommissioning programs. Once again, the EC is undertaking a big challenge trying to harmonize nuclear regulations across EU-27.

Governments, local authorities, financial institutions and mainly the nuclear industry's large and smaller vendors and operators have to get organized quickly in order to make the nuclear renaissance a long standing success.

They should concentrate on:

- Non-proliferation behavior and compliance with the international treaties,
- Long term stable regulatory framework,
- Enforcement of a safety culture in all steps of a plant's lifetime,
- Strict financial control in construction, operation and decommissioning phases in order to keep a competitive edge,
- Ramp up successfully all components of this industry: industrial facilities as well as human skills,
- Finally, ensure that the stakeholders including the public become and remain positive.

Industrials are investing in power generation

Faced with rising electricity costs due to the ever higher prices in the deregulated market, **industrials started to create users' consortiums coupled with intense lobbying in order to secure long term purchasing commitments at more favorable rates**.

Although the French User Group Exeltium[a] finally received in July 2008 the green light from Brussels to go ahead with its 320 TWh contract spanning over 24 years with EDF at a price said to be around €39/MWh, **other European heavy energy consumers are taking a step forward and are investing in power generation**.

Two different approaches have been developed so far:

- **Association between industrials and a Utility company to build large plants**: For example, five or six German companies belonging to the large consumer group VIK were considering to build 800 MW coal power stations, ArcelorMittal plans to build "one or several" power plants in Lorraine (France) along with new entrant Poweo,
- **Taking shares in the construction of a nuclear plant**: Sixty Finnish and Swedish companies including Aga (industrial and medical gases), Atria (Food manufacturer) or Kesko (multi-retailer) are stakeholders (30% of the shares) of the 1,500-2,500 MW Fennovoima's nuclear site, enabling them to receive a share of power capacity.

This is similar to the earlier UK experience where a number of large energy users built a CHP plant adjacent to their sites, typically in collaboration with established power companies.

However, political commitment is required to spread these initiatives. It hasn't been the case for Norway, where the attempt to offer lower prices for large users was blocked by the government in November 2007.

[a] Large energy user group created in May 2006 led by Air Liquide, ArcelorMittal, Arkema, Rio Tinto Alcan, Rhodia, Kymmene and Solvay

Table 1.6 Electricity generating costs (US$c/kWh), projection for 2010

	Nuclear	Coal	Gas
Canada	2.60	3.11	4.00
Czech Republic	2.30	2.94	4.97
Finland	2.76	3.64	-
France	2.54	3.33	3.92
Germany	2.86	3.52	4.90
Japan	4.80	4.95	5.21
Korea	2.34	2.16	4.65
Netherlands	3.58	-	6.04
Romania	3.06	4.55	-
Slovakia	3.13	4.78	5.59
Switzerland	2.88	-	4.36
USA	3.01	2.71	4.67

Note: 5% discount rate, 40 years life time, 85% availability, no CO_2 price included for coal and gas
Source: OECD/IEA NEA 2005 – Capgemini EEMO10

Electricity Wholesale Markets

In a context of rising commodity prices, wholesale spot power prices picked up in September 2007, setting new all-time high records for electricity in the first half year of 2008

Power prices are driven by other commodity prices and carbon valuation:

- **Oil prices:** Oil price drives power price as it is a commodity used in the generation mix (for fuel and gas generation) and also plays an important role in power market psychology. In 2007, oil prices rose significantly from a mere $50/barrel in January to over $96/barrel by the end of the year (see Table 2.1). Throughout 2008, oil prices have continued to increase, reaching a record $147/barrel on July 11. This price variation is due to numerous structural and temporary factors, ranging from an increasing demand in fast-growing countries such as China or India, or the increasing exploration costs, to tensions in oil-rich countries or market speculation. In September 2008, oil prices went down in a context of slowdown of the world economy (reduced demand) due to the financial crisis,
- **Gas prices:** Gas prices are driven by oil prices (oil still serves as a price reference for a majority of indexes within gas supply contracts in Europe) and local security of supply issues. The downward trend that started in April 2006 came to a halt in May 2007, with gas spot prices quoting as low as €7/MWh on the NBP. From that point onwards, gas prices on Europe's three main hubs (NBP, Zeebrugge and TTF) jumped consistently, peaking up to €28/MWh by the end of November, which represents a 300% increase in seven months,
- **Coal prices:** Imported coal delivery prices increased by a tremendous 95% over the year 2007, with the ARA index evolving from $66.5/mt in January to $129.5/mt in December. This price surge was due to increasing freight rates and a rising demand from fast-growing countries. The price surge has been spectacular throughout the second half of 2007 with market price at Richards Bay increasing by 80% and freight rates increasing by 60% over the same period,
- **Carbon valuation:** Refer to the analysis in the Sustainable Energies chapter and the "Windfall Profits" focus.

Power prices are impacted by structural and temporary supply and demand parameters:

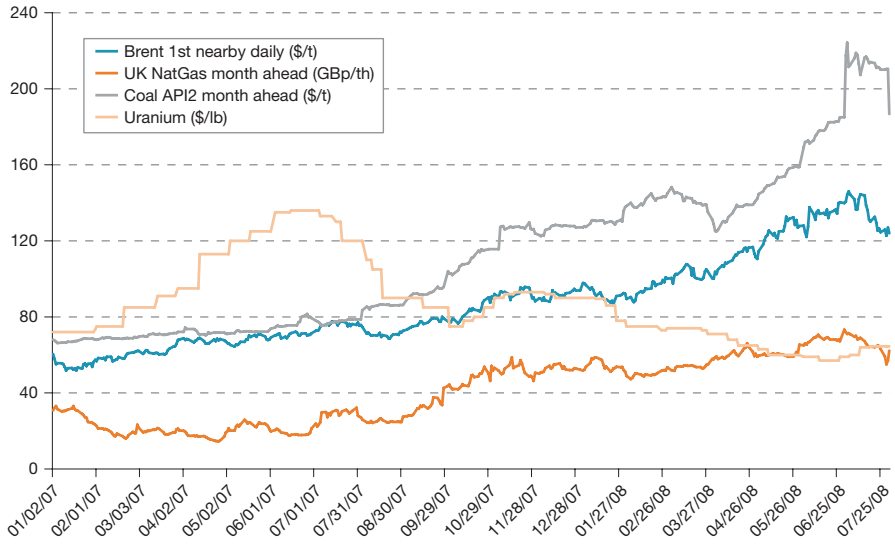
- Capacity margins and demand forecasting: See the Generation chapter,
- Liquidity and market activity: The greater the liquidity, the lesser the ability of incumbents to manipulate power price,
- Hydro levels have more or less impact depending on the share of hydro in the countries' energy mix,
- Mild weather induces feeble use of air conditioning and lower energy requirements for cooling of nuclear plants in the summer, and less heating energy in winter (saving carbon emissions in addition).

After reaching a peak in the summer of 2006, European wholesale spot prices decreased until late September 2007, when price curves started picking up again. New peak levels were reached in November-December (around €80/MWh), which then stabilized at high marks (around €60/MWh) as of February 2008 (Nordpool being an exception with some price decrease in February 2008 thanks to good hydro supply).

European power exchange statistics reflect these trends well, if we consider average spot prices (excluding Eastern European exchanges, Belpex and OMIP):

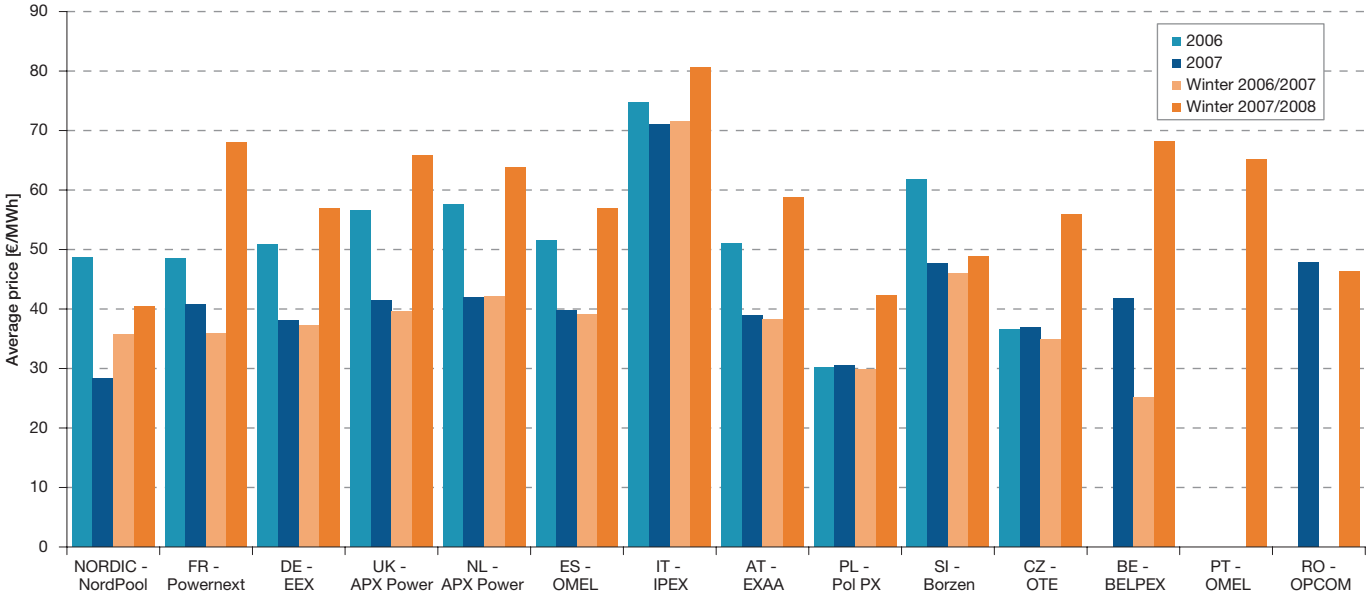
- Decreasing within a range of a mere 5% (Ipex) to a significant 42% (Nordpool) from 2006 to 2007,
- Increasing within a range of 13% (Nordpool and Ipex) to an astounding 90% (Powernext) when comparing the winter 2006/2007 to the winter

Table 2.1 Commodity prices (2007 and H1 2008)



Source: SG Commodity Research – Capgemini analysis, EEMO10

Table 2.2 Average electricity spot prices



Source: Power Exchanges web sites – Capgemini analysis, EEMO10

2007/2008 period.

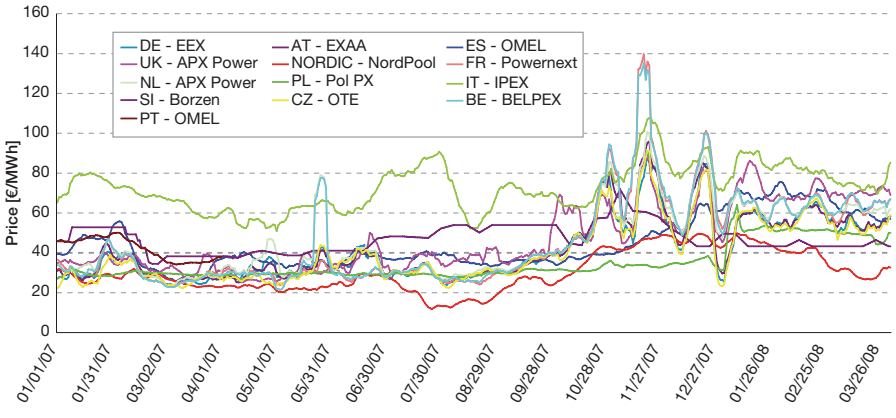
2007 versus 2006

Following the trend observed during the second half of 2006, 2007 has seen falling power prices until the end of the summer, after which increasing commodity prices started to move power prices up again (see Table 2.3). A few exceptions can be accounted for like the Ipex price surge in July (due to high temperatures resulting in a peak in demand combined with capacity reduction because of plant water cooling issues).

Winter 2007/2008 versus winter 2006/2007

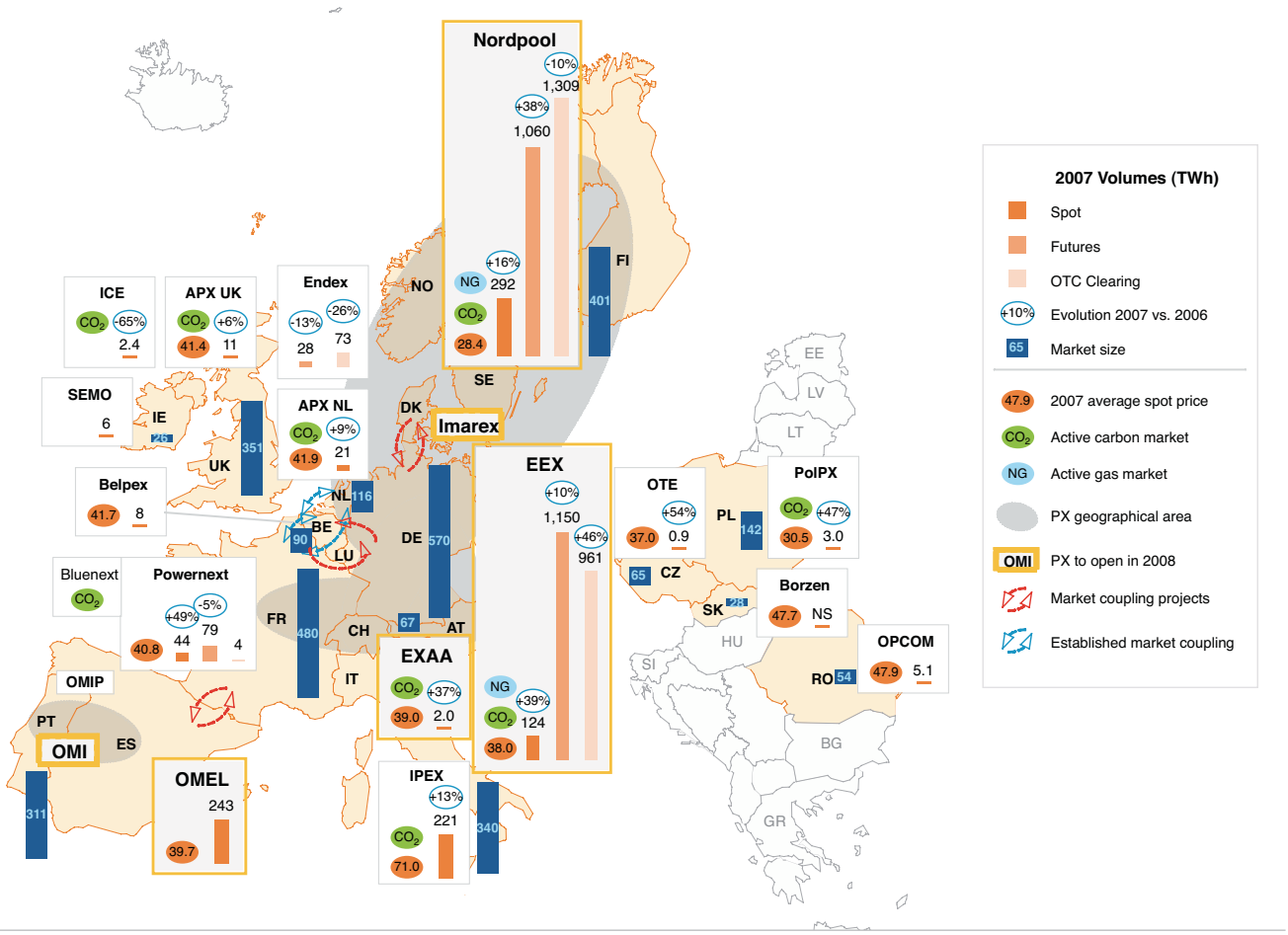
During the winter 2006/2007, Europe was under good conditions when considering the following: mild temperatures (France, Germany and the UK), weak fuel prices, high wind output in Germany, good hydro supply in the Nordic region and in France,

Table 2.3 Electricity spot market prices



Source: Power Exchanges web sites – Capgemini analysis, EEMO10

Table 2.4 Map of electricity trading (2007)



Source: Power Exchanges web sites – Capgemini analysis, EEMO10

high gas storage facilities in the UK and anticipation of lower carbon price.

The higher average prices of the winter 2007/2008 can be mostly explained by the structural commodity price increase trend, considering these favorable supply and demand parameters, i.e. mild temperatures (with one brief chill beginning in January), good wind outputs (Germany and Spain) and temporary anticipation of a bearish oil market due to a hypothetical American recession.

Power exchanges continued growing fast in terms of traded volume and product and geography diversification

Twelve power exchange operators served the European market in 2007 (see Table 2.4), including the new Irish power exchange that opened in November 2007 (i.e. SEMO which is a compulsory day-ahead market for the Republic of Ireland and Northern Ireland). In January 2008, Imarex launched a trading platform of derivatives contracts for the Nordic and German markets, with the will to win some market shares to the other exchanges of the area.

The main products which are traded on these exchanges are spot and prompts contracts for short term positions (up to one day-ahead of delivery), contracts for physical and financial long term positions (forwards and futures, referred to as futures as a whole) and clearing services for OTC forward contracts. However, liquidity remains concentrated on short term contracts, i.e. for the next calendar year, quarter and month ahead of delivery. Besides, pure financial product volumes remained very low in 2007 (less than 1% of total volume).

On top of that, some exchanges have diversified their activity by offering trading of other underlyers apart from power, such as EU emission allowances, coal or natural gas. Depending on their maturity, some exchanges try to increase their added value by offering more sophisticated services such as intraday

trading, or by trying to expand activities out of their borders.

Significant traded volume evolution and product diversification in 2007

In 2007, the traded volume of power on European exchanges (including OTC volumes cleared on exchanges) reached 5,633 TWh (up 16% compared to 2006), representing twice the volume of European power consumption. Spot volumes in major Western European power exchanges reached 941 TWh, increasing by 31% in comparison to 2006. Total futures volume jumped 21% to 2,341 TWh in 2007. As regards product diversification, 2007 witnessed brand new development (gas trading) and new launches of continuous day-ahead or intraday trading.

Nordpool

In 2007, Nordpool remained Europe's biggest exchange with a total traded volume of 2,661 TWh, still accounting for 47% of the volume of all European exchanges combined (versus 51% of all volumes in 2006).

The move towards exchange-based transactions can be accounted to the increasing trust market players have in the Nordpool market, thanks to policies aimed at improving transparency and surveillance, as well as available products and services.

EEX

In terms of volume, German EEX comes in second place in 2007, with a total of 2,235 TWh. In July 2007, EEX added spot and futures gas trading to its German activities.

IPEX

In 2007, the Italian exchange booked spot transactions for a total of 221 TWh. The majority of the exchange's activity relies on the state-regulated incumbent Enel, which accounts for a significant share of the country's generation capacities. Traditionally, the IPEX is Europe's most expensive spot market (the share of gas-fired generation is higher in the Italian mix) and 2007 is the case again, with an average spot price of €71/MWh over the year. Italy is working on establishing a trading platform of energy derivatives, which will be managed by Borsa Italiana (within the IDEX compartment). Financial and energy regulators are currently setting conditions for trading, which could begin by the end of 2008.

Table 2.5 Assessment of power exchange maturity and attempts to develop abroad

Exchange	Power exchange abroad developments	2006 spot ratio[1]	2007 spot ratio
OMEL	July 2007: spot trading operations extended to Portugal	54%	85% [2]
Nordpool	■ 2005: launch of the Kontek spot bidding platform in Northeastern Germany. In 2007, 7 TWh were traded (equivalent to 5% of EEX's spot volumes). This spot bidding platform is due to be terminated when the coupling of the Danish and German markets is implemented ■ 2007: balancing market services offered to all Germany ■ Jan 2008: futures contracts offered on the German and Dutch markets (some volume reported on the German market, but not on the Dutch one)	64%	73%
IPEX	No report of development abroad	58%	65%
EEX	■ 2005: launch of spot market for Austria ■ 2006: launch of spot market for Switzerland (4 TWh traded in 2007) ■ 2005: launch of futures and OTC clearing in the French market (feeble volumes in 2006, no more trades in 2007) ■ Dec 2007: decision to merge with Powernext	16%	22%
APX NL	No report of development abroad	16%	18%
Powernext	■ Dec 2007: decision to merge with EEX	6%	9%
Belpex	No report of development abroad	1%	9%
APX UK	No report of development abroad	3%	3%
EXAA	■ Launch of spot market operations in Germany and Switzerland: small volumes in Germany, termination of service in Switzerland	3%	3%

Notes: 1 spot ratio = power exchange spot volume / country electricity consumption
2 this ratio accounts for Spanish transactions only, but a 2007 new accounting regulation made the exchange's spot figures soar
Source: Power Exchanges websites – Capgemini analysis, EEMO 10

OMEL and OMIP

OMEL's spot volumes soared to 243 TWh in 2007, after a 50% crash between 2005 and 2006.

This rebound can be explained in two ways. First, a new regulation decided to assimilate bilateral contract volumes to the spot volumes of the exchange, reversing the regulation of 2006. Second, volumes for delivery in Portugal started to bolster the activity, as of July 2007.

OMIP offers physical and financial futures contracts, as well as clearing services for OTC forward trades. In 2007, OMIP registered futures volumes of 22 TWh and OTC clearing volumes of 3 TWh. This represents a growth of 400% in 2007, but derivatives trading (in Spain and Portugal) had just started in July 2006. Besides, volumes for derivatives trading on the OTC market amounted to 41 TWh in 2007, while volumes traded on OMIP came mostly from auctions (VPP for instance).

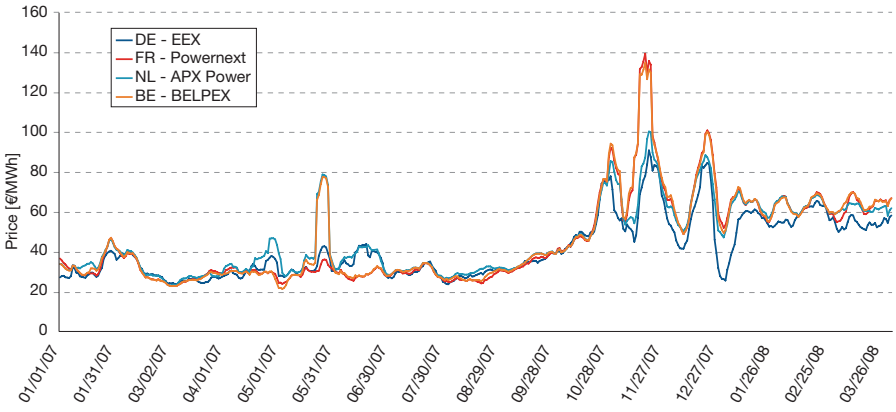
Powernext

Powernext's 2007 activity was split between spot volumes of 44 TWh, futures volumes of 79 TWh and OTC clearing volumes of 4 TWh (Powernext started offering OTC clearing services in March 2007). In July 2007, the exchange launched continuous day-ahead and intraday trading. In December 2007, the exchange sold Powernext Carbon to NYSE-Euronext and the emissions exchange was renamed Bluenext. In the context of increasing energy prices, the French government allowed I&C customers having chosen market contracts to opt back to regulated tariffs, thus hurting the trading volumes for physical contracts. In addition, with the French market being correlated to Germany's, many traders prefer dealing in Germany, as the French market is less liquid than the German one (EDF controls the physical market with its hands on 85% of generation capacities).

APX Power and Endex in the Netherlands

In 2007, spot market volumes on APX reached 21 TWh (+8.5%). In 2007, Endex booked a 13% drop in its futures volumes (28 TWh), following a 39% drop in futures volumes between 2005 and 2006. In addition, OTC clearing volumes fell by 26% to 73 TWh (to be put into perspective after a 87% rise between 2005 and 2006).

Table 2.6 Electricity spot market prices on the continental markets



Source: Power Exchanges web sites – Capgemini analysis, EEMO10

All in all, volumes at Endex decreased in 2007 and two intertwined reasons can be identified: first, Essent and Nuon's dominant positions, and second, the uncertainty caused by the merger project which was discussed at that time.

APX and ICE Futures in the UK

In 2007, spot and prompt volumes at APX UK rose by 6% to 10.6 TWh. In February 2008, APX UK started an OTC clearing activity. ICE Futures is primarily an exchange for the oil market. Yet, it offers power futures contracts (base and peak) for delivery in the UK and OTC clearing services. In 2007, ICE Futures' volumes collapsed by 65%. As a whole, the UK wholesale market is still dominated by OTC transactions.

Belpex

Belpex launched its spot market in November 2006, offering hourly products on the Belgian network. Simultaneously, a trilateral market coupling with Powernext (France) and APX (Netherlands) was launched. Due to market coupling, Belpex's prices have been strongly correlated to Powernext's and APX's, right from the beginning of trading operations.

For its first year of trading, Belpex recorded total spot volumes of 7.6 TWh. Daily traded volume has continued to increase throughout the beginning of 2008. In March 2008, Belpex launched continuous day-ahead and intraday markets. In April, SPE joined this market hence increasing the liquidity.

Significant new steps of market integration have been reached towards a single continental wholesale market for Western Europe

Establishing a unique European power market would allow three main benefits for the European energy sector:

- A greater flexibility to handle security of supply issues thanks to a wider energy market in contact with a larger scale of resources,
- Improved liquidity, power price convergence and reduction of short term price volatility,
- Increased competition in Europe through minimization of interconnection constraints.

The consolidation of the power exchange business is accelerating:

- Powernext/EEX: In December 2007, Powernext and EEX signed a cooperation deal regarding their spot and futures trading operations. This deal entails:
  - A merger of their spot markets (the new exchange being based in Paris), scheduled for the end of 2008,
  - A merger of their derivatives markets (the new exchange being based in Leipzig), scheduled for the beginning of 2009,
  - A centralization of clearing as of April 2009, with all transactions being cleared by ECC AG, EEX's clearing subsidiary.
- OMEL/OMIP: Spain and Portugal had agreed in March 2007 to implement a single Iberian power market (OMI) by the end of 2007, by merging Spain's OMEL day-ahead market with Portugal's OMIP futures market. Political delays have nevertheless slowed down the process, with ongoing discussions over the future location of the OMI.

Belpex, Europe's first project of market

Energy markets and regulation of financial markets C[/]M[/]S[/] Bureau Francis Lefebvre

The opening of energy markets has revealed some similarity with markets in financial instruments. The need to balance electrical systems in real time, the influence of technical and climatic hazards on generation and supply, and short term demand inflexibility require securities: forward, futures, and derivatives products that are sold and purchased on power and gas exchanges. There remain, however, strong differences. In energy, there are physical markets (spot trading, long term products, etc.), the existing power exchanges are not regulated markets and only deal with part of long term contracts, security of supply generates requirements that have no equivalent on financial markets, and situations are still fairly different in the 27 national markets.

In December 2007, the **EC delivered two joint mandates** for technical advice to:

- CESR[a] and CEBS[b] **on the functioning of commodity derivatives markets and on differences in the treatment of players,** especially the various firms providing investment services / activities in relation with energy commodities like electricity, coal, gas, and oil, under the meaning of MiFID[c] and Capital Adequacy Directive[d],
- CESR and ERGEG **on whether a better functioning of wholesale electricity and gas markets could be achieved** through an adaptation of Directives on markets in financial instruments (record keeping, transparency of transactions, etc.).

1. **The industrial nature of a great number of operators and the existence of physical contracts (both spot and long term) raise strong debates about implementation of MiFID that now covers commodity derivatives markets.** These debates include questions like: Where should the boundary between physical and financial markets be placed, and therefore, which regime should be applied to energy sale and purchase contracts? Which set of rules should apply to energy operators once they are acting on markets qualified as financial markets (licenses, prudential rules, capital requirements, market transparency, etc.)? Which regulator should monitor such activities? Should the current exemption for commodity buyers/sellers that are marginally acting on financial markets be renewed?

CESR and CEBS have not identified systemic risks. Their advice could be to adapt the exemption and to draw up a specific regulation (in particular as regards equity) for undertakings that specialize in commodity derivatives contracts, inter alia, energy traders. As regards energy operators, the major point at stake is the avoidance of double regulation: in the UK, FSA and OFGEM have set up a unique simplified regime for all long term contracts, both physical and financial, in relation to power, gas, and oil.

2. **CESR and ERGEG issued in July a preliminary advice about whether it makes sense to extend Market Abuse Directive (MAD)[e] to wholesale power and gas markets** that are subject to low levels of transparency, informational asymmetry between some incumbents and their competitors in commodity derivatives markets, and strong market powers (dominant positions and pivotal situations). They first noticed that this Directive does not encompass either physical contracts, bilateral contracts, or contracts passed on non-regulated marketplaces. They further observed real and growing risks of manipulation on wholesale prices due to such asymmetry on markets dominated by sellers. However, rather than an extension in scope of MAD, they suggested drawing up a specific regime for power and gas markets, monitored by energy regulators and based on principles laid down by Regulations on conditions for access to the networks for cross-border exchanges in electricity[f] and gas[g], on “good practices” put down by ERGEG (including on gas storage and LNG facilities), **and the Nordpool experience.**

These recommendations will probably lead to a greater role for energy regulators as regards non-regulated business, in order to improve the way power and gas markets work. But it is also unlikely that such control do not further expand to other energies (oil, coal, etc.) and to markets of negotiable allowances (CO_2) that are correlated and that explain part of price volatility.

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a) Committee of European Securities Regulators

b) Committee of European Banking Supervisors

c) Directive 2004/39/CE of 21 April 2004 on markets in financial instruments

d) Directive 2006/49/EC of the European Parliament and of the Council of June 14, 2006 on the capital adequacy of investment firms and credit institutions

e) Directive 2003/6/CE of January 28, 2003 on insider dealing and market manipulation (market abuse)

f) Regulation (EC) N° 1228/2003 of the European Parliament and of the Council of June 26, 2003 on conditions for access to the network for cross-border exchanges in electricity

g) Regulation (EC) N° 1775/2005 of the European Parliament and of the Council of 28 September 2005 on conditions for access to the natural gas transmission networks

Electricity Retail Markets

While still increasing by 0.9% year-on-year, overall electricity consumption curbed slightly for the first time in many years

Overall consumption across Europe has again increased in 2007. However, with a 0.9% growth, it started curbing for the first time over many years (the growth was 1.6% in 2005 and dropped to 1.3% in 2006). This curb was due to a decrease in energy intensity of European economies coupled with a mild 2006/2007 winter. The energy conservation mindset, which is making inroads into both industrial and residential consumer segments, appears to have yielded its first results. This likely trend is to be confirmed in the next edition of this Observatory.

2007 demand figures (see Table 3.1) show that overall electricity consumption is still increasing in only a few countries: Spain +2.9% (+4.5% in 2006), Poland +4.2% (same growth as in 2006), Norway +3.9% (same growth as in 2006), whereas high growth recorded in 2006 has been strongly curbed in 2007 for other countries such as Finland +0.4% (+5.7% in 2006), Austria -0.1% (+5% in 2006) and Ireland +2.3% (+4.7% in 2006).

Only three countries recorded a clear decrease in their overall electricity consumption in 2007 over 2006: UK (-1.1%), Switzerland (-0.6%) and Belgium (-0.5%).

Skyrocketing trend of electricity retail prices across Europe

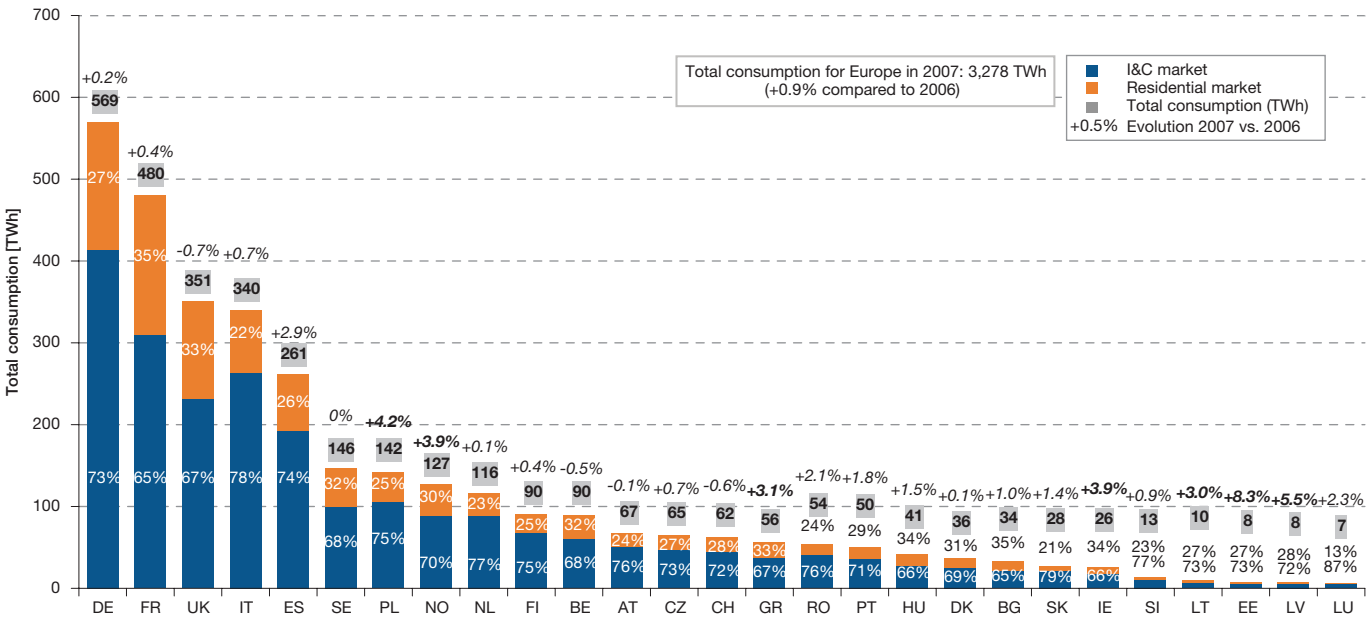
General price trends

Although the upward trend in electricity prices has been acute for more than two years in a row, the second half of 2007 and first half of 2008 in particular were characterized by skyrocketing prices, especially in countries where regulated tariffs do not exist. This increased the already noticed discrepancies of price between EU Member States, throughout all market segments.

In Germany, Vattenfall Europe increased its prices by 6 to 7% in July 2007. Then, E.ON announced that it would increase its electricity prices on January 1, 2008 by 10%, and most power suppliers raised their tariffs again by 6% in August 2008. In the UK, all suppliers announced price hikes of around 15% in January 2008, followed by hikes of 17 to 20% in July 2008. In Finland, electricity prices increased by 8 to 9% in the first half of 2008, and increased yet again this summer. In Norway, the average electricity price rose by 9% between summer 2007 and summer 2008.

In the above countries, increased price rises led to increased churn among customers.

Table 3.1 Size of I&C and Residential electricity markets (2007)



Source: UCTE, BALTSO, Nordel, Eurostat, BERR, EirGrid – Capgemini analysis, EEMO10

In countries benefiting from regulated tariffs, price hikes have been less harmful. In Spain for instance, prices rose by 3% in January 2008 followed by a 6% rise in July 2008. In France, regulated tariffs rose by 1% and 2% in August 2007 and 2008. In Italy, regulated tariffs rose by 5% in July 2008. However, in several countries benefiting from regulated tariffs, price hikes were more important. For example, electricity prices rose by 17% in Ireland in August 2008.

In all European countries, Utilities attributed early 2008 price hikes by rising fuel costs, as well as increased wholesale prices. At the same time, media, consumer associations and politicians questioned the calculations behind those price increases, arguing that the industry was taking benefit of the circumstances to increase its profits.

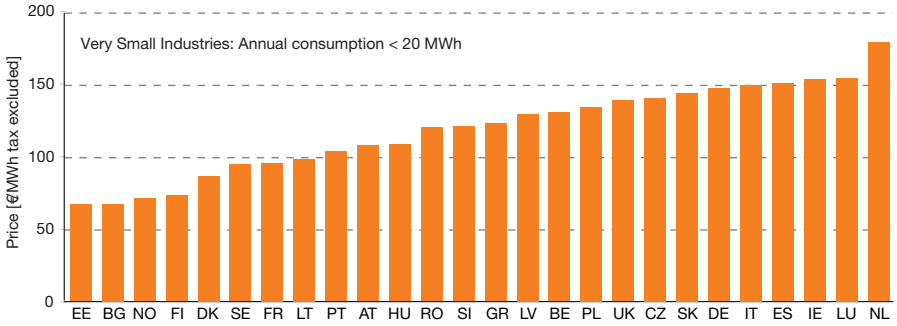
In this edition of our Observatory, we are unfortunately unable to present statistical price changes between 2007 and 2008 across EU-27, following a change in methodology used by Eurostat to calculate and report electricity (and gas) prices across Europe. We therefore report prices in all EU-27 countries for the second semester of 2007 in the following paragraphs.

I&C prices

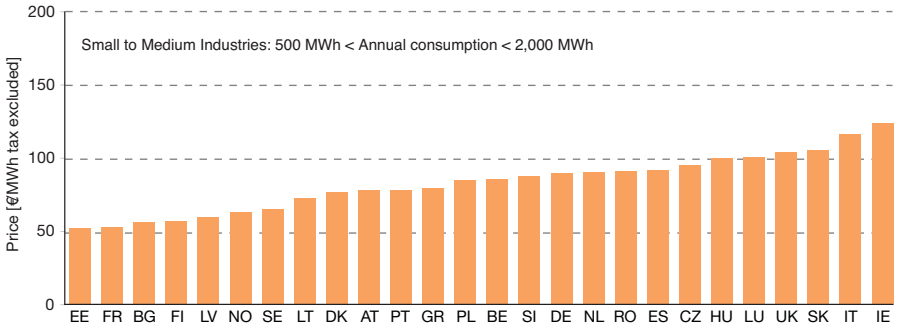
Discrepancies of price across EU States vary from €50 to €120/MWh for small I&C; from €60 to €170/MWh for mid I&C; and from €40 to €110/MWh for large I&C (see Tables 3.2).

Overall, Ireland, Netherlands, and Italy are the EU States with the highest average electricity price. Finland, France, Norway and Bulgaria, on the other hand, are the four Member States with the cheapest average electricity prices, excluding Baltic States, as some of them have no real open market yet.

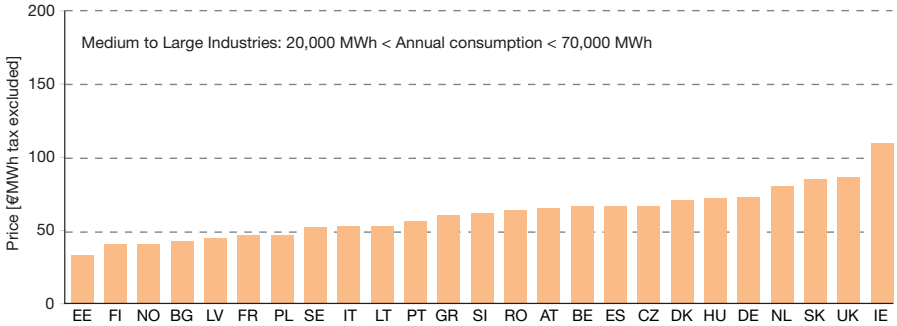
Table 3.2 I&C electricity prices (H2 2007)



Source: Eurostat – Capgemini analysis, EEMO10

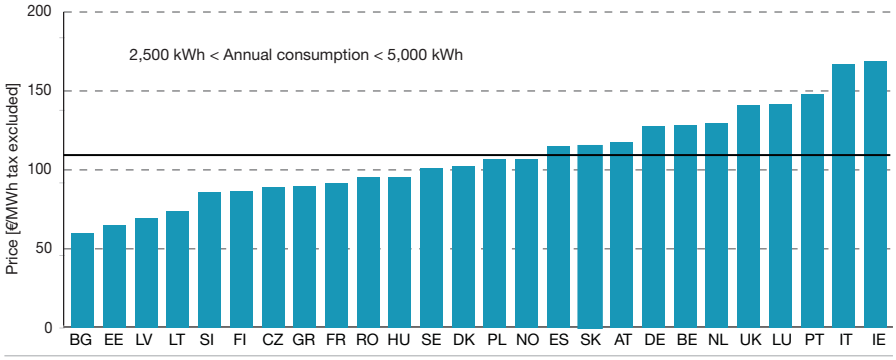


Source: Eurostat – Capgemini analysis, EEMO10



Source: Eurostat – Capgemini analysis, EEMO10

Table 3.3 Residential electricity prices (H2 2007)



Source: Eurostat – Capgemini analysis, EEMO10

One of the reasons behind such discrepancies lies in the generation mix of each Member State (French, Finnish nuclear or Norwegian hydro generated megawatts being the cheapest).

Residential prices

For residential market segments (see Table 3.3) as well, discrepancies of price across EU States are important, varying from €60/MWh to almost €170/MWh, with cheapest electricity available in Poland, France, Finland and Spain—excluding countries in which competitive markets are theoretical such as Baltic states, Greece, Slovakia; and Czech Republic—and most expensive electricity in Ireland and Italy (around €170/MWh on average), and Portugal and the UK (around €150/MWh on average).

Full market opening first anniversary: Where is the retail competition?

After a little over a year of full market opening, the picture of retail competition across Europe is still somehow paradoxical, with a significant gap between theory and reality.

In June 2007, the European Regulators' Group for Electricity and Gas (ERGEG) published a report on the status of end-user price regulation for both electricity and gas in Europe. This report—based on end 2006 research and later confirmed in the CEER 2007 annual report—stresses the fact that in 16 out of 27 EU countries, regulated tariffs are available for eligible customers, and that such tariffs are being contracted by more than 80% of electricity clients (both residential and industrial) in 14 out of the 16 countries, indicating that such tariffs are clearly not a transitory measure but rather a long term one (see Table 3.4).

Table 3.4 Status of electricity price regimes (as of end 2007)

Country	Existence of price control
AT	N
BE	N
BG	Y
CZ	N
DE	N
DK	Y
EE	Y
ES	Y
FI	N
FR	Y
GR	Y
HU	Y
IE	Y
IT	Y
LT	Y
LV	Y
NL	Y
NO	N
PL	Y
PT	Y
RO	Y
SE	N
SI	N
SK	Y
UK	N

Source: ERGEG – Capgemini analysis, EEMO10

As quoted from the ERGEG authors, "This indicates that in these countries, there is a lack of competition in the retail market, end-user price regulation being one of the factors which hinder equal access of all suppliers to customers."

While governments still heavily interfere in electricity (and gas) price control, it generates important deficits in state budgets which are sometimes difficult to offset. In Spain as a case in point, the Spanish regulator CNE expects the deficit generated by regulated electricity tariffs in the country to reach €4.7 billion at the end of 2008, 3.8 times more than the total for 2007 (cumulative deficit since 2000 approaching €14 billion). For offsetting it, the government tried to transfer the deficit to banks but all the attempts failed so far. According to CNE, the only remaining solution is to increase the tariffs by 30%, which is obviously not popular.

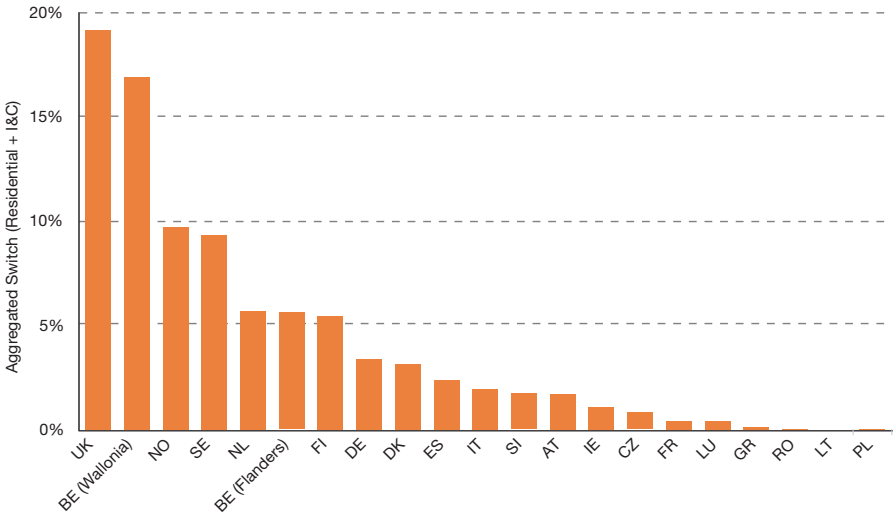
In the UK, where regulated tariffs do not exist, amid growing consumer concern over rising energy prices, initial findings of Ofgem's energy supply probe, released in October 2008, call for a package of measures to "accelerate the transition to competitive markets, many consumers not yet benefiting fully from the competitive markets". At the same time, social tariffs—the only ones accepted by Brussels' directives in order to protect disadvantaged customers at a time when bills are soaring—have also been on top of the news. Fuel poverty is said to occur when a household needs to spend more than 10% of its income on total energy use. According to Energywatch[22], fuel poverty in 2007 has reached the four million mark. During the 2008 budget discussion, instead of imposing a windfall tax on Utility company profits, the government demanded that Utility companies spend some €300 million on social tariffs over the next three years, which commentators think is a drop of water compared to 40% price increases expected just for 2008.

Finally, it is worth noting the French government's approach to regulated tariffs: a law passed in January 2008 allows consumers (both residential and I&C) to opt back to regulated power tariffs after having contracted a free market contract, hence broadening even further the use of regulated tariffs among French consumers.

Needless to say, such intervention of politics in the price setting processes in so many EU countries impacts the behavior of consumers, which in turn influences customer switching (see Table 3.5).

[22] According to EnergyWatch campaigns director Adam Scorer – September 2007

Table 3.5 Annual European electricity switching (2007)



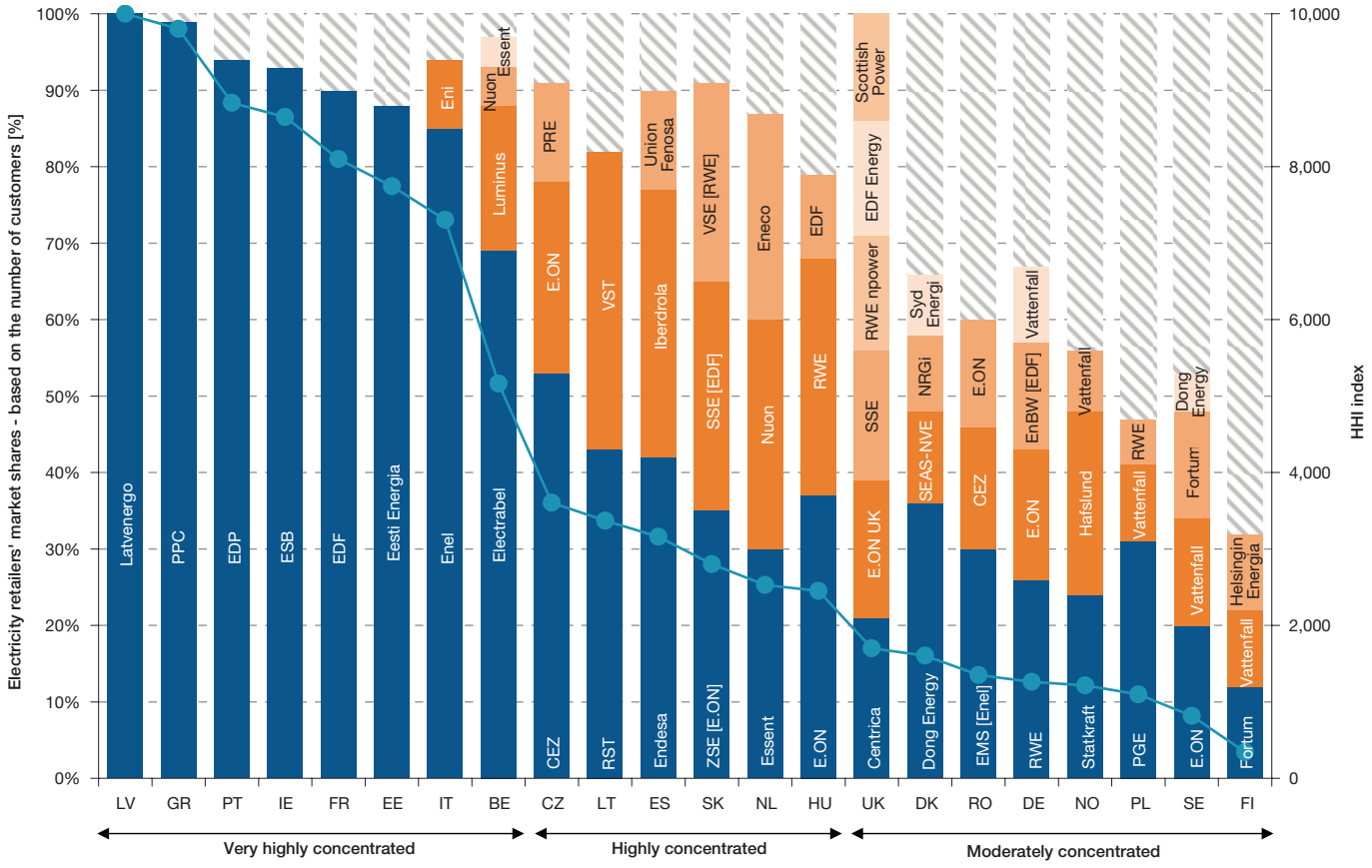
Note: 1. A "switch" is essentially seen as the free (by choice) movement of a customer from one supplier to another. Switching activity is defined as the number of switches in a given period of time and includes re-switch (when a customer switches for the second or subsequent time, even within the same 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.
2. Great Britain data excludes I&C switching but includes switches due to moving home and registering with the local incumbent. These two errors are estimated to approximately equal each other out.
3. Italy, Slovenia, France, Greece, Romania, Latvia and Poland were only fully liberalized for half of 2007. Values for these markets are extrapolated.
Source: VaasaETT – Capgemini analysis, EEMO10

The footprint of large incumbents is steadily increasing across Europe's electricity retail business

Our electricity retail market concentration indicator (see Table 3.6), released for the first time in 2007, shows even more than in the previous year that the top heavyweight European Utilities (EDF, E.ON, Enel, GDF Suez, RWE, Vattenfall), while slightly losing customers in their home market, are cumulating more and more customers across Europe, either through further commercial development into neighboring geographies (e.g. German E.ON, and RWE in Eastern European countries) or though mergers and acquisitions (e.g. GDF Suez, and Enel-Endesa).

As an illustration, the new GDF Suez group is announcing a total of 15 million gas clients and six million electricity customers. Enel's acquisition of Endesa's Spanish customer base should increase its total customer base by approximately 10 million, whereas the asset swap requested by the European Union between Enel and E.ON should simultaneously increase the

Table 3.6 Electricity retail market concentration (2007)



Note: Herfindahl-Hirschman Index or HHI, is an indicator of competition among companies. Calculations based on 2006 data when 2007 data unavailable
Source: Companies websites and annual reports, regulators – Capgemini estimation, EEMO10

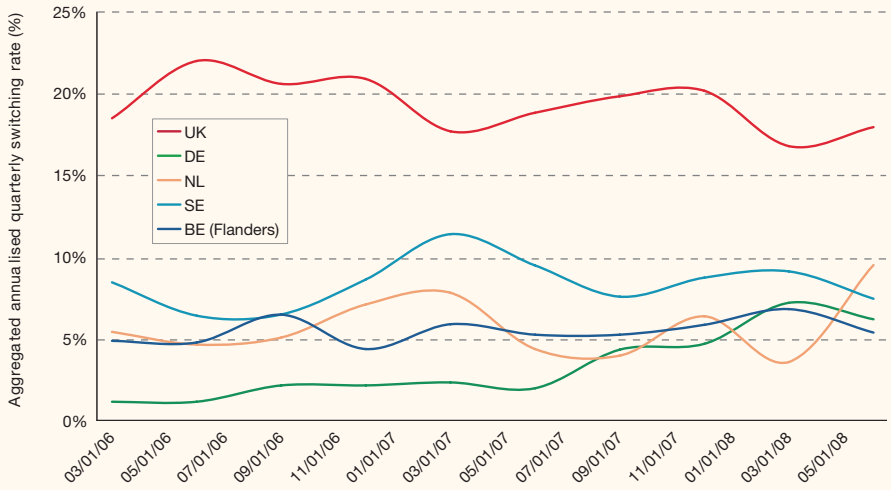
Increasing switching activity in Europe

2007 saw the opening of 13 new European electricity markets to Full Retail Competition (FRC). In terms of switching activity, while only one of these new markets can be considered active, overall switching activity in Europe is on the increase according to the latest results of the VaasaETT Utility Customer Switching Research Project.

Switching highlights in 2007/2008
The average annual switch rate in European FRC gas and electricity markets in 2007 was approximately 3%, compared with a rate of over 13% elsewhere.

2007 finally saw the emergence of significant churn in the German residential market, spurred on by spiraling prices and increased competitor activities. Approximately 3.5% of customers in the electricity market changed suppliers in 2007, increasing significantly in 2008. It is predicted to rise to a level slightly closer to that of the Nordic markets by 2009.

Selected European electricity switch trends (2006-2008)



Source: VaasaETT – Capgemini analysis, EEMO10

The UK maintained its long term lead at the top of the European switching rankings for 2007 and early 2008, fueled by market momentum, the effects of high fossil fuel dependency and sizeable retail margins in early 2007.

Walloon in Belgium for a short period overtook the UK's electricity market on the back of pre-registrations at the beginning of 2007, and then fell back to a more average, yet active level of switching. Nevertheless, the Benelux is now second only to the UK and the Nordic markets in terms of its levels of switching activity.

Big variations in activity
Most European markets now display significant switching for larger I&C customers, which is far higher than for residential customers, with cumulative market switch levels ranging up to or over 80% in some cases. Some more active markets such as Belgium and less active markets such as France display rather less activity; however, they are similar to residential markets. Gas market switching varies similarly, generally emulating electricity market levels, although in some markets such as Spain, switching has been far more prolific in the gas market.

If residential and I&C electricity market switching is aggregated, some interesting categories and market rankings can be derived for 2007/2008:

Hot Markets (15% annual switching) are defined as those markets where switching activity is so intensive that competition issues form a central role in the strategies and lives of Utilities. In 2007, the only market in Europe which truly reached this level of activity was the UK. Walloon also won its spot in this leading category through a technicality (see above).

Warm Active Markets (9.5% annual switching) are markets which are sufficiently active that Utilities risk losing serious numbers of customers if they do not actively compete. Switching momentum is significant but mainly related to occasional stimulants in the market such as price rises or profit announcements. In 2007, only two Nordic markets, Norway and Sweden reached this level of activity.

Active Markets (3.5% annual switching) are markets where switching activity leads to competitors becoming more customer-focused in the face of the threat of customer switching, but the switching itself does not pose a major threat to Utilities' pricing or profitability. In 2007, Germany, Finland, Denmark and the Benelux markets of Flanders (Belgium) and the Netherlands were active.

Cool Active Markets (approx. 1% annual switching) are markets in which switching is noticeable and measurable, but insufficient to affect any substantial change in the attitudes or behavior of Utilities. Competition is barely visible. In 2007, Italy, Slovenia, Austria, Ireland and Spain displayed such a level of activity.

Dormant Markets (0-0.5% annual switching) are markets where switching and competition exist only in theory. The markets may be officially open to competition, i.e. customers are able to choose their supplier, but in practice only larger consumers are motivated or able to do so. In 2007, France, Greece, Romania, Latvia and Poland represented this level of activity.

Cost to serve

In Europe, as well as globally, **the retail/sales part of the Utility value chain is unprofitable.** The major cause is a high cost to serve.

The high cost to serve is a result of **ineffective processes**, and a **high customer contact ratio**. Non-ergonomic IT user interfaces drive contact duration up, and require more service agents. More employees explode the overhead cost for facilities and training.

The incumbent Utilities are facing a challenging new competitive situation. The energy retail markets in Europe are opening up towards competition, i.e. the churn is rising. **Incumbents have to decrease the cost to serve, keep customer satisfaction high and minimize churn.**

Our experience indicates that to be competitive, **the incumbents have to drive down their cost to serve by 30 to 50%.** The main drivers to decrease the cost to serve are two fold—bring down the contact ratio and shorten the contact duration. Compared to the best new entrants in the Utility retail market, the incumbents generally have a contact ratio that is between 230 to 250% higher, as well as contact duration that is 160 to 180% longer than the best.

With the increasing roll out of smart meters, the residential customer billing and service processes are getting simpler. A lean Utility does not need more than 20 end-to-end business processes to handle billing and services, but most Utilities have more than 60 disruptive processes.

To improve, the **Utilities have to transform their customer value streams from being reactive to proactive problem solving**. They need to gather intelligent feedback from their customers in order to understand the sources of their problems. KPIs need to be implemented to rectify and eliminate problems. Agile end-to-end processes must be designed to solve the problems quickly, and IT interfaces need to be intuitive to service both agents and customers efficiently.

customer base of E.ON in Spain, France, Italy and Poland.

In France, 14 months after the market opening, only 1.5% of the 29.4 million households (i.e. 449,000) have opted for an alternative supplier (many of them having chosen the offer of the other incumbent Gaz de France), whereas slightly more than 7% (i.e. 346,000) of the non-residential clients have left the incumbent supplier EDF. Overall, when searching for new entrants in the electricity market across Europe, one can find new brands which are actually spin-offs from incumbent players, or which have been absorbed by incumbents. As a case in point, RWE has bought in March 2007, Eprimo, a low-cost Internet energy retailer in Germany which had a customer base of 200,000. In Germany as well, E.ON created in February 2007 the E-Wie Einfach brand, which captured 400,000 clients in one year and claims one million clients today, and Yello—the EnBW low cost retailer which was created in 1999—which claims 1.4 million customers today. However, the new "discount" brands, which are still in the perimeter of major Utilities, cannot be really considered as new players.

Innovation in energy retail is progressing slowly

In the 2007 edition of our Observatory, we commented that finding other levers than price for commodity products such as electricity (or gas) is definitely challenging. Overall, the picture for year 2007/2008 is quite unchanged from our past report.

Some of the main characteristics of today's residential retail offerings can be summarized as follows:

- **Dual offers (gas plus electricity) have made more and more inroads into European countries:** Dual offers, which were created over 10 years ago in the UK for counterbalancing the power of former gas monopoly British Gas, are now rolled out by all major Utilities in almost all geographies having a strong gas market (e.g. Germany, France, Italy, Spain, Netherlands and Belgium),
- **Green offers have increased their footprint on some European markets:** In the Netherlands, 0.9 million Essent customers have chosen Green electricity offers. In the UK, following increased skepticism from customers, the regulator Ofgem announced in July 2008 that it would launch an independent accreditation scheme for Green offers in order to give consumers greater assurance that a tariff comes with real extra environmental benefit. Today, only 3% of UK households have selected a Green tariff. However, it is also important to highlight that in some other countries like Sweden, numerous households switched from Green to Grey offers in 2007; i.e. they are no longer ready to pay a premium on top of the general price increases for environmental reasons,
- **Fixed rate offers have become very popular all across Europe as an answer to energy price hikes:** Numerous suppliers took advantage of the multiple price hikes passed onto customers over the past 18 months to create fixed price contracts with flat rates guaranteed over one to three years (e.g. RWE Treuestrom),
- **Energy efficiency focused offers are becoming the main "battleground" for European Utilities:** In our 2007 edition, we reported Poweo in the French market and Oxxio in the Netherlands proposing to their clients a wireless energy consumption monitoring device. Such offers are now being rolled out by large incumbents. As a case in point, in April 2007, E.ON UK launched an Energy Saver package to help its customers track energy use and save money. The package includes a free energy monitor which tracks consumption, coupled with capped electricity (and gas) prices until October 2009.

In France, EDEV Téléservices, a subsidiary of EDF is now proposing multiple home services under the Edelia brand. One of them enables—through an energy box and a radio device connected to the meter—the monitoring of residential electricity consumption on a day by day basis in a similar way as the Poweo "box" does.

In Spain, the government has decided to revise its electricity tariffs structure to encourage greater energy efficiency. Under the new tariff structure, which has taken effect on July 1, 2008, all residential customers are not charged for the first 12.5 kWh used each month, whereas rates rise progressively, increasing by as much as 9% based on usage, to penalize heavier power users.

Finally, to attract more customers, some suppliers rolled out marketing campaigns offering low energy light bulbs for free. Eneco in the Netherlands handed off 30,000 such units, while Enel gave away eight million units.

Demand Response: How Europe could save Gigawatts, billions of euros and millions of tons of CO_2

Peak demand is expected to grow by about 1.8% per year for EU-27 by 2020. Electricity accounts for a sizable portion of today's CO_2 emissions. **If Europe continues to follow present consumption trends, it will fail to meet its climate change objective of 20% of CO_2 reductions by 2020**. Demand Response (DR) refers to any program which communicates with the end-user regarding price changes in the energy market and encourages them to reduce or shift their consumption.

DR alone would achieve 25 to 50% of the EU's 2020 targets related to energy savings and CO_2 emission reductions according to a dynamic scenario developed by Capgemini [a].This dynamic scenario is an ambitious but necessary goal for Europe. However, in reality, it will prove to be a major challenge. The results are unlikely to be achieved with the current level of commitment by Member States and the energy industry.

There are a number of barriers preventing implementation of the dynamic scenario. These include a lower level than expected smart metering roll out in Europe. This will seriously inhibit the potential for DR as only a small proportion of customers will have the feedback, pricing and control mechanisms essentially required for effective DR. Regulators, Utilities and consumers in all Member States need to pull together if they are to stand a chance of accomplishing the results of the dynamic scenario by 2020.

For DR to reach its full potential, the following measures need to be implemented:

- **Regulators should be obliged to do all in their power to utilize DR** to achieve the 3x20 2020 objectives,
- **Authorities and regulators need to unlock regulated tariffs** which inhibit DR. Introducing financial rewards for energy savings is also an effective method,
- **Customer behavior will need to be gradually modified** through the development of customer self-awareness and a set of energy efficiency knowledge tools.

[a] For further information, see 'Demand Response: a decisive breakthrough for Europe', a study from Capgemini, VaasaETT and Enerdata, May 2008

Competitive Gas

Upstream

In 2007, European gas production decreased for the second consecutive year

Domestic production, which currently represents 39.8% of European consumption (down from 43% in 2006), has generally continued to decrease over the period. The fall in domestic production reached 6.4% in 2007, after a 4.6% drop in 2006, and a 7.1% drop in 2005. It represents a 14.3% decline of indigenous production in five years. This drop can be partly attributed to mild winters of 2006/2007 and late 2007, as well as high energy prices which drove the consumption down, but the main explanation comes from the fact that most European gas producing countries have reached their peak production and are now experiencing reserves decline. The most significant decrease in production volumes comes from the UK, where production dropped abruptly by 9.5%, accounting for 79% of domestic consumption, down from 88% in 2006 (see Table 4.1). The Netherlands also continued its structural decline with a slight decrease of 1.2%. These two countries are the largest European producers, accounting for over 71% of EU-27 production. Significant decline in production also occurred in Italy (-11.5%), Denmark (-11.4%), Germany (-8.4%) and Romania (-3.1%).

In terms of gas reserves, the decline also continued in 2007

According to Eurogas forecasts, European gas demand will rise by 43% by 2030, while domestic production is expected to drop to a third by 2020, and to a quarter by 2030. Since 1999, European gas reserves have declined by 4.8% per year on average.

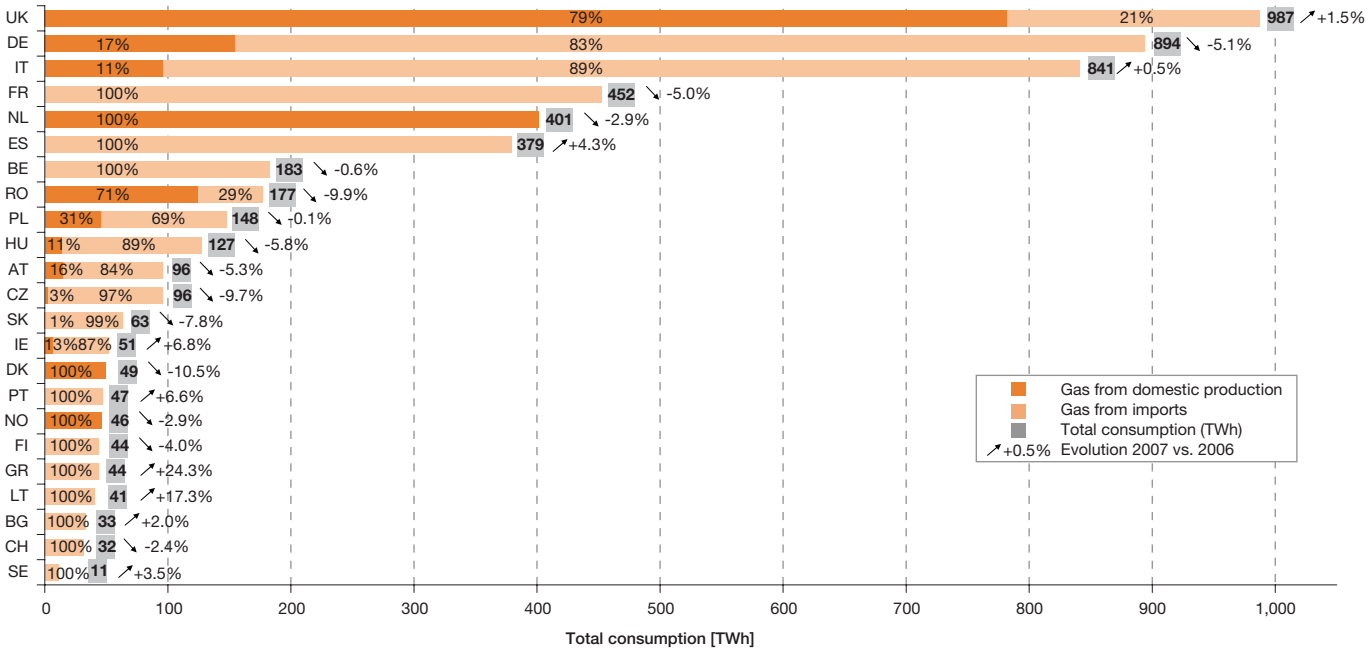
In 2007, the reserves level in trillion cubic meters globally continued to decrease (see Table 4.2). The UK, Romania and Poland managed to maintain the same level of reserves as in 2006, while other European gas producers faced a dramatic drop in their reserves, for e.g. Germany (-11.6%), Italy (-5.3%), and Netherlands (-5.2%).

In this context of thirst for gas, large reserve holders like the UK and the Netherlands are taking measures to increase the renewal rate of their reserves and to extend the lifetime of their biggest fields.

The UK for instance, offered a record number of exploration blocks in the 25th offshore licensing round which included previously unexplored acreage. This demonstrates the government's commitment to maximizing the UK's own energy resources.

In the Netherlands, the home of Europe's largest gas field (Slochteren, in the Groningen area), the Dutch government acknowledged in June 2008 that natural gas production had passed its peak, since non-Groningen fields are expected to deplete from 2008 onwards. In 2006, the Dutch government had already decided to set a production cap on the field, in order to maximize its length. For the ten year period 2006-2015 this cap is set at 425 bcm. In addition, the Dutch government is working on licensing regulation improvement to

Table 4.1 Domestic gas production vs. imports (2007)



Source: Eurogas, BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1_3,

attract new players, and is also working on fiscal incentives for new marginal fields' development. These measures should contribute to stimulate exploration activity and slow production decline.

European Union's dependency on gas imports, primarily from Russia, is steadily growing

The main external suppliers to European countries (including LNG imports) are Russia with 24% of the total net supplies in 2007, Norway with 18% and Algeria with 10%, followed by Nigeria (3%), Libya (2%), Qatar (1.6%) and Egypt (1.2%).

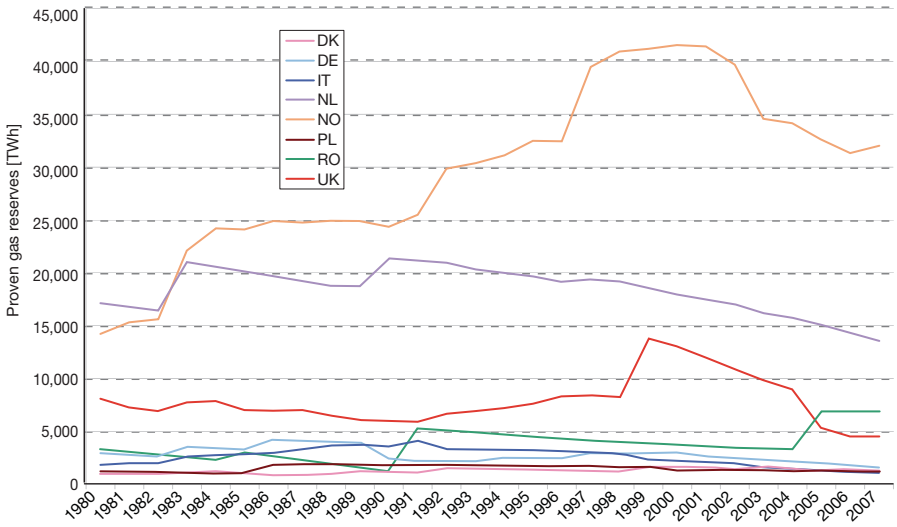
In 2007, total net European imports declined by 3.5%. Russian exports to Europe decreased by 5.6%—due to an "abnormal warm winter" according to Gazprom—while Algerian gas exports also dropped by 10.5%. Algerian gas deliveries to Spain and Portugal remained unchanged compared to 2006, while exports to Italy via the Enrico Mattei pipeline dropped from 24.5 bcm to 22.1 bcm.

In contrast, there was a slight 2.6% growth in Norwegian gas imports and a 1.6 bcm increase in Libyan deliveries to Italy. 2007 was a big year for Norwegian gas, with the first LNG shipment from Snøhvit in October, the first LNG upstream and liquefaction plant in Europe, and the start up of gas production at Ormen Lange in September. The Ormen Lange production plateau is expected to begin in 2010 and should represent around 20% of Norwegian gas production, which will ensure Norway's position as a major gas supplier to Europe for years to come.

The decline of EU-27 proven gas reserves translates into growing import dependence and will continue to do so

In Norway, although several new developments were made, there were few gas resource discoveries in 2007. First estimations for these new discoveries are around 17 bcm of gas. Additionally, the Norwegian Petroleum Directorate (NPD) estimates undiscovered resources of 1,875 bcm of gas in the Norwegian Continental shelf and in the Barents Sea, which represents almost four years of European consumption at the current rate. However, the Norwegian potential is not expected to be large enough to compensate for the decline of reserves and production in Europe and the expected growth of European gas consumption. In this context, the Norwegian parliament refused—in October 2007—a plan to

Table 4.2 Proven gas reserves (2007)



Source: BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

Key issues in Eastern Europe
The hunt is still on

Of the major trends going on in the energy space in Eastern Europe in the last years, **consolidation** was the most striking one.

In early August 2008, **Austria's OMV decided to stop their efforts to gain a majority stake in their Hungarian counterpart MOL**. This decision marked a preliminary end to OMV's efforts to expand their 20.2% stake in MOL.

Both OMV and MOL have had strategic ambitions to become a dominant player in Central Eastern Europe. In April 2000, MOL succeeded in acquiring a 36.2% stake in Slovakia's Slovnaft (later extended to make it a majority stakeholder) for which OMV had also been bidding. In July 2003, MOL again succeeded, against OMV, in acquiring 25% plus 1 share in Croatia's largest oil and gas company INA.
But in December 2004, OMV was finally able to retaliate by successfully acquiring a 51% majority stake in the largest Romanian company, SNP Petrom SA, for which MOL had also been bidding. Since then, OMV very successfully managed to integrate Petrom into its Group structure.

After the planned **merger between OMV and the largest Austrian power company, Verbund AG, failed in mid 2006**, OMV began to increase its shares in MOL. This was regarded as a hostile takeover by the MOL management and it retaliated by buying back its own shares and by selling parts of its shares to "friendly" companies such as Czech Republic's largest energy group CEZ. It was this fierce resistance from the MOL management and Hungarian politicians combined with weaker support than expected from the European Commission that made OMV halt their plans.

However, this does not mean that MOL and OMV stopped competing with each other in the Central Eastern European arena. Only days after their decision to stop their takeover plans for MOL, OMV redirected their interest in acquiring a 14 to 19% stake in Croatia's INA for which MOL had been negotiating with the Croatian government. Whereas MOL is offering a share swap deal, OMV is reported to offer a cash bid. Recent signals from the Croatian government are increasingly in favor of the MOL offer. Time will tell. **The hunt between the old rivals MOL and OMV is still on.**

accelerate gas production in the Troll field (the second largest gas field in Europe). Norway chose the path of restrained production which will favor an extended plateau at lower than maximum possible production levels, instead of increasing production to sustain a short term production boost.

In addition, as all the major Russian gas fields are either 50% depleted[23] (Urengoy, Yamburg and Medvezhye) or at plateau (Zarpolyarnoye), many observers are worried that the lack of investments in upstream in Russia might constrain supply, raising some concerns about Russia's ability to guarantee gas supplies to customers. The challenges for Gazprom are important since second tier giant gas fields lie in difficult areas: Bovanenko (holding between 1,700 and 3,400 tcm of gas) lies on the Yamal peninsula below permafrost, and Stockman which will be exploited with Total and StatoilHydro (holding 3.7 tcm of gas) lies out of helicopter range in the Barents Sea. Furthermore, as Russia seeks to diversify its client portfolio (the Sakahlin projects will see East Siberian gas entering the Asian markets for the first time), it could cause a reduction in the quantity of gas available for EU countries.

Another element putting pressure on European gas markets is the perspective of the creation of a GAS cartel (GASPEC). Since the establishment of the Gas Exporting Countries Forum (GECF) in 2001, there has always been speculation, particularly in Europe, that the world's largest producers of natural gas, in particular Russia and Iran, intend to create a gas cartel equivalent to OPEC which would set quotas and prices. However, Russia and Iran did not manage to coordinate in time the charter of the Forum of gas-exporting countries which was announced to be held in June 2008 because of some disagreements. The next forum has finally been scheduled in november 2008 in Moscow. The collapse of gas prices during summer 2008, which are indexed on oil prices, could lead to a consensus driven by Moscow to actually set up a gas cartel aiming at controlling prices.

European companies have launched several new pipeline projects to diversify imports

European countries and gas operators facing a considerable gas supply challenge are currently engaged in discussions about new pipelines (see Table 4.3). If all these projects come online at the expected time, they will provide a supply of over 130 bcm per year. These pipeline projects will increase gas supply from countries such as Algeria (Galsi, Medgaz and Transmed), Libya (Greenstream pipeline), Russia (Nordstream and Southstream) or from the Caspian region (Nabucco, Turkey-Greece-Italy pipeline and Whitestream). The three most significant new routes in terms of volumes are:

- **Nabucco:** A 3,300 km long gas pipeline project, approved by the European Union in 2007, which will offer an alternative to Russian gas, transporting natural gas from the Middle East and Caspian region to Western Europe. The expected supply capacity is forecasted at a maximum of 31 bcm/year of natural gas, representing 6% of annual European consumption. Project costs are estimated around €7.9 billion (a 58% rise since last year). The project is expected to begin construction in 2010 and end by 2013, with initial start up of operation and marketing by 2012. OMV, MOL, Transgaz, Bulgargaz, Botas and RWE (who became shareholders in February 2008), each own 16.67% of the project. Gaz de France was also interested to get a stake in the pipeline, but was rejected by Turkey. There are speculations that Gazprom may also be interested in participating in the project,
- **Nordstream:** A 1,200 km long off-shore natural gas pipeline owned by Gazprom (51%), Wintershall (20%), E.ON Ruhrgas (20%) and Gasunie (9%) who joined in June 2008. It will ensure supply between Russia and Northern Germany across the Baltic Sea. Operations are scheduled to start in 2010, with a capacity of 27.5 bcm/year[24],
- **Southstream:** A 900 km long pipeline that will take Russian gas under the

Key issues in Italy

High dependency on natural gas is increasing energy costs and reducing security of supply
The Italian share of natural gas consumption against total energy consumption is 38%, well above the EU-27 average (25%). Also, 65% of the Italian thermoelectric production is fuelled with gas.

Italy's high reliance on natural gas has negative implications on energy costs. With the recent oil price increase, the gas price, which is indexed to oil, has dramatically increased and so has the Italian electricity price. High dependency on gas also means limited energy source diversification.

Measures to address gas reliance are needed and should include the use of alternative energy sources and the implementation of further energy conservation programs.

In fact, some measures have already been taken. The center-right government has launched a series of initiatives around nuclear power generation and so has Enel, whose strategy includes the development of clean coal and renewables.

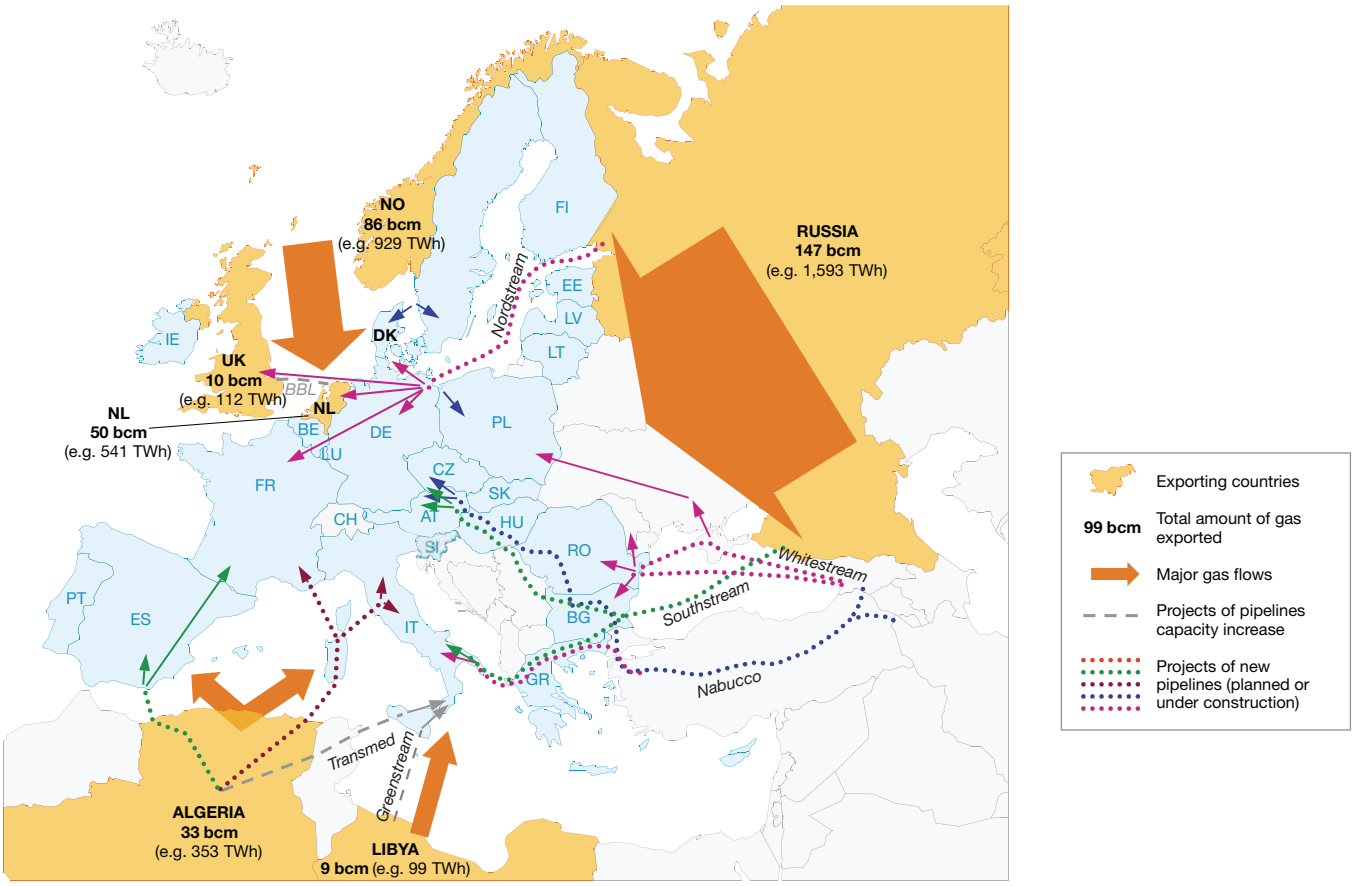
Eni's acquisition of Distrigas and Enel's acquisition of Endesa are landmarks in the consolidation process of the European energy market
On May 29, 2008, Eni signed an agreement with Suez-Tractebel for the acquisition of a 57% holding in the Belgian company Distrigas. Eni gas sales, at 99 bcm in 2007, increased through Distrigas' acquisition by 19 bcm and the Italian company becomes the first gas supplier in Europe.

More than one year before Eni's moves, Enel started its maneuvers for the acquisition, in partnership with Acciona, of Endesa. The initiative reached a positive solution when E.ON decided to withdraw its offer in exchange of some European assets of Endesa and some Spanish assets of Enel and Acciona.

In the same time period, i.e. April 2007, Eni and Enel concluded a joint acquisition of some of the assets of Yukos, a Russian oil and gas company, thereby expanding their operations scope beyond European borders.

[23] Source: V. Milov, Institute of energy policy , UFG Russia one on one conference, London, Feb. 2004

Table 4.3 Gas imports through pipelines and pipelines projects (2007)



Source: European Commission, BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

Black Sea to Europe. It is planned to carry 31 bcm/year. In 2008, Hungary and Greece officially joined the Southstream project.

Other projects such as Whitestream with an 8 bcm/year capacity or TGI (Turkey-Greece-Italy pipeline) with also an 8 bcm/year capacity are expected to contribute to reduce dependency from Russia. In terms of status, most of these projects (Nabucco, Southstream, Galsi, TGI) are simply plans at this stage and the final investment decisions have not been made so far. Only three projects are currently under construction or authorized: Nordstream, TAP (Trans Adriatic Pipeline) and Medgaz.

This pipeline development will not be enough to fill the gap of missing domestic production and should contribute to the pursuit of LNG imports expansion, even though European LNG imports decreased by 8.5% in 2007 (see LNG chapter). The main source of new supply will be West Africa (Nigeria), Qatar and possibly Iran, depending on geopolitical evolutions.

European gas companies are trying to develop cooperation and swap agreements with NOCs to secure their access to gas

The top 16 European gas producing players who represents around 90% of European production (EU-27+Norway) are not in the same position regarding reserve base diversification (see Table 4.5).

Large oil companies such as ExxonMobil, Shell, Total, Conoco or BP are international players; however, some companies are local operators and have no access to gas reserves other than the ones located in their home country (Petoro, EBN, Centrica, Romgaz and PGNiG). Other regional players such as StatoilHydro, Eni, BG Group or OMV have access to gas reserves located outside Europe which eventually enable them to provide gas to their home country.

Also to be noted, gas and electricity Utilities such as GDF Suez or Centrica are moving up the value chain in order to secure direct access to supply. On the contrary, producers such as Sonatrach, Gazprom and StatoilHydro (three of the top six gas suppliers in EU-27 along with Shell, ExxonMobil and BP)[25] want to move downstream.

Asset swapping illustrates—in addition to other movements such as Merger & Acquisition—the trend that is currently going on and which sees Utilities or gas supplying companies achieving vertical integration

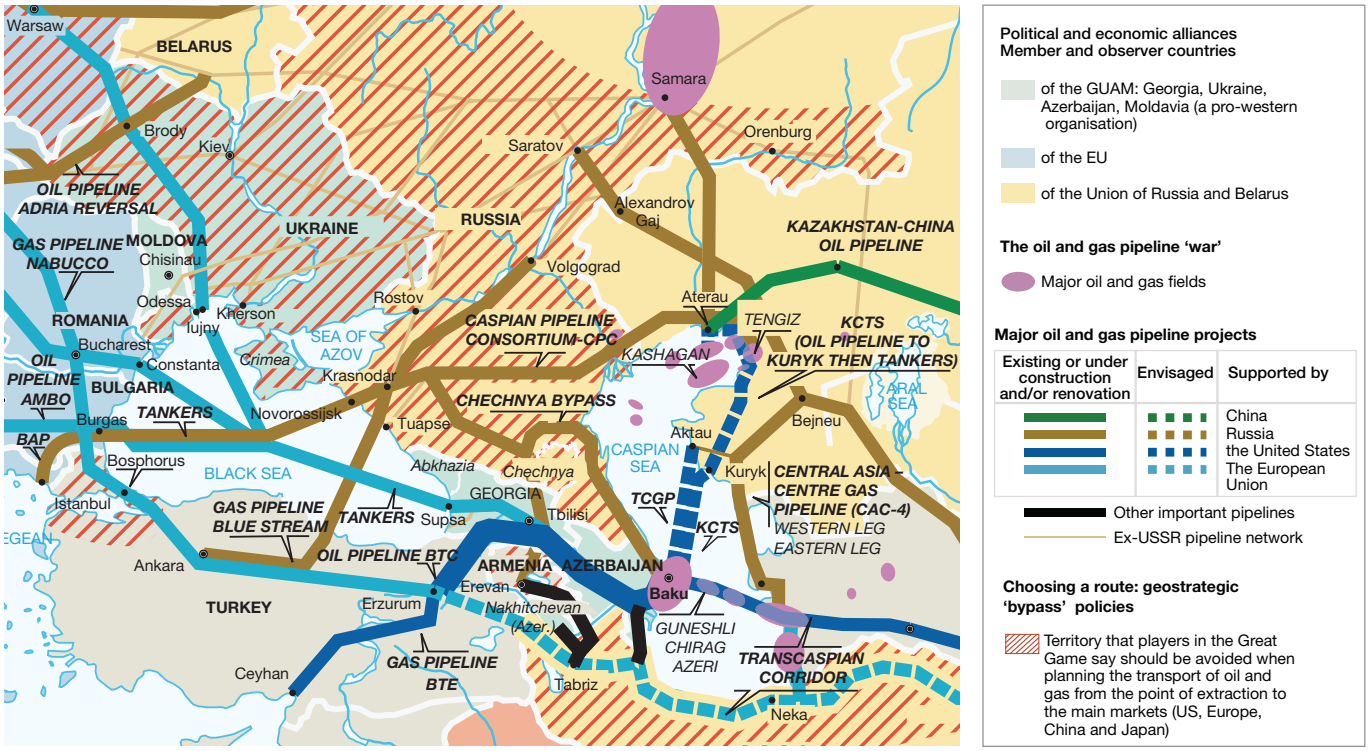
European gas producing players are currently trying to secure their access to gas reserves by developing partnerships with supplying companies (mainly national oil companies) and swap agreements:

- Eni (the largest gas importer in Europe)[26] recently offered its stake in Libya's Elephant field to Russia's Gazprom, as part of their asset swap deal signed in November 2006, which aims at securing

[25] Source: Cedigaz, The players on the European gas market 2008 edition

[26] Source: Cedigaz, The players on the European gas market 2008 edition

Table 4.4 Gas pipelines in the Caucasian region (2007)

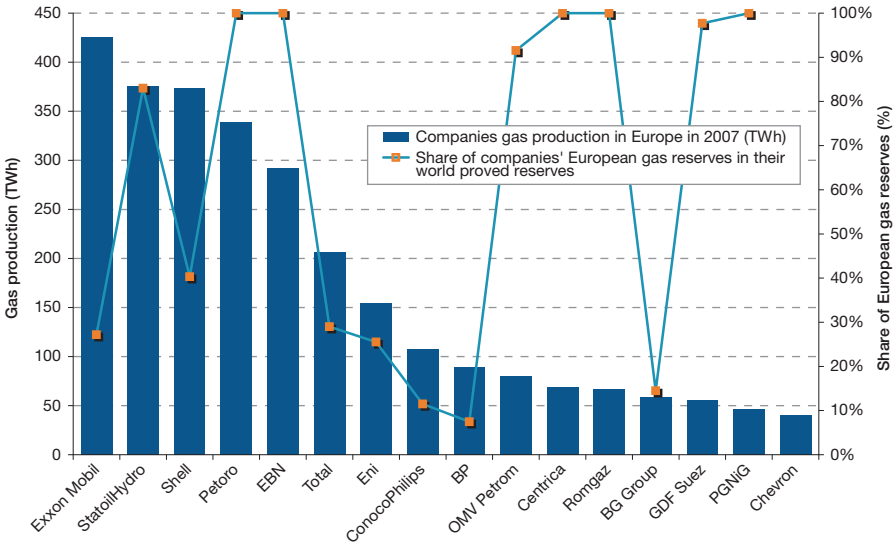


Source: http://maps.grida.no/go/graphic/major-oil-pipeline-projects – Capgemini EEMO10

Eni's access to gas production in Russia in exchange of assets in Italy and third countries for Gazprom. Gazprom also intends to buy back the 20% stake that Italy's Eni holds in its oil branch GazpromNeft for $4 billion,

- E.ON (the third largest European gas importer) was finally granted early October 2008 25% minus one share in Gazprom Yuzhno Russkoye gas field. In return, E.ON stakes in Gazprom are reduced by 1.4%,
- Gaz de France (the fourth European gas buyer), who also signed a cooperation agreement with Gazprom in 2006, announced in May 2008 that they have signed a letter of intent outlining the major terms under which Gazprom will become an equity partner in the proposed Canadian Rabaska liquefied natural gas regasification project, and contract for 100% of the import terminal's capacity. Using the Rabaska terminal, Gazprom expects to import Russian LNG supplied from the Shtokman liquefaction project currently under development,
- StatoilHydro signed a partnership agreement with the Algerian Sonatrach to seal a long term partnership at the U.S. Cove Point regasification terminal.

Table 4.5 Gas production and European proved reserves by company (2007)



Source: Companies annual reports – Capgemini analysis, EEMO10

Under the terms of the contract, Sonatrach will receive access to 2 bcm/year of regasification capacity at the Cove Point terminal for 15 years from the beginning of 2009. As part of the arrangement, StatoilHydro will also purchase 1 bcm of LNG per year from Cove Point from 2009 to 2014,

- Energias de Portugal (EDP) signed a deal with Sonatrach in which the Algerian NOC will take a 25% share of three CCGT (one of which will be in Spain). Additionally, Sonatrach's shares in EDP will increase from 2% to 5%. In turn, EDP has secured long term gas supply for the expansion of its Iberian gas business.

LNG

European countries are getting prepared for a more active and competitive LNG market

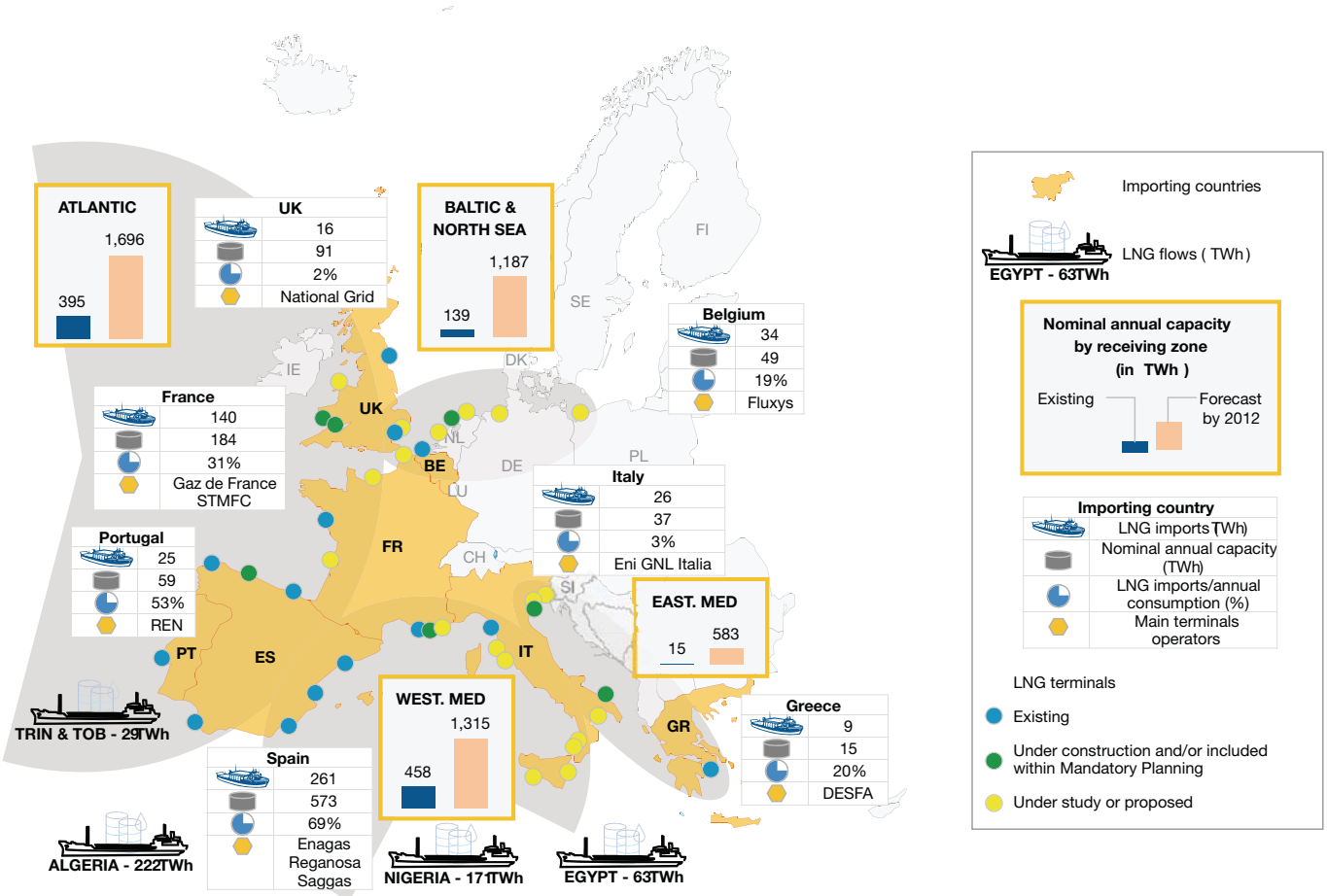
In 2007/2008, a significant growth in new projects was registered, in particular in the North and the East coasts. Consequently, there is a rebalancing between maritime zones which will ensure better penetration of LNG in Europe. Fourteen regasification terminals currently exist, while nine new terminals are under construction or mandatory planning (see Table 5.1). In addition, there are 30 potential projects that have been announced in the past years.

The classification of LNG importing countries might strongly evolve with all the recent project announcements. If all the projects announced come on stream, the UK and Italy could make up for their lost time; the UK, for example could add up to 1,155 TWh by 2012.

Most activity took place in the UK with seven new projects being announced in winter 2007/2008, the most important being the announcement of a 324 TWh terminal project made by Canatxx. In Spain, the additional capacity should be reached through extension of existing capacities.

In 2012, if all infrastructures projected are built, total regasification capacity in Europe could reach over 4,700 TWh, from around 1,000 TWh in 2007. This forecasted increase is however to be regarded with caution, since many projects have only been announced and have no final investment decisions or legal authorization.

Table 5.1 Map of LNG terminals and flows (2007)



Source: GIE gle, BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

Table 5.2 LNG imports to Europe (2007)

In TWh	From										
To	Trinidad & Tobago	Norway	Oman	Qatar	Algeria	Egypt	Libya	Nigeria	Total LNG imports	% of total Europe	Evolution 2007 vs. 2006
Belgium	0.8	-	-	29.7	3.8	-	-	-	34	7%	-26%
France	0.6	0.8	-	-	84.8	13.1	-	40.8	140	27%	-7%
Greece	-	-	-	-	5.4	3.3	-	-	9	2%	65%
Italy	-	-	-	-	26.2	-	-	-	26	5%	-22%
Portugal	-	-	-	-	-	-	-	24.9	25	5%	17%
Spain	22.6	0.8	1.3	48.1	46.7	43.6	8.2	90.0	261	51%	-1%
United Kingdom	4.2	-	-	2.9	6.9	1.7	-	-	16	3%	-59%
Europe	**28.2**	**1.5**	**1.3**	**80.7**	**173.8**	**61.8**	**8.2**	**155.7**	**511**	**100%**	**-8%**
% of total Europe	**6%**	**0%**	**0%**	**16%**	**34%**	**12%**	**2%**	**30%**			
Evolution 2007 vs. 2006	**-31%**	**NA**	**-88%**	**39%**	**-15%**	**-32%**	**6%**	**7%**			

Source: BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

LNG imports dropped in 2007, but the liquefaction capacity is forecasted to increase in the coming years

With 47 bcm (511 TWh), LNG imports represents less than 10% of EU-27 gas consumption. With a slight decrease of European gas consumption (-1.6%), the imports of LNG fell 8% against an increase of 23% in 2006 (see Table 5.2). Apart from Greece and Portugal, all the other LNG importing countries saw a decrease in their imports in 2007. One explanation of this decrease is that in complement to flat load contract, LNG is used as a peak load adjustment, especially in the UK. With the mild winter, less additional flexibility was required, reducing the need for more LNG imports.

The relative reduction in the imports of LNG in Europe is due to a milder winter than expected, tension on the level of production (e.g. caused by delays in liquefaction projects), and competition at the level of the imports (strong demand from Asia) involving arbitrations towards the zones at higher prices.

The source of supply changed significantly in 2007. Imports from Qatar, Nigeria and Libya rose, while imports from Trinidad & Tobago, Oman, Algeria and Egypt dropped dramatically. These changes can be mainly explained by both a growing demand in the domestic market and arbitrages on the spot market for countries such as Qatar, Oman or Trinidad and Tobago.

In terms of supplying companies, the market is dominated by NOCs like Qatar Petroleum (world's largest LNG producer), Petronas (Malaysia, which also produces LNG in Egypt), Pertamina (Indonesia) and Sonatrach (Algeria, which has access to the US and UK regas facilities and is the most active state-owned company on the spot market).

Major listed companies are also important players on the production side, since they either invest in liquefaction capacity, and/or operate liquefaction plant(s). Very active players in this market are oil and gas majors like Shell, BP, Total, ExxonMobil, Eni, Repsol-YPF or BG Group, which is a major LNG player as 70% of its hydrocarbon production is gas. A few newcomers produced their first LNG in 2007 thanks to the start-up of Snøhvit in Norway (StatoilHydro, Gaz de France, Hess and RWE).

All these suppliers, especially NOCs, have plans to increase their liquefaction capacities. For instance, Sonatrach should raise its LNG exports by 2012 after the reconstruction of the Skikda liquefaction plant. NNLG of Nigeria has also made several announcements about the extension of liquefaction capacity, which remained unchanged in 2007 mainly due to attacks on facilities. In 2007, Libya NOC held an exploration and production round mainly focused on gas, and signed a deal with Eni in October 2007 to build a new liquefaction plant in order to multiply by two Libyan LNG exports.

Also to be noted, Gazprom plans to move into the LNG market in 2009. In April 2007, the shareholders of Sakhalin Energy Investment Company Ltd. (Sakhalin Energy) signed a sale and purchase

agreement with Gazprom to trigger the transfer of shares in Sakhalin Energy. Under the new shareholding structure of Sakhalin Energy, Gazprom holds 50% plus one share, Shell 27.5%, Mitsui 12.5% and Mitsubishi 10%. The two-train LNG plant is planned to have a total capacity of 13 bcm/year. With the first LNG train coming on stream at the start of 2009, Gazprom is expected to become a major LNG producer, and its grip on the worldwide market is therefore likely to become increasingly strong. After Sakhalin, the next LNG project for Gazprom is Shtokman which should happen by 2013.

The activity of the terminals become more complex to plan and organize due to an increasing uncertainty in the LNG market

The average terminals' usage rate fell from 57 to 51% but showed a better distribution, although some terminals were poorly used—particularly in the UK where LNG is a swing facility. The increase in competition on a world level and soon within Europe makes it difficulty to forecast with accuracy the activity of the terminals.

Greater import capacity does not guarantee security of supply. Regasification terminals are of great value provided they are fully used. If too many regas terminals are competing for too little LNG then the value of each regas terminal is reduced; besides, today, liquefaction capacity is equal to half of all regas capacity worldwide. In a supply constrained world, a customer without a long term contract is not a priority for a producer.

On a security of supply view, however, adding regasification capacities appears to be important in order to rebalance the imports zones that are currently mostly located in Spain and in France and to reduce transportation costs. Furthermore, according to Cedigaz, LNG demand in Europe might grow at an average of 9.5%/year by 2015. Substantial investments in regasification capacities are therefore needed in the medium to long term to make all the necessary additional volumes available to Europe.

Key issues in France

After one year of complete market opening (both for electricity and gas), the French retail market remains very quiet.
The French Senate has approved a continuation of regulated tariffs beyond 2010 and TaRTAM still allows customers having chosen competitive market offers to opt back to regulated tariffs. Considering this outcome and the fact that wholesale market prices do not offer the opportunity for retailers to be competitive in comparison to regulated tariffs, no market development could be expected in the near future.

This situation also has a negative impact on the development of energy savings and demand response policies.

In the meantime, the wholesale market continues its progression towards market transparency:

- OTC transaction is still the preferred way to manage power deals, but volumes traded on the power exchange progresses,
- Market coupling project for the CWE region is on track and GRT Gaz and Gaz de France have entered Powernext capital with the intention to facilitate the creation of a gas power exchange.

On the generation side, **EDF consolidated its leading position in the nuclear domain** with the construction of the Flamanville EPR reactor launched in 2007 as well as several commercial successes abroad (e.g. signature for the construction of two EPR reactors in China).

In the meantime, **wind power continues to progress and France is now the third European market for wind energy in terms of development rates**, with more than 1,000 additional MW installed in 2007.

As for gas, **LNG confirms its progression** and the French regulator's report recommends revising the third party access obligation in order to stimulate the development of new LNG terminals.

The European Parliament rejected the proposition backed by France to allow energy producers to keep property on transmission assets. This will open a new round of negotiations which poses a question mark on the future strategy of French Utilities.

As forecasted, the **mega merger Gaz de France-Suez** is now effective, creating a new giant both on the gas and electricity market.

Competition will accelerate with the arrival of new players

The projection of the capacities by country and main players at horizon 2015 indicates a very atomized market. A new terminal building requires important investments based often on joint venture, mainly between the local downstream gas retailer and a major upstream LNG supplier.

Enagas is the first player by its capacity available and the number of terminals, but its presence is limited to Spain. New group GDF Suez comes second with a majority presence in France and Belgium and a new project in Italy.

New players such as Canatxx, a North American player, add significant competition to the European LNG market. Power Utilities such as EDF, E.ON and Poweo, are also moving into the LNG business.

In a market becoming more complex, new regulation is necessary

Energy regulating bodies are currently working with LNG players in order to define rules that will allow achieving the right level of investment in LNG terminals.

To encourage investment, most terminals planned in Europe have obtained regulated third party access exemptions or are in the negotiation process, pursuant to article 22 of Directive 2003/55/EC.

There are two possible approaches for achieving the right level of investment in existing LNG terminals:

- A centralized method, requiring planning of market needs and regulation of new capacity,
- A market-led method, whereby investors are free to make their decisions based on the regulatory framework and current incentives, but with a higher level of risk.

The French energy regulator CRE has commissioned a report to GTTM[27] to analyze the regulation behind France's potentially large LNG market. The GTTM has responded with a view that for French new LNG terminals, investment should be decided by the open market and not through any government body.

With regard to the regulation of LNG terminals, the Group's main recommendations point to encouraging the extensions of regulated terminals by improving the stability and visibility of the regulation framework, creating a climate which is favorable to the development of new LNG terminals - via possible exemption from regulated third party access – as well as ensuring consistency between the rules applying to regulated terminals and to exempted ones.

The GTTM said there was no need to specifically set aside a certain amount of capacity for short term access to new LNG terminals, but said that no more than two thirds of the capacity at a site should be held by any one supplier on a long term basis. The group also said that for the existing LNG terminals, a method of tarification for a period of 15 to 20 years which will define the share of risks between the operator and shippers should be established.

European energy regulators are also seeking public comment on a draft set of guidelines aimed at helping LNG system operators regulate third-party access to LNG facilities.

ERGEG said it wants stakeholders' views on a number of issues including: general questions regarding Guidelines on Good Practice on TPA for LNG System Operators (GGPLNG) scope and implementation; access tariffs to the system; TPA services; capacity allocation and congestion management; transparency requirements; and trading of capacity rights.

[27] GTTM stands for Groupe de travail sur la régulation des terminaux méthaniers (Working group on the regulation of LNG terminals). For further information, visit http://gttm.cre.fr/

Gas Wholesale Markets

The European wholesale gas market in 2007 is still strongly influenced by long term oil-indexed contracts by incumbent Utilities, and exporting and producing companies

Gas supplies to European players are still dominated by as much as 90% by long term contracts, restraining the capacity to increase liquidity in gas-to-gas market competition. Long term contracts have been signed between exporting and producing companies (like Gazprom in Russia, Sonatrach in Algeria and StatoilHydro in Norway) and incumbent Utilities (E.ON, Eni, GDF Suez, etc.).

Although in 2007 around 75% of natural gas long term contracts in Europe were indexed to oil or oil derivates, contracts linked to gas natural underlyers are increasing in the context of rising international oil prices. In the US gas market, over 60% of gas contracts are for a period of one year or less with a high level of gas-indexed underlyers.

Although gas prices went up during 2007 in the context of strong increase in oil prices, paradoxically, the oil-based long term contracts have provided some stability. The main reasons can be traced to the fact that the oil prices indexation typically includes an average of up to six months on contract valuation, as well as the more favorable evolution in the dollar's exchange rate against the euro.

While 2007 finished in a context of high volatility in the three main European gas hubs during the first quarter of 2008, day-ahead prices remained relatively stable between €22/MWh and €25/MWh (see Table 6.1).

The NBP, Zeebrugge and TTF indexes remained well correlated and converged. The physical interconnections between those three markets with BBL and Interconnector are responsible for this correlation.

During 2007 and the first quarter of 2008, the monthly average day-ahead price for the main spot markets in Europe converged to long term contracts prices, with a spread between €2/MWh and €5/MWh. This evolution reflects the influence of the oil-based market on the spot gas market.

Liquidity increased in the majority of the continental spot markets but remained moderate, still far away from the UK NBP, showing different levels of development

As long term contracts at border prices have shown more stable behavior in comparison to prices traded at the liquid hubs (such as the UK) in 2007, the oil-based market is still seen as an advantageous mechanism by market participants, even though limiting the availability of free gas for trading purposes and thus limiting liquidity in the gas wholesale markets.

Gas volume being exchanged at the main continental wholesale markets increased in 2007, either if sold for spot or forward purposes, but as explained earlier, liquidity remained moderate. On the opposite side, the UK wholesale market records for the same period witnessed a significant increase, above 40% in terms of traded volume, whereas the UK market still accounts for around half of the liquidity in the main three exchanges in Europe (NBP, Zeebrugge and TTF).

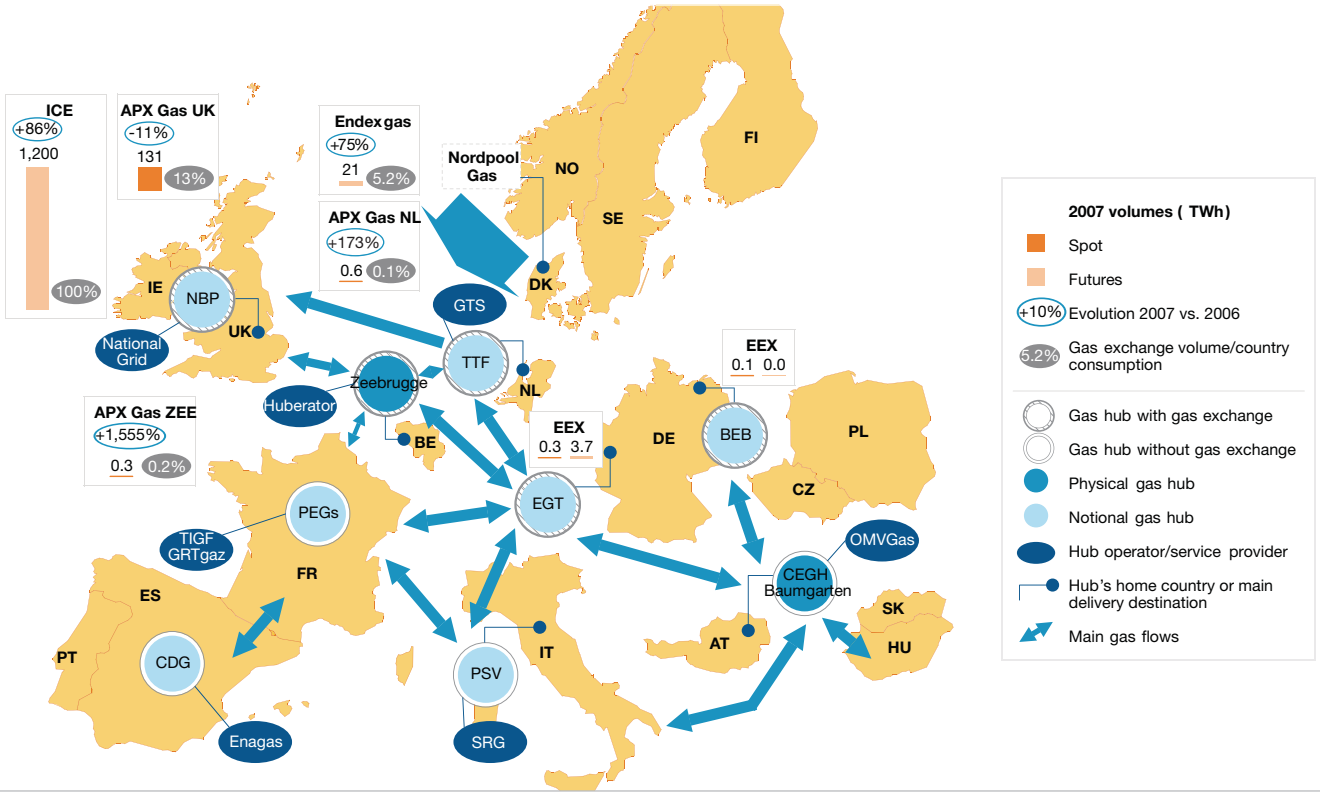
It is no surprise, wholesale markets across Europe display different levels of development in 2007 (see Table 6.2). The UK National Balancing Point, with around 10,000 TWh of traded volume, remains the most mature gas marketplace in Europe, with also a price setter for continental hubs like Zeebrugge and TTF.

The Zeebrugge Hub in Belgium and the TTF virtual point in the Netherlands are the two dominant marketplaces in the continent. Zeebrugge is the first continental market as far as liquidity is concerned (with average trading volumes in 2007 at around 35 TWh/month); however, TTF's market in the Netherlands

Table 6.1 Gas spot prices (2007 and Q1 2008)

Source: Platt's PowerVision – Capgemini analysis, EEMO10

Table 6.2 Map of gas trading (2007)



Source: Gas Exchanges websites – Capgemini analysis, EEMO10

(with approximately 25 TWh/month) is catching up with its liquidity growing rapidly. Volumes traded at the TTF, including the beginning of 2008, show a continued ramping up of trading after a minor decrease in December of 2007.

To maintain its leadership position, Fluxys (Belgian TSO and owner of Zeebrugge hub) is enhancing trading at the Zeebrugge hub by opening the transfer of gas without capacity limitations in the entire Zeebrugge area from February 2008 onwards, and driving other developments in hub capacity at the LNG terminal.

The other key continental wholesale gas markets have shown a steady increase in liquidity due to the developments and introduction of support services into the exchange platforms. As an example, PEG market liquidity has been increased by market developments, including the creation of a standard trading contract and the volume of gas made available via Gaz de France's mandatory gas release. Following a similar trend, PSV liquidity has shown significant growth in the past year; however, it remains very much an emerging rather than established market. PSV (Italy) and PEG (France) each accounted for 10 TWh/month during 2007.

Traded volume in the Spanish OTC market has increased significantly during last year. Trading contracts were signed at the regasification plants and transmission balancing point. In 2007, traded volume was higher than the physical throughput, although still low if compared with other markets. The development of a liquid market in Spain is constrained by the existing limited interconnection capacity with the rest of Europe (70% of the supply is LNG). From 50 TWh/month of total traded volume, less than 6% was exchanged at the transmission balancing point (CDG virtual point).

Austria's CEGH hub demonstrated a stiff increase in traded volume in 2007, doubling from the year before and amounting on average to 16 TWh/month. Econgas release programs conducted in 2007 introduced extra liquidity into the market. The recent partnership between OMV and Gazprom would also provide further developments on the CEGH in the near future.

Germany's wholesale gas liquidity increased in 2007, maintaining this trend during the first half of 2008. Traded volume in E.ON's virtual point in 2007 was 80 TWh, being increased to 110 TWh in the first half of 2008. The merging of the existing balancing zones and the new network access rules have driven gas liquidity to increase significantly. Wingas's decision to merge its three gas trading zones in Germany into one from October 2007, following similar moves by RWE and E.ON, should help to strengthen liquidity.

Attractiveness of participants for trading on organized marketplaces increased but remained low in 2007 (excluding UK OCM, which acts as a balancing mechanism over the NBP). Traded volume in APX Zee and APX NL remained limited in 2007, with 340 and 600 GWh/year of traded volume respectively. These volumes are increasing during 2008, up to 148 GWh and 350 GWh respectively during the first half, but still far from the liquidity of the reference OTC markets (Zeebrugge and TTF).

APX has recently started trading secondary firm capacity rights for entry-exit point at Bunde-Oude Statenzijl. Also, in cooperation with Centrica Storage Limited (CSL), the APX is providing a secondary storage capacity market at Rough, the UK's largest gas storage facility.

In March 2008, Nordpool Gas launched for gas trading services, offering products for day contracts and a following-month contract. Nordpool aims to create a reference gas price for North Western European markets, but the penetration is still low with few participants signed on.

ICE captures all liquidity for futures gas trades; newly created futures markets remain unsuccessful

ICE remained as the reference future commodity market in Europe, with a significant increase in volume during 2007. The other under developed futures gas markets, Endex and EEX, experienced very low liquidity. The main products being exchanged in those markets are the month futures, typically used for hedging needs.

However, some improvements have been made. Endex's TTF monthly gas volumes experienced a stiff increase during the first half of 2008, almost quadrupling volumes compared to 2007. Since July 2007, EEX started to offer futures trade for the BEB and EGT German market areas, traded volume has been steadily increasing, reaching 7.8 TWh in the first half of 2008.

Gas futures market liquidity remains constrained by the low level of development on the corresponding physical markets and the low level of confidence in price indexes universally accepted, reliable and not subject to the incumbents' operation.

Some improvements are required to foster liquidity and real gas to gas competition: Ease of access to capacity, reduction of complexity and increase transparency

In the near future, developments have to take place in these different areas, which include:

Introduction of secondary capacity markets that enable fair access to the system for all participants

With access to pipelines, LNG terminals and storage capacity is constrained for new entrants wanting to access the gas markets since traditionally, primary gas infrastructures are considered as natural monopolies associated to incumbent Utilities. The unbundling process that has been taken in most of the market for TSO activities should provide the agents fair and regulated access for competing on an equal basis around Europe. The GGPSSO promotes storage in a very good way to enable all parties to have access to capacities.

Reduction of complexity within and between markets

The complexity of operation and the level of fragmentation in some of the markets are clear barriers for new entrants and, in the end, for liquidity and real competition. This complexity is critical for pan-European players wanting to structure operations between market zones for portfolio optimization purposes. Positive trends can be observed around the simplification of access rules (single entry-exit system), the reduction of the market areas or balancing points.

Key issues in Spain

In 2007, the **unregulated retail market gained market share** for both electricity and gas in detraction of regulated tariff, but still accounting for a poor share in the first case (27% of electricity demand). This situation is going to change in the short term, since from January 2009 for electricity (July 2008 for gas), **the regulated tariff is to disappear** for all customers, although remaining a regulated last-chance tariff acting in reality as a cap over the liberalized price.

Electricity prices in the spot market have been at their highest (€75/MWh) during the first quarter of 2008. Although a single Iberian spot market for electricity was recently introduced, during the first quarter of 2008 **more than one third of the energy was settled in market splitting conditions** (i.e. with different prices in Spain and Portugal).

For **gas prices**, the Spanish **reference index CMP** (a commodity basket of different indexes of oil and refined products which base the tariff valuation) **has compensated Brent price increase** during the last period with a more favorable Euro/dollar exchange rate.

In 2007, the Spanish regulator set an objective requiring the **installation of smart meters for the entire electricity residential market** to be accomplished by distribution companies by the end of 2018.

Corporate context in the last year has been marked by **M&A movements around main Spanish players** like the recent acquisition of **Endesa by Enel** and the announcement of intention made by **Gas Natural to acquire Unión Fenosa**. These movements will provide **further opportunities for other big European players like E.ON or Eni** through the required divestments that will result from these operations (e.g. in the case of E.ON, it is already present in Spain though Viesgo and other generation assets transferred from Endesa). Finally, **Iberdrola**, which recently acquired Scottish Power, obtained in September 2008 the final authorizations to move forward with the acquisition process of Energy East in the US which has been initiated in June 2007.

Table 6.3 Types of trading transactions, July 2007 vs. August 2006 (in brackets, the year before)

	Gas (%)	Electricity (%)
Electronic platform	59 (85)	71 (55)
Voice brokered	41 (15)	29 (45)

Source: FSA (UK) - Analysis of activity in the energy markets 2007– Capgemini analysis, EEMO10

Increase of transparency through further development of gas exchange platforms

Transparent market information is a key requirement for enhancing confidence, encouraging trades, and favoring the access of new entrants. Most of the current OTC gas trades go through electronic platform with limited level of services. In the same way, the absence of public price indexes and volumes providing day to day information reduces the attractiveness for new participants. A latest survey conducted by the UK's Financial Services Authority in October 2008 showed an increase of voice-brokered gas trading in Europe, in opposition to electronic platform exchange (see Table 6.3).

The wholesale gas market is dominated by major gas incumbents, with a strong presence outside their domestic markets

Eni (including from now Distrigas), E.ON-Ruhrgas, GasTerra and Gaz de France remain the main players in wholesale gas markets in Europe, accounting for more than 4,000 TWh/year in European sales in 2007. They all developed a high presence outside of their domestic markets.

Banks and investments companies have traditionally had little or no underlying business in the physical gas markets. Because of the poor liquidity in the gas financial markets, merchant banks and multi-commodities traders are strongly moving to the physical markets, ranking as dynamic players on most advanced natural gas markets (i.e. NBP). Most prominent banks on natural gas markets in 2007 were Barclays, Merril Lynch, Goldman Sachs and Deutsche Bank. Nevertheless, the sub-prime crisis is now leading to the re-evaluation of the portfolio of activities from these players, and it is not sure whether they will remain committed to the commodities markets in the future worldwide financial model.

Gas Retail Markets

Gas retail markets are open in most EU countries, after the July 1, 2007 milestone, although switching rates among low-consuming segments are very moderate

Full opening of national gas retail markets was achieved on July 1, 2007. All Member States have met the deadline except Finland, Latvia, Lithuania and Portugal. These emergent markets have benefited from the derogation provided by the gas directive 2003/55/EC and will open their retail markets after 2010 (due to the reciprocity principle, the above countries are not allowed to sell gas outside their domestic markets). The gas consumption of these markets is however negligible compared to the demand of the other Member States. Hence, from a volume viewpoint, the European gas retail market can be considered fully open.

From a legal point of view, all European gas consumers are now able to choose their suppliers. In practice, only the larger I&C gas customers can be deemed to benefit from retail competition. Most European markets now display significant churn rates for large consumers, with cumulative switching ranging up to or over 80% in some cases.

While the rates of switching for larger customers continue to rise, most small business customers and households still have limited scope to exercise their right to choose and display switching rates in the range of some percentage points.

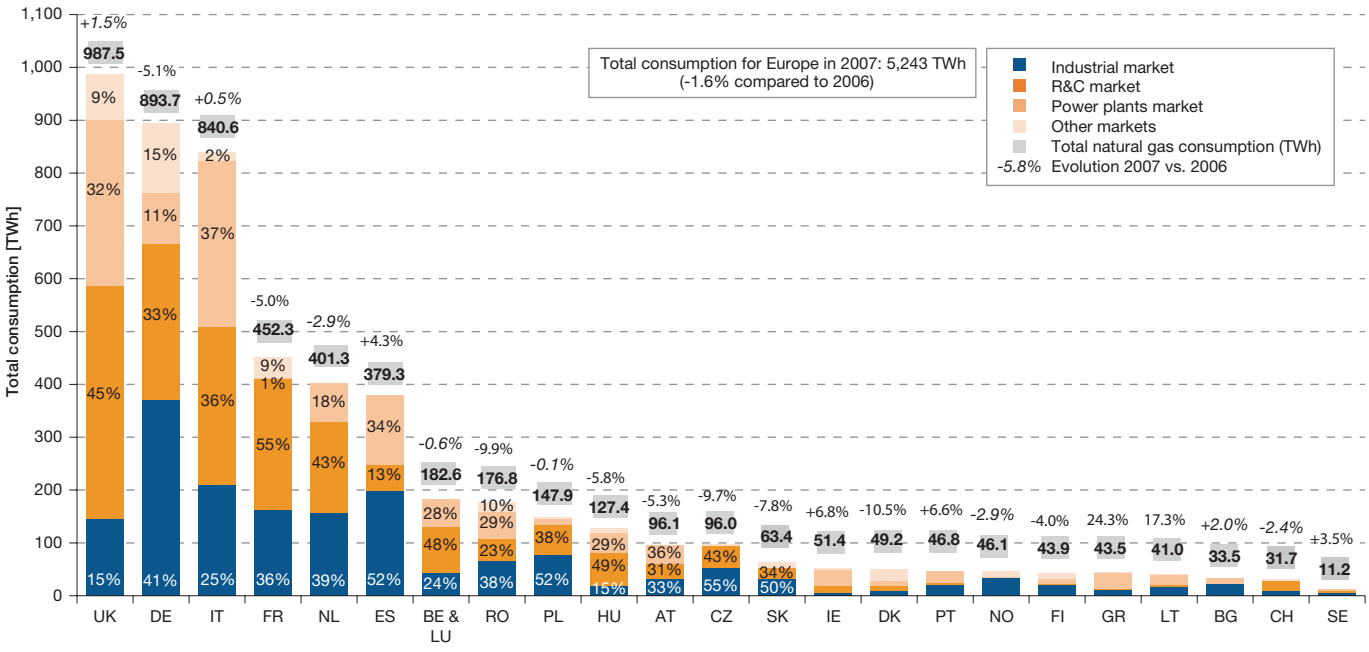
The UK maintains its long term lead at the top of the European switching rankings, fueled by market momentum. Nordic and Benelux markets then follow.

Total EU consumption has slightly decreased, signaling stabilization of energy demand

Gas consumption in Europe amounted to 5,243 TWh in 2007, which represents a slight decline (-1.6%) from the 2006 figures (see Table 7.1).

Most of the higher consuming countries registered a negative trend, except the UK, Spain and Italy, where gas consumption increased. The general decreasing demand pattern is a continuation of last year's trend and clashes with the bullish market forecast. It is explained by the favorable weather conditions, characterized by very mild temperatures at the beginning of 2007 across Europe, and also by the effect of high energy prices and increased energy efficiency. Diminishing energy intensity and increased price elasticity are the causes of what seems to be a stabilization of gas demand.

Table 7.1 Size of I&C and Residential gas markets (2007)



Source: Eurogas, BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

The UK (988 TWh), Germany (894 TWh) and Italy (841 TWh) have the greatest gas markets. Together they account for 53% of EU-27 final consumption. The second tier markets are France, the Netherlands and Spain. Although it has a relevant population and economic activity, France utilizes little gas to feed its power generation plants, which are mainly nuclear ones. Among the Eastern European countries, Romania displays high gas consumption when compared to its population and GDP.

First and second tier markets, i.e. the above mentioned six nations, account for 77% share of total European consumption.

Gas is mainly used for industrial processes (33% of the total), for heating households and work places, and for power generation. Member States with the greatest industrial use of gas are Spain (52%), Germany (41%) and the Netherlands (39%). Poland, Czech Republic and Slovakia's industrial consumption of gas is also significant.

Some 36% of gas was burnt to heat Residential and Commercial (R&C) interiors, to cook, and to warm water. Countries with a high incidence of R&C consumption are France (55%), the UK (45%) and the Netherlands (43%). Also in Hungary, Belgium and Luxemburg, the R&C consumption is high.

Finally, 27% of gas has been used to feed power plants. In 2006, the percentage was 21%. Countries with a high incidence of thermoelectric gas consumption are Italy (37%), the UK (32%) and Spain (34%). Also, the thermoelectric segment displays the greatest gas consumption growth. In the top six gas countries, the yearly increase of consumption from the power generation segment has been 4%. These countries, concerned with energy efficiency and environmental protection, are switching to CCGT plants which also offer high flexibility that is needed to cover power demand peaks.

New entrants in retail markets: How to win the challenge of Retail Portfolio Integration?

Full opening of gas and power retail markets has created a number of opportunities for new entrants over the last few years. It **has also pointed out the great challenge facing managers in order to simultaneously acquire market shares, secure supply strategy and reach profits as soon as possible.**

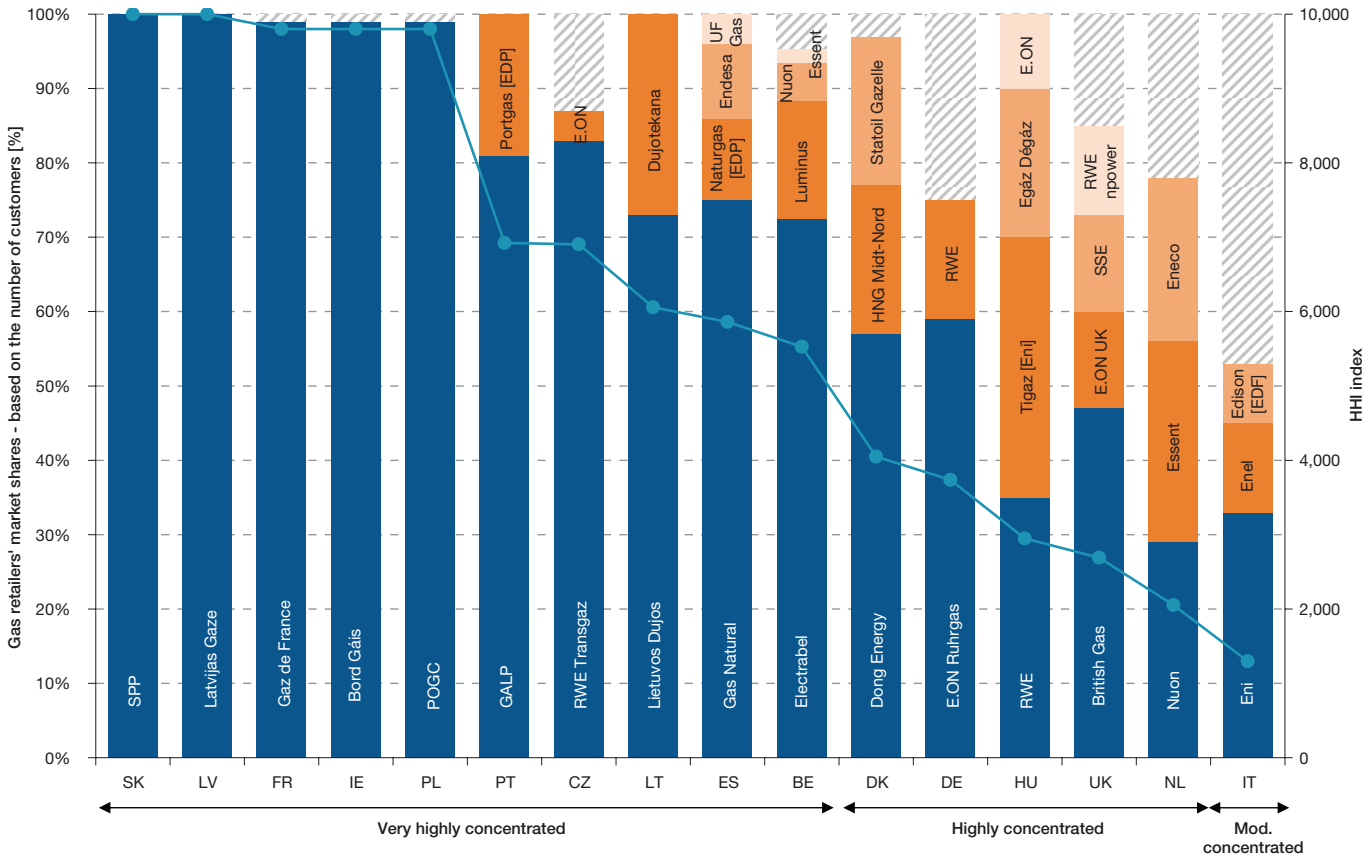
These objectives are more structural when they are under scrutiny by financial analysts whose major focus is to turn around very concrete indicators such as the number of new delivery points acquired per month, amount of generation capacity projects with secured financing scheme, revenues by activities and exposure to market risks.

From a management point of view, fulfilling market expectations calls for continuous iterations between the various activities in order to properly manage mid term business risks. An increase in the number of customers can still generate financial losses if sales prices do not properly reflect the supply mix. Generation capacity projects are sometimes developed on an opportunist basis which might favor access to available financing schemes instead of mid term portfolio effects. Profits from speculative trading can also compensate slow retail profits to come, but in that case, the performance of the ongoing integrating new entrant can be assessed on the basis of a pure trader business model.

Winning the challenge of Retail Portfolio Integration for a new entrant implies setting up a smart, flexible and customized organization. Positioning of key functions such as generation and retail management should be determined compared to proven and quantified business synergies. A dedicated Portfolio Management function can help in creating coherence between short and long term views and in determining the level of acceptable business flexibilities along the value chain. Conception and implementation of home made price transfer mechanisms are a complex but intelligible process to drive the teams toward really shared objectives. Last but not least, risk management functions must be aligned on best practices even if initial investments appear high for a new player.

Capgemini Consulting is proud to have supported several key players on European gas and power retail markets in their Retail Portfolio integration process. Our track record includes business model conception, organizational design, risk management policy, and conception and implementation of transfer prices.

Table 7.2 Gas retail market concentration (2007)



Note: Herfindahl-Hirschman Index or HHI, is an indicator of competition among companies. Calculations based on 2006 data when 2007 data unavailable, non significant markets: SE, FI, NO, GR, SI, EE, LU
Source: Companies websites and annual reports, regulators – Capgemini estimation, EEMO10

The European retail market is consolidating while non-European players like Gazprom and Sonatrach are extending their footprint downstream in the EU market area

The competitive landscape shows the dominance of incumbents in their domestic markets and, in some cases, also in foreign countries (see Table 7.2).

In France, the Netherlands and Germany, the main operators are the incumbents and they enjoy market shares above 75%. In Italy, Spain and the UK, the main suppliers are again the incumbents, although their market shares are in the range of 50% in volume terms. The market is even less concentrated in Italy when considering the number of clients.

Arguably, 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 these countries show the smallest market concentrations. These results, however, do not come necessarily from purely virtuous market dynamics. 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 release programs, to increase the market shares of players other than the incumbents. In the UK, Ofgem (Ofgas at the time) did play a relevant role when preventing British Gas from lowering fuel prices, thereby opening the market to other gas suppliers. Also in Germany, the gas release program imposed on E.ON-Ruhrgas has resulted in diminished market concentration.

In countries where such measures do not exist or are limited, for instance in France, the incumbents still enjoy very high market shares. Retail markets are not developed mainly because of limited access to gas supplies for new entrants.

In domestic markets, usually, the main

competitor of the gas incumbent is the electricity incumbent that has learned the strategies of business while procuring gas for the power generation business. 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 very often the dual fuel offer, which is becoming a must-have in the supplier's marketing portfolio.

Some of the ex-monopolies show interesting performance also in non-domestic markets. E.ON, from Germany, is the main player in Hungary and Sweden, and is the second largest player in the UK. GDF Suez is well positioned in Luxembourg and in Belgium. Eni, from Italy, through stakes in Distrigas, Unión Fenosa, GVS and GALP Energia is also performing well in non-domestic markets.

The reason why incumbents obtain good results abroad lie mainly in their procurement capacity that is then transferred into final prices. Smaller suppliers cannot compete with ex-monopolies in fuel procurement costs, although some of them may have lower costs to serve.

The main European gas suppliers are Eni (Italy, 98 bcm of wholesale and retail gas sales), E.ON-Ruhrgas (Germany, 87 bcm), GasTerra (the Netherlands, 78 bcm) and Gaz de France (France, 71 bcm).

These players have been at the forefront of an ongoing market consolidation process. In May 2008, Eni has agreed with Suez to acquire a 57% stake of Distrigas. Eni, supposed to launch a mandatory tender offer on the remaining Distrigas shares, becomes the first gas supplier in Belgium and consolidates its position in other markets.

The sale of Distrigas has been imposed by the European Commission as a condition for the approval of the merger of Suez with Gaz de France. The merger has also been one of the major landmarks in energy market dynamics.

Gazprom and Sonatrach, major gas producers that provide fuel to the main European gas suppliers, have been consolidating their European position as well, and also their position in the retail segment of the market. Through the Gazprom Marketing and Trading vehicle, the Russian company supplies gas to large consumers in Belgium, France and the UK. Through its stake in Wingas, Gazprom supplies gas to the German and British markets.

Similarly, Sonatrach has enlarged its business footprint into gas retail markets. It sells gas to Spanish final clients, through Sonatrach Gas Comercializadora and Cepsa Gas Comercializadora, and supplies gas in the UK market. It is also poised to start commercialization activities in France, Italy and Portugal.

Gazprom and Sonatrach's moves provide evidence of the vertical integration trend in the industry.

Beating the UK Credit Crunch

Pressure to reduce cost-to-serve amongst retail Utilities in the UK has intensified. Capgemini has developed a suite of offerings to help Utilities improve performance and lower costs. One particular element of the solution is attracting significant interest—the High Performance Collections suite.

UK Utilities are currently owed in excess of £2 billion by their customers of which £100 million is overdue.

The "credit crunch" is piling on the misery for Utilities companies. Half the UK's water Utilities have overdue debts of over £100 million. With the onset of winter, when credit cards reach their limits, fixed rate mortgage deals expire and the cost of borrowing increases, Utilities will suffer.

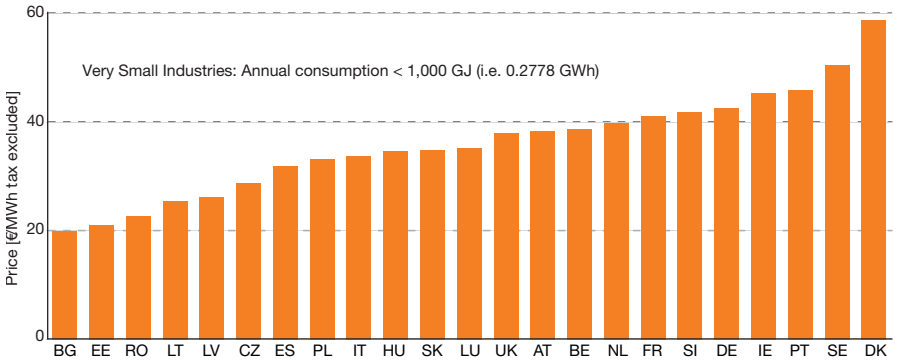
A MarketResearch.com survey concluded that:

- Utility bills worth approximately £600 million are not paid on time,
- Utilities spend £2.5 million chasing payments,
- The payment of electricity and gas bills are the first to be delayed,
- Many respondents admitted delaying payment of gas or electricity bills. Only water bills and council tax have a higher delinquency rate.

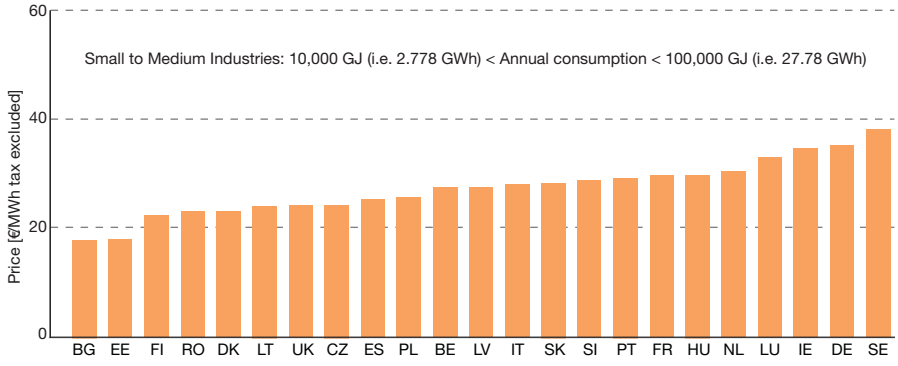
To tackle these issues in payment collections, Utilities are looking to increase automation, by using outbound dialers, IVR, and segmentation based on product, payment type and credit history. Capgemini's Collections Suite provides a holistic solution through six key capabilities:

- **Real-time strategies** – Utilizing a new software development every interaction with the customer is evaluated and the "next best action" most likely to result in a successful collection is recommended,
- **Debt avoidance** – Collection interventions are made as early as the point of sale, proactive against reactive,
- **Continual strategy improvement** – Success of the collections strategy is evaluated and modified in real-time,
- **Multi-channel** – Executing collection strategies through multiple channels, including, for example, text messaging,
- **Consistent customer experience** – Integration across channels ensures that the collections strategy takes into account previous contacts,
- **Lean processes** – Capgemini's BeLean® approach to processes helps operate a collections organization that maximizes revenue collection per head.

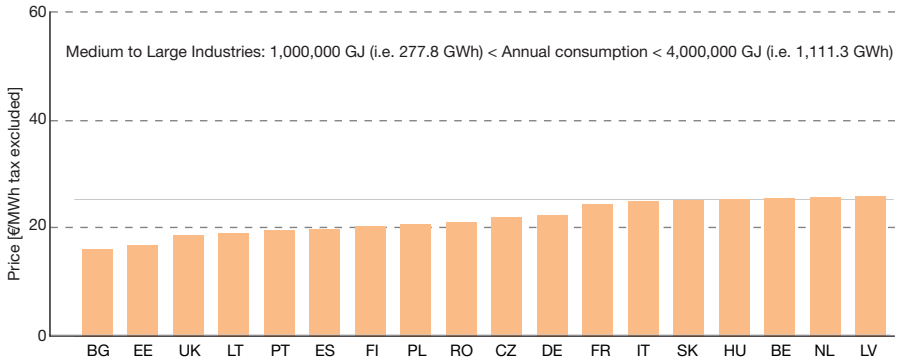
Table 7.3 I&C gas prices (H2 2007)



Source: Eurostat – Capgemini analysis, EEMO10



Source: Eurostat – Capgemini analysis, EEMO10



Source: Eurostat – Capgemini analysis, EEMO10

Gas prices have increased and differences remain significant across the EU

Compared to 2006 levels, final prices for all consuming segments have remained substantially stable in 2007 but have increased dramatically since the beginning of 2008.

Oil price increases are passed onto final gas prices with some delay, however, on the basis that gas supply is dominated by long term contracts in which the gas price is indexed to oil. The Brent price of 2007 was 11% higher than that of 2006, after years of greater increases, and this resulted in a European average gas price increase for residential clients of (only) 1%. Countries with the lowest price increment were Spain (+0.3%) and Italy (+1%). In the UK, the price increase was the greatest (2.6%).

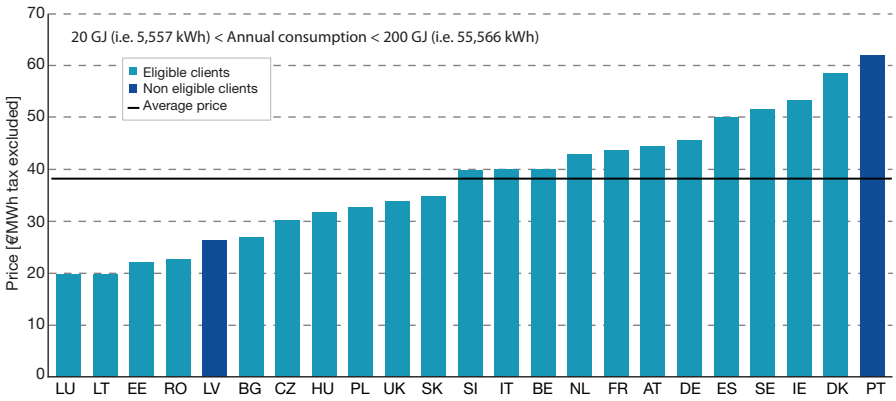
But the tremendous oil price hikes of the first part of 2008 have taken the gas end-user prices to an all-time high.

Gas regulated tariffs in France were raised by 4% in January 2008 and by a further 5.5% in April, and similar increases have been observed in Italy. In the UK, EDF Energy increased its gas prices by 22% in July 2008 and in Hungary, gas tariffs were raised by 9.9%.

Price formulas in long term contracts relate the gas price to the oil prices averaged over a period of six to nine months. Hence, any oil price hike produces its results on end-user prices with a time lag. The oil price peaks reached in July 2008 will therefore generate gas price increases even higher than those noticed in the first part of 2008. UK energy households prices, for example, are expected to rise by as much as 30% by the end of the year.

The picture for the European gas price levels is varied. The latest Eastern European countries to join the EU, i.e. Bulgaria and Romania, enjoyed the lowest gas prices for the I&C segments which were in the range of €20/MWh (see Tables 7.3). Also in the UK and Spain, gas prices for industrial consumers are in the lower European price band. French,

Table 7.4 Residential gas prices (H2 2007)



Source: Eurostat – Capgemini analysis, EEMO10

Table 7.5 Status of gas price regimes (as of June 2007)

Country	Existence of price control
AT	N
BE	N
BG	Y
CZ	N
DE	N
DK	Y
EE	N
ES	Y
FI	N
FR	Y
GR	N
HU	Y
IE	Y
IT	Y
LT	N
LV	Y
NL	Y
NO	N
PL	Y
PT	Y
RO	Y
SE	N
SI	N
SK	Y
UK	N

Source: ERGEG – Capgemini analysis, EEMO10

German and Dutch industrial clients, instead, paid among the highest prices in Europe, which ranged roughly from €25 (Medium to Large Industries) to €40/MWh (Very Small Industries). Italian prices were somehow aligned with the European average.

Also residential clients were better off in Bulgaria and Romania and in the neighboring countries like Czech Republic, Hungary and Poland as well. The price ranged between €20 and €30+/MWh. The UK gas price for residential consumers was below the European average whereas residential price for all the other major gas markets, i.e. France, Germany, Italy, the Netherlands and Spain were in the higher European price band.

As seen, there is no such a thing as a European gas price reference, as values vary significantly among Member States. For industries, the variation is limited as prices vary between €16/MWh (Bulgaria) and €26/MWh (Latvia). But for residential clients, the deviation is relevant, with prices in Luxembourg as low as €20/MWh and prices in Portugal as high as €62/MWh (see Table 7.4).

This variability tells something about the modest level of convergence and interaction in the gas retail markets. It could be expected that at least prices for industrial clients in Belgium, the Netherlands and the UK are similar, since the wholesale price levels in these three markets tend to converge. On the contrary, industrial prices are very different. Pricing in the UK follows the NBP index but pricing in continental Europe follows the oil index and this explains the above discrepancy.

In countries where industrial prices are below average and residential prices are above average, the second group of clients is cross-subsidizing the first group. This is the case in Italy and Spain.

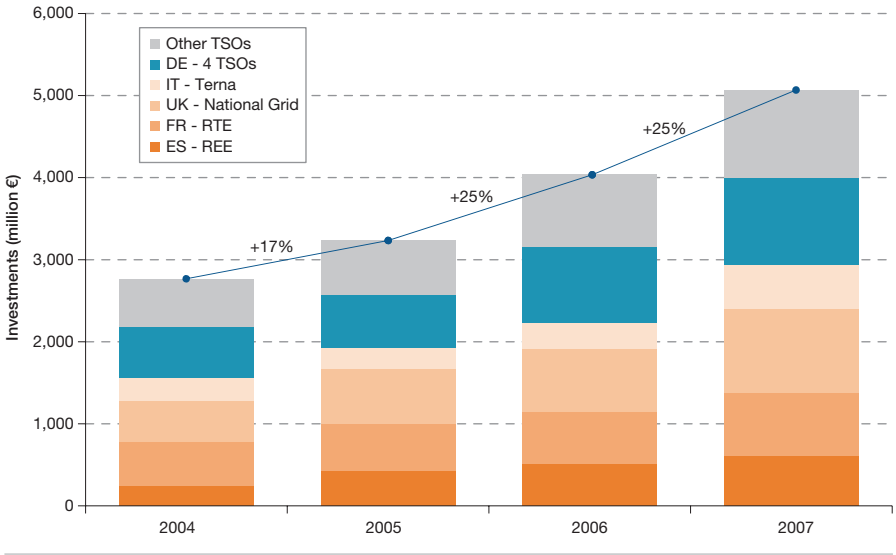
Price control measures also tend to distort proper pricing of gas offers and might have negative consequences for the development of competition. Regulated tariffs are usually set below market levels and do not allow new entrants to recover all costs. While incumbents can balance the losses with large client portfolios or even with vertical cross subsidies, a new entrant with only a retail business and a small initial portfolio of clients cannot do so and is soon out of business.

Still, most of the nations maintain price control regulation (see Table 7.5), among which are France, Italy and Spain, which have regulated tariffs, and the Netherlands, where the NRA monitors price levels and intervenes in case of excessive prices. Also Bulgaria and Romania, countries with the lowest price levels in Europe, have regulated tariffs.

Infrastructures and Regulated Activities

Electricity Transmission

Table 8.1 Total annual investments in the national transmission grid of 14 major Western European TSOs



Source: Companies annual reports, regulators – Capgemini analysis, EEMO10

There are ongoing needs for significant TSOs investments at a country level

Investments in transmission networks have increased dramatically between 2004 and 2007 (see Table 8.1). They even increased in 2007 by 25% compared to 2006, and the combined investment programs of 14 of the largest TSOs reached €5 billion.

According to UCTE, continental European power grid operators will have to spend €17 billion on interconnections and domestic transmission lines (400-kV and 225-kV) by 2012.

This investment is needed to replace aging assets in some countries (such as the UK) and also to resolve congestion across networks in others (e.g. Italy). However, there is a difficult balance between

Ownerhship unbundling in electricity — C'M'S' Bureau Francis Lefebvre

The Member States and the EU Parliament are strongly divided into two camps regarding the possible Ownership Unbundling (OU) of the Transmission System Operators (TSOs).

The debate on the third Energy Package is actually focused on the shareholding of the TSOs, and on the continued break-up of vertically integrated Utilities. In a first phase, based on the EC's open intention to propose such provisions, eight Member States opposed the Commission, the EU Parliament and seven Member States.

The draft Directive, unveiled on September 19, 2007, formally left open an option between OU and ISO (Independent System Operator); ISO was however designed in such a cumbersome way that it was not a genuine alternative. In a second phase, the opponents successfully proposed to the Energy Council an additional **"third way" between OU and ISO, now called ITO (Independent Transmission Operator),** that offers more effective independence of the TSO than contemplated in the current Directive, and preserves the financial interest of vertically integrated companies. The ITO would own the assets, the independence of its management would be strongly guaranteed, and the regulator would approve a long term investment plan and have veto rights as well as the ability to fine the TSO in case of discriminatory behavior. **Should the option between OU, ISO and ITO be eventually adopted, the EC could carry out a review of ITO-related provisions two years after implementation.**

The debate is now between the Commission and the majority of MPs on the one hand, and the Council, on the other hand. Basically, the EC and supporters of the OU option are convinced that OU of TSOs is necessary to remove the obstacles to a fully integrated market, by, inter alia, improving fair and non-discriminatory access to the grids and fostering investments in networks and interconnections. The opponents uphold the opinion that a whole set of reasons explain both increasing prices and the slow pace towards an integrated market, and that severe rules for TSOs and ex-post regulation would suffice to reach the objectives of fair competition and investment. **Behind this everlasting controversy, the business model of major Utilities may continue to widely differ.**

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1_4,

regulatory (mandatory) investments imposed on the TSOs and investments decided in due time by the TSOs so that they can address the specific problems arising due to aging of assets, user needs and opportunity to leverage new technologies.

Most of the TSOs are currently undertaking ambitious investment plans for the coming years. These include:

- In the UK, National Grid Electricity Transmission intends to invest €4.5 billion from 2007 to 2012,
- Nordel, the group of Nordic transmission system operators, has proposed grid reinforcements up to and beyond 2015 that will see capital investments in the region's transmission grid double to €600-700 million a year (Nordel Grid Master Plan 2008),
- The Italian TSO, TERNA, has a €2.7 billion plan from 2007 to 2012,
- RTE has plans to spend €850 million in 2008 alone, which is a 7% increase from 2007, €250 million of which will be spent on the Vigy-Marlenheim reinforcement and €215 million to accommodate renewable interconnection.

The EU believes that ownership unbundling of the TSOs is instrumental in reaching fair and transparent access to infrastructures and improved market mechanism across countries

The EU proposed in September 2007 a regulatory package for ownership unbundling. Not all EU countries were supportive of this proposition. Countries opposing ownership unbundling introduced a "third way" in February 2008. The suggestion is in reality the implementation of an Independent Transmission Operator (ITO) where the assets would continue to belong to the integrated Utility, but management would be independent and highly regulated.

Table 8.2 Electricity TSOs in Europe (2007)

Country	Number of TSOs	Ownership unbundling	Operating perimeter of ■ > 150 kV ■ 132-50 kV
AT	3	N	Verbund
BE	1	Y	Elia
BG	1	N	NEK
CZ	1	Y	CEPS
DE	4	N	
DK	1	Y	Energinet.dk
EE	1	N	OÜ Põhivõrk
ES	1	Y	REE
FI	1	Y	Fingrid
FR	1	N	RTE
GR	1	N	HTSO
HU	1	N	Mavir
IE	1	Y	ESBNG
IT	1	Y	Terna
LT	1	Y	Lietuvos E.
LV	1	N	Latvenergo
NL	1	Y	TenneT
NO	1	Y	Statnett
PL	1	Y	PSE Operator
PT	1	Y	REN
RO	1	Y	Transelectrica
SE	1	Y	Sv. Kraftnät
SI	1	Y	Eles
SK	1	Y	SEPS
UK	1	Y	NG

Source: European Commission, ETSO, Platt's – Capgemini analysis, EEMO10

Both options—full ownership unbundling or the creation of an ITO—aim at the same objective. Each model will lead to different regulatory regimes and will cause different financial implications. An EC meeting in June 2008 decided that both options are still open. There are additional aspects of this debate including the role of a future European Regulatory body (ERGEG +), harmonization of administrative processes, and measures to encourage and reward investors through improved tariffs.

Table 8.2 represents a high level summary of unbundling that has been introduced across different Member States.

The debate will continue but the proposal to divest grid assets in Germany by E.ON and Vattenfall Europe may have a greater influence on proceedings.

Flows across European electricity markets are restrained by insufficient physical capacities

Interconnection level is defined as the import capacity divided by the total generation capacity of a country (see Table 8.3). The EU authorities consider a minimum of 10% interconnection level as sufficient to introduce effective competition across borders[28].

Countries such as France, the UK, Italy and Iberia still fall short of this 10% interconnection capacity target. However, even given the priority placed on increasing the level of interconnection by the EU, only nine of the 32 electricity Projects of European Interest (PEI) set up in 2003 (EC Energy packages) have been—or are being—built. The main reason for this, as reported by the EU's own consultants MMV in an audit of the TEN-E projects (2004-2006) published in 2007, is that the main failures were due to procedural as well as coordination problems. In both cases, the main reasons cited for failure (60 to 70%) were fears over electromagnetic fields and environmental reasons which exist due to the lack of a legal mandatory framework.

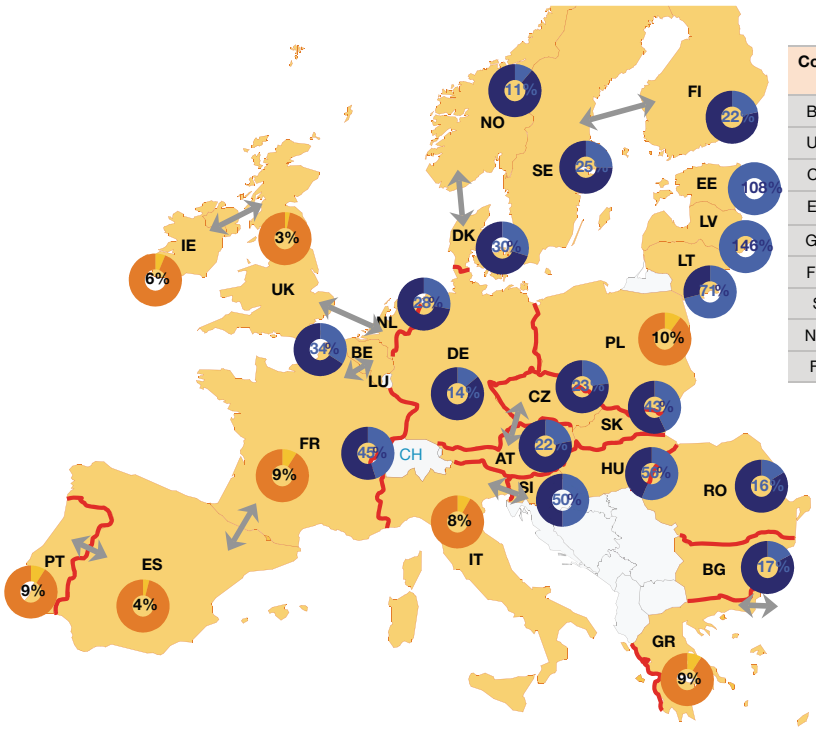
Some major projects commissioned in 2007/2008 include:

- NorNed 700 MW subsea power cable linking Norway and the Netherlands (cable of 580 km) went into full operation in May 2008. Thanks to this €600 million infrastructure, the Dutch market expects to have lower and more stable prices, and use their production capacity nearer to the optimum,
- The Estlink HVDC submarine cable between Estonia and Finland (350 MW), which will be the first interconnection between the Baltic and Nordic electricity markets,
- A new 400 kV line between Romania and Hungary, which should be completed soon.

Some additional projects that have also been agreed for 2008 include:

- Interconnection reinforcement between France and Spain resulting from the continuing pressure exerted by the EU,
- TenneT and National Grid, the Dutch and English TSOs agreed to build the BritNed link interconnector. This 1 GW interconnector cable between the two countries (260 km) is being built at a cost of €600 million, and is planned to come into operation by 2010,
- Italy and Albania decided to build a new interconnector between their countries. The privately owned and operated submarine 400 kV cross border cable will have a total capacity of 500 MW and a total length of 145 km,
- A new 550 MW connection cable between Finland and Sweden (Fenno-skan 2) and a 600 MW power cable between Denmark and Norway (new Skagerrak cable) have been submitted for government approvals,
- In Ireland, the second interconnector to the UK has been approved with the potential capacity of 500 MW planned for completion by 2012; this is in addition to the 350 MW currently expected to be completed in 2010.

Table 8.3 Level of interconnections, bottlenecks and priority interconnections (2007)



Countries	Projects of interconnections ⟷	Expected date	Capacity increase
BE - FR	Moulaine– Aubange 225kV	2009	400 MW
UK - NL	BritNedHVDC link	2010	>1,000 MW
CZ - AT	Slavetice – Durnrohrtie-line	2008 - 2009	900 MW
ES - PT	Aldeadávila – Lagoaça 400kV	2009	n.a.
GR - TK	N. Santa– Babaeski 400kV	2008	n.a.
FR - ES	Baixas– Bescano 400kV	2011 - 2012	1,200 MW
SI - IT	Italy with Slovenia 380kV	2013	500 MW
NO - DK	Skagerrak4 submarine cable	2012	600 MW
FI - SE	Fennoscan submarine cable	2011	550 MW

Level of interconnections

8% Below 10% EU threshold

17% Above 10% EU threshold

Bottlenecks (> 50% occurrence of congestion)

⟷ Priority interconnections set by the EC (Energy Package), construction expected within the next four years

Source: ETSO, UCTE, European Commission – Capgemini analysis, EEMO10

[28] Barcelona European Council of March 15 and 16, 2002

Table 8.4 Congestion methods and electricity TSOs (2007)

Source: ERGEG – Capgemini analysis, EEMO10

Market-based mechanisms for congestion management

In compliance with Regulation 1228/2003 (amended November 2006) access to congested interconnection capacity is now allocated through a market mechanism—namely an auction (see Table 8.4).

The ERGEG's seven electricity Regional Initiatives launched in 2006 played a significant role in congestion management rules improvement and harmonization throughout Europe. Initiatives include:

- Capacity allocation and calculation rules,
- Transparency (the availability of reliable transmission and generation data) improves liquidity and attracts new players,
- The development of cross border balancing initiatives,
- Efforts for the introduction of day-ahead market coupling.

In parallel, other initiatives were created in 2007 which led to greater integration of regional energy markets (Pentalateral Energy Forum, the SEMO in Ireland, and MIBEL in Iberia).

Explicit auctions are likely to be the main means by which to allocate capacity in both the long and medium term. Evidence in this respect for 2007/2008 includes:

- Joint allocation across the Italy-Slovenia (September 2007) and Italy-Switzerland borders (January 2008),
- Explicit auctions have started for NorNed (Norway-The Netherlands) transactions, which is now waiting for an implementation of implicit auctions in 2009.

Implicit auctions along with market coupling are emerging as the preferred means to allocate day-ahead capacity. Two illustrations of this in 2007 are:

- The agreement between grid operators and regulators to couple the day-ahead markets in Belgium, France, Germany, Luxembourg and the Netherlands in early 2009. This market coupling project is an extension and improvement of trilateral market coupling launched in November 2006 between France, Belgium and the Netherlands,
- A rapid progress for market coupling between Germany and Denmark was due to start in autumn 2008.

Recent changes and implications: Grid divestment, increased connection of intermittent generation and resource constraints

The voluntary divestment of grid systems

There have been some recent moves to attain complete ownership unbundling both under national legislation and EU legislation (as described above) and also to have voluntary actions to avoid EC anti-trust investigations. These include:

- In the Netherlands, legislation on ownership unbundling of Dutch networks has taken effect in July 1, 2008. This means that management of networks of 110 kV and above must be in the hands of the TSO (TenneT) and that any legal owner of shares in an energy generating company or commercial energy supplier cannot hold shares in a network company at the end of December 2010,
- On the back of an abuse of dominance investigation for withholding capacity and deterring third party investment in addition to the suspicious operations of the grid, the German group E.ON announced that it was prepared to sell off its transmission grid assets (10,000 kilometres of 380 kV and 220 kV transmission network) within two years and 4.8 GW worth of power plants. The EC is to decide whether to end its current antitrust proceedings against E.ON before autumn 2008 in light of this act of limiting dominance. The value of the transmission grid is estimated at €2 billion. As E.ON would retain 22,600 kms of 110 kV network, a new owner of its ultra-high voltage network would not necessarily simplify power transmission in Germany, but rather add a fifth player alongside RWE, EnBW and Vattenfall,
- The potential for other Utilities to sell their transmission networks will increase if E.ON is able to obtain a good price for its network and the impact on its core business and finance ability is limited; indeed, Vattenfall has welcomed enquiries about selling its high voltage grid.

Increased connection of intermittent generation

As described in the Generation chapter, it is clear that a significant level of investment is now being undertaken in wind generation projects. For example, in Western Europe, the percentage increase in wind generation for 2007 was 23% (total increase of 8 GW) compared to a 19% increase in 2006. Although this technology is improving and its reliability increasing, the implications of accommodating this type of generation on to the system and managing the minute by minute balancing of supply and demand becomes increasingly difficult for system operators.

These costs can be incurred due to:

- The need to connect those intermittent sources through new connection lines,
- The need to manage the generation reserves to offset energy generation capability at any time.

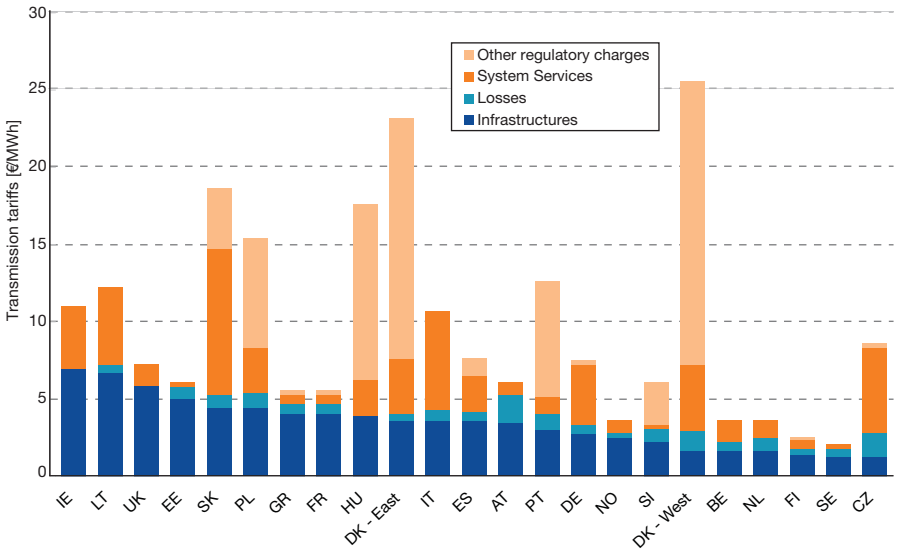
Increased resource constraints

The level of investment noted across Europe—and increasingly the world—has led to longer lead time requirements for capital assets. This is true for generation as well as networks, with the implications that considerable amount of planning and care must be undertaken to retain system security. The constraints as indicated in the Generation chapter reflect both asset and skills shortages on a global scale.

There have been few changes in access tariffs since 2006

Table 8.5 shows the access tariffs and their make up in 2007. Compared to 2006 tariffs, at an absolute level, they have increased in Denmark, Ireland, and Czech

Table 8.5 Levels and components of transmission tariffs (2007)



Note: Other regulatory charges include stranded costs, public interest contribution, renewable energy
Source: ETSO – Capgemini analysis, EEMO10

Electricity Distribution

As a regulated asset business, with set operational processes and obligations, change within the structure and operation of the networks business is slow. However, certain issues have arisen including the unbundling of the network in line with the 2003/54/EC directive; the continued intention to reduce costs; and the increased impact of distributed generation. At the same time, the regulatory approaches adopted continue to evolve, particularly with an increase in incentive-based regulation (for example for supply quality and information provision) and investigation of the potential for smart metering.

Key issues in Denmark
Changes on the horizon

Current political energy and climate objectives in Denmark reflect the 3x20 EU objectives and a long term vision of **complete independence on fossil-based fuels for Denmark.**

They include:

- **Increasing competition** on the energy **retail market**,
- **Reducing consumption** of energy and **increasing efficiency of energy utilization**,
- Increasing **development** and usage **of renewable energy sources**,
- **Developing** and demonstrating **new energy and climate efficient technologies**.

Examples of concrete initiatives which are being discussed and investigated in detail among the stakeholders are:

- Introduction of a **central data hub** for developing competition and increasing switching rates,
- Development of a new **energy price portal**, enabling easy access to and knowledge about prices and products for consumers,
- Introducing **information campaigns** emphasizing the Danish consumers' freedom to choose between electricity suppliers,
- Implementation of **Smart Meters** throughout Denmark (approximately 3.2 million meter points),
- **Integration** of the Danish electricity and gas infrastructure (transmission) with the **neighboring countries.**

These initiatives towards market opening, convergence, and transparency will potentially affect the Danish energy market drastically. It is an official political wish that a truly open and transparent Nordic energy market develops in the years to come.

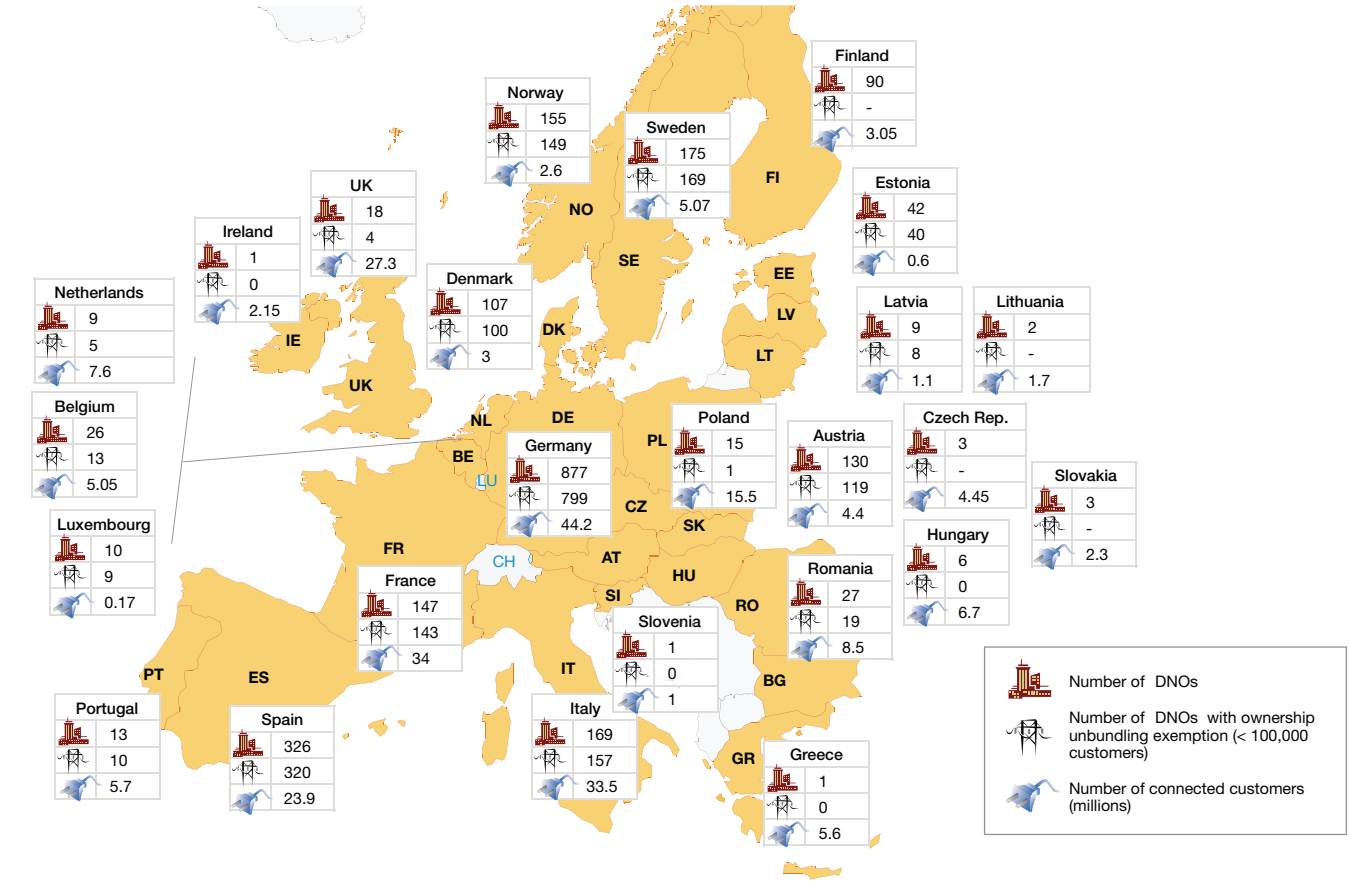
This means **potential benefits for consumers**, the already **established players** (DONG Energy, SEAS-NVE, Syd Energi, NRGi, etc.), and **up-and-coming market players** (e.g. Modstrøm). Incumbents will have to adapt to new competitive market conditions, new innovative players, as well as other established international players (e.g. E.ON, Vattenfall) with aggressive market entry strategies.

Distribution Network Operators (DNOs) prepared for full market opening

A few remaining countries had to achieve full opening of their market by July 1, 2007 as required by the European Directive (Italy, France, Luxemburg, Poland, Romania, and Slovenia). This means heavy organizational changes and considerable increase in information exchanges for DNOs, which must act as market facilitators.

- As a whole, the DNOs' preparation was satisfactory on the supplier switching process (e.g. in many countries, a customer only needs one contact for switching) and for customers' information. But the switching of residential customers is still marginal in these countries and problems can arise as market transactions increase,
- Switching delays were between one and two months in most countries. However, at the beginning, some cases of excessive delays in the switching process were reported,
- Progress has to be made mainly in harmonizing data transfer and improving the quality of the meter value data which can lead to disputes between the involved parties (automated metering on the other hand greatly improves this).

Table 9.1 Electricity DNOs in Europe (2007)



Source: European Commission – Capgemini analysis, EEMO10

Across Europe, different models have been adopted to meet the requirements of the EU unbundling Directive (2003/54EC)

In order to avoid any perception that owners of networks can interfere with retail competition, an unbundling directive was issued. All Member States were also asked to ensure that their DNOs met conditions for legal unbundling by July 2007. In 2006 and mainly in 2007, most of the remaining Member States implemented "legal" unbundling for the largest DNOs, which certainly improved the situation. In practice, many DNOs were still not unbundled given the exemption granted by the EU for DNOs that had fewer than 100,000 customers (see Table 9.1).

The major electricity distribution operators throughout Europe remain subsidiaries of the incumbent Vertically Integrated Utility, as the typical model of unbundling is legal unbundling (see Table 9.2). This can still lead to the accusation of unfair access to distribution data by the historical energy operator.

Different operating models and structures amongst DNOs make unbundling difficult:

- Holding concession contracts with the municipalities (e.g. France, Portugal),
- Leasing contracts with an asset manager (usually the parent group) e.g. some German and Austrian DNOs,
- Outsourcing of a significant part of their activity to subsidiaries within the parent group (e.g. France, Denmark).

Table 9.2 Level of Unbundling (as of Jan 2008)

Major DNOs in Legal unbundling	Major DNOs in Ownership unbundling	Not unbundled yet
Austria, Denmark, Germany, France Spain, Sweden, Portugal, Italy, Czech Republic, UK (owned by major energy groups), Finland	Belgium, Netherlands*, Norway (public ownership for a majority of DNOs)	Ireland, Greece, Hungary

Note: (*) From the national regulation, distribution activities in the Netherlands will be separated from other activities in terms of ownership
Source: European Commission – Capgemini analysis, EEMO10

The regulatory levers used across Europe tend towards a similar model

Despite important differences in the approaches developed by each regulator, the economic regulation of electricity distribution Utilities tends towards the same common characteristics (see Table 9.3):

- Many countries in Europe have now set up a "Revenue/Price cap" regime for their DNOs which set the targets for the network operators. Countries which have not set this model yet will implement a multi-annual incentive-based revenue regulation in 2008/2009 (e.g. France, Germany, and Belgium),
- Different countries have implemented a quality incentive regulation with penalty or rewards, modifying the allowed revenue in recent years. Results of this quality regulation are promising a decrease in the number and length of supply interruptions, but there is no proof that it gives a sufficient incentive for investments,
- Only a few countries have implemented incentives for optimization of network losses; since most countries carefully control the level of costs for losses.

EMIX

The EMIX initiative made by the Swedish industry organization, Swedenergy, continues according to plan. **The initiative is aiming to be the vehicle by which the industry can be moved 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.** To enhance the flow of information, Sweden will implement a platform called EMIX (**Energy Market Information Exchange**), an automated process for handling information between the players in the market in processes such as household's change of suppliers.

In late April 2009, this platform will be up and running as the Swedish electricity industry's **common communication hub that facilitates a cost-effective, fast and reliable exchange of information between all the players in the industry and at the same time provide quality assurance, audit trails and logs of all messages.** To secure the launch of the information hub, there will be a test production period during the autumn of 2008, engaging a large part of the energy community in Sweden.

Although connection to the communication hub is voluntary, today the majority of the Swedish market players have already signed up to be a part of the community that will use the hub. Driven by security reasons, the launch of the hub will also be settled with a much more rapid speed than expected from the beginning.

The project is followed by high interest from Norway and Denmark, stimulating discussions and ideas around similar solutions, while also being driven by the idea of a Nordic common retail market. Hubs in different countries connected within a network could facilitate and support a common Nordic process which is necessary to enable this type of market.

The first version of the hub handles the basic functionality of the communication between energy players and **also opens up for new ideas regarding future functionality** with integrated processes for both the retailers and distributors in the market.

Table 9.3 Economic regulatory framework for distribution in some European countries

	Countries with a revenue vs. price cap regime*	Dominant method for target setting	Incentive on quality of supply included	Incentive on network losses included
Austria	X	National Benchmark		
Belgium	**	National Benchmark		
Denmark	X	Cost audit		
Finland	X	National Benchmark		
France	**	Cost audit		
Germany	**	Benchmark		
Ireland	X	Cost submission, Benchmark	X	
Italy	X	Cost audit, inc. need for quality improvement	X	
Netherlands	X	National Benchmark	X	
Norway	X	National benchmark	X	X
Portugal	X	Internal grid cost analysis	X	
Spain	X	Reference network model	Implemented soon	Implemented soon
Sweden		Reference network model		X
UK	X	National Benchmark	X	X

Notes: (*): multi-annual based revenue incentive regulation. (**): Price vs. income cap regime to be implemented in 2008/2009
Source: National regulatory reports – Capgemini analysis, EEMO10

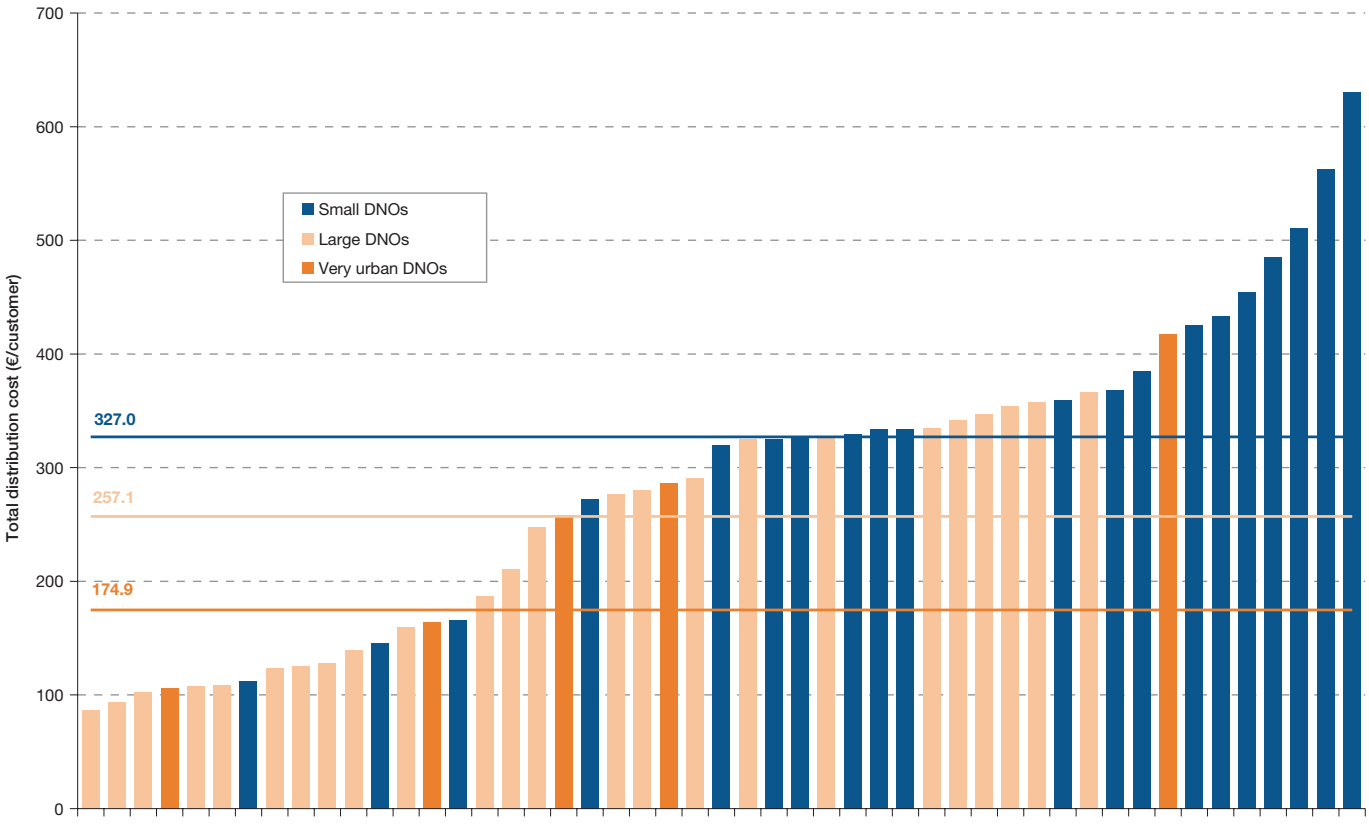
A common understanding of core business activities still does not overcome the impact that diversity of organizational and operational structures of DNOs have on costs

Most of the European countries now have distribution operators with a set of broadly common activities separated from the rest of the industry as a consequence of the obligations placed on DNOs by the European Commission. However, many variations still exist:

- The organization, operating environment and scope of operated networks of these operators leads to significant cost and tariff differences,
- Different treatment of DNOs in relation to ownership of distribution network, regional taxation and municipal obligation policies, regulatory environment as well as contestability within a given service, contribute to a complex and heterogeneous picture of DNOs across Europe.

Table 9.4 shows these structural differences in the full distribution costs per customer in a set of about 50 DNOs from 13 different European countries in 2007.

Table 9.4 Total distribution cost per customer (2007)



Note: Data cover 45% of EU-15 and 35% of EU-25 by GWh
Source: Capgemini 2008 European distribution benchmarking survey – Capgemini analysis, EEMO10

Increased distributed generation tends to change the DNOs' business model

With the increasing penetration of renewable energy, the volume of generation connected to the distribution network is increasing and has a significant influence on the activity of the operators. Such developments are not without complex design implications and system management needs to ensure both system security and supply quality. Some DNOs now have a significant amount of these generation capacities. This is particularly true in Austria, Denmark, Germany and the Netherlands. This changing model will have costs and operational implications which should boost interest for smart power grids.

Significant progress towards smart metering

Intense discussions on Automatic Meter Reading (AMR) took place in 2007 throughout Europe, particularly in the countries where a full scale roll out of this technology was already in its implementation phase.

The Smart Power Grid trend

The key to Smart Grid is how information technology can optimize grid operations:

- Electrical devices coupled with Smart Metering to operate 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 to move the grid beyond central control to a collaborative network.

For everyone concerned about power reliability, the smart network will offer greater capacity to bounce back from troubles, fewer blackouts and brownouts, better use of old plants, and contribute to security of supply.

Scale of the challenge for Europe

According to Smart Grid's European technology platform (2007 Strategic Research Agenda) supported by the EC, EU Member States will need to invest in excess of €750 billion in power infrastructure over the next three decades, including some €90 billion in transmission and €300 billion in electricity distribution networks, and Smart Grid projects will play a major role in this investment trend.

The EU Strategic Research Agenda has set a wide research program focusing on Smart Grid developments.

With growing interest for Smart Grid, many other initiatives are underway

The IEA (International Energy Agency) has launched ENARD (Electricity Networks Analysis, Research and Development) dealing with related problems. The grid operators also undertake analysis in a coordinated, international manner (ETSO, UCTE, Nordel). Other organizations such as Eurelectric should be noted here too. The European regulators and ERGEG have indirect impact on the abilities of regulated network companies to be involved in research activities. Within the international framework, closer links will be established between Smart Grids and key players like CIGRE and CIRED. This initiative has defined a wide research for Smart Grid issues.

The distribution network of the future

The main possible outcomes that were identified for distribution networks are:

- The integration of Distributed Energy Resources (DER) to enhance supply security and quality,
- Achieving asset renewal cost-effectively and securely.

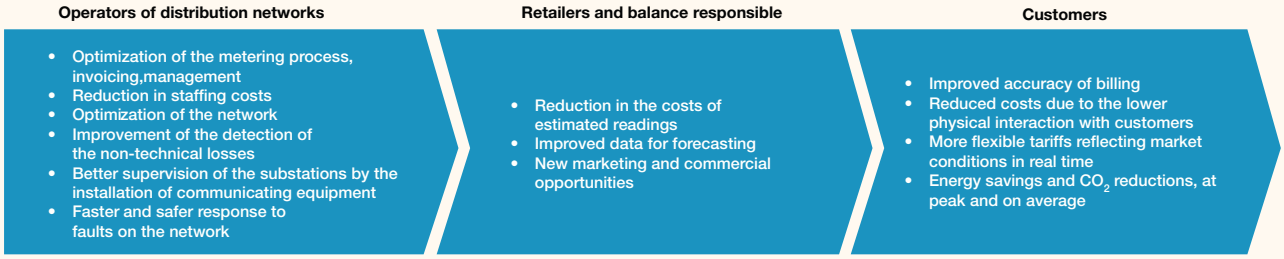
But other potential innovations in this field will affect distribution activities including:

- New architectures for system design,
- Management of large distributed generation penetration and demand response,
- Development of new services for customers,
- New network asset management tools.

Smart Metering

Introduction of **smart meters with two-way communication allows remote reading and greater automation of processes and procedures,** which have an impact on the tariffs that can be offered based on the more "real time" data and accurate measurements.

These projects, known by the acronym AMM, which stands for "Automated Meter Management," present a common interest for all the players:



The first projects were initiated around 2003. These included PG&E and SCE in North America who wanted to manage demand and try to avoid blackouts. In Europe, ENEL (Italy) introduced it to reduce fraud and Vattenfall (Sweden) used it to manage its costs of billing due to the large dispersion of its customers and for easing meter maintenance management.

Smart Metering is entering a second phase of experimentation in Europe, either in an **analysis phase** (Iberdrola in Spain, ENECO in the Netherlands, and Sibelga in Belgium) or in **pilot programs** (ERDF in France, ENDESA in Spain, and RWE in Germany). Factors of motivation go beyond national specificities:

- **Maturity of technologies**: Improving communication technologies and reducing the risks of interruption of services,
- **Multiplicity of offers for Machine-to-Machine data transfers by telecom operators**: Reducing the communication operating costs between the metering infrastructure and the information systems,
- **Potential reduction of smart meter prices over the next 10 years,** following an effect of volume and with the appearance of new suppliers on the market.

These projects represent major industrial challenges and require considerable investments. It is crucial to handle carefully the main technical and organizational issues which have important economic impacts:

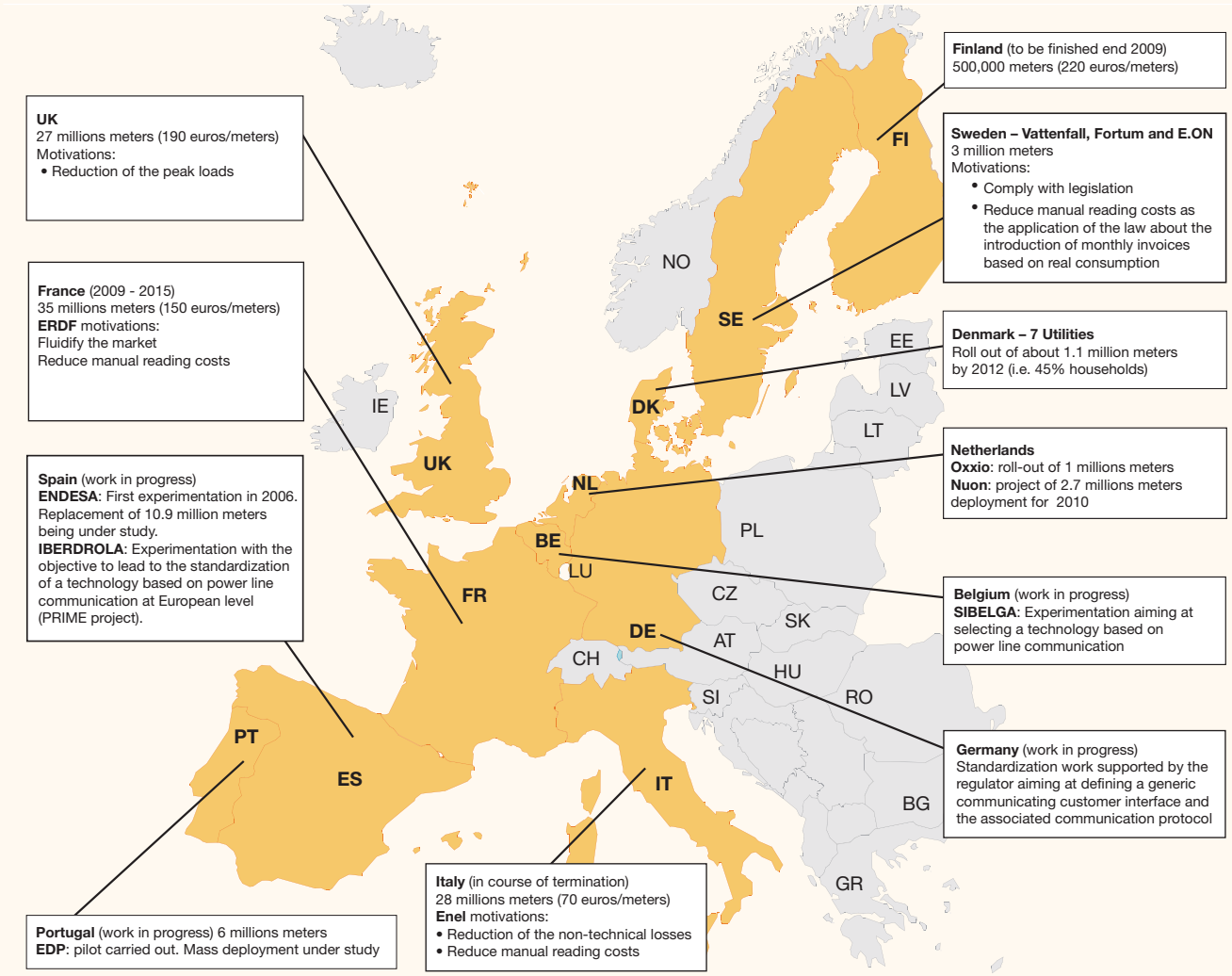
- **Simplify the meter at the maximum** to make it the least expensive and as longest lasting as possible,
- **Ensure the interoperability of the equipment of the system** to encourage competition between suppliers and simplify maintenance,
- **Set up extremely innovative and powerful information systems** able to guarantee the service quality and continuity required, including in the phase of deployment and replacement of the meters,
- **Optimize and shorten the mass roll out** by taking into account at an early stage the methods of installation and metering devices.

Despite all these benefits, **the generalization of remote reading** is not free from barriers, and **requires a solid business case**. A rigorous financial analysis has to be conducted, integrating the huge initial investments, the costs of maintenance of the new system, the headcount reduction and the profits related to the optimization of the network and the park of meters.

In some countries in Europe, issues around initial investment costs and responsibility sharing lengthen the debates preliminary to the launch of such projects.

The youth of this industry also constitute another point of vigilance, as shown by the absence of standards (project PRIME in Spain, DSMR in the Netherlands, and MUC/SML in Germany) or the brittleness of certain solution providers.

Examples of Smart Metering initiatives in Europe



Source: Capgemini analysis, EEMO10

Gas Transmission

Capacity at interconnections is congested, often commercially

Capacity at some entry points of European national transmission systems is congested. For example, import capacity from Belgium to France, Germany and the UK is congested; the Northern and Eastern entry capacities in France are congested (Dunkerque, Taisnières and Obergailbach are used at maximum capacity level); and import capacity from Norway, the Netherlands, Denmark and Belgium to Germany is congested. In addition to these, many other interconnection points do not display sufficient capacity.

Very often though, transmission capacity is fully booked but not used. This happens when there is overcapacity, i.e. the transmission system can (technically) handle greater flows, but access to it is obstructed by incumbent shippers that have bought the entire amount available. For example, import capacity from Belgium to France, Germany and the UK is fully booked until 2009, and import capacity at Dunkerque, Taisnières and Obergailbach is fully booked until 2018 (although also used at the maximum levels).

Incumbent gas players tend to book as much capacity as they can as a protective measure for their market. Indeed, new entrants without import capacity can access gas only at the exchanges, but their liquidity is low, or at LNG terminals, which regasification capacity can also be congested.

To prevent incumbent shippers from booking more capacity than they actually need, many regulators have implemented the Use It Or Lose It (UIOLI) rule. Shippers that do not use booked capacity are forced to release it to the benefit of shippers without capacity. But the UIOLI rule is not working properly because of the lack of transparency and, in particular, steering information, i.e. information about capacity usage (as well as other reasons).

In more mature markets, capacity trading, i.e. the trading of transmission capacity rights among shippers, is also used as a tool to redistribute capacity according to market needs. Capacity trading is very illiquid and mainly done on an OTC mode, although some exchanges have started offering a trading service.

In May 2008, APX opened the Capacity Usage Rights (CUR) market for trading secondary firm cross border capacity at the Bunde-Oude Statenzijl interconnection point, at the Dutch-German border. No trades were registered until June of the same year. The service offer is expected to be extended by the end of 2008 with capacity trading at the Danish-German interconnection point of Ellund.

Key issues in Germany

Increasing competition in the retail market

With regulation of electricity end user prices having expired in July 2007, **retail prices** went up significantly over the past 12 months, last but not least driven by increasing oil and gas prices. Because of rising prices, **customer switches** became more apparent than before (actual rate of 7%, quickly growing), further facilitated by easier switching regulation. Utilities partially tried to counterbalance this by offering **fixed prices**, for e.g. two years or other innovative pricing schemes. Overall, increasing activities in order to optimize and strengthen **customer relationship and loyalty** have been observed at all energy retailers. Apart from this, many new market entrants and discount retailers are focusing on **segment-oriented customer care** activities. As an illustration, E.ON's discount Internet brand **E wie einfach** gained about **400,000 customers** in 2007, and as per latest news, it is already close to the 1,000,000 customer mark.

More environmental concern

The discussion about high **energy prices** was fostered by politics. At the same time, a stronger anxiety for **environmental pollution can be observed**. In consequence, a significant number of coal-fired power plants projects were stopped, and renewable sources pushed forward by major German Utilities (examples include the creation of a renewable branch at EnBW, wind and biogas projects of RWE Innogy, etc.). Furthermore, indications show that there might be an opportunity for extending the **runtime of nuclear power plants**, as it seems to be a common point of view that CO2 reduction targets in Germany cannot be achieved by 2012. However, initiatives launched by the industry to intense the discussion between government and industry, e.g. "Energiepakt", have not shown tangible success. It also might not be a great help that three of Germany's big four Utilities recently named a new CEO.

Grid Divestments

Due to mainly political driven reasons, three out of Germany's big four Utilities announced their plan to **sell** their **transmission grids** (E.ON and Vattenfall's power transmission grid; and RWE's gas transmission grid) and there is an ongoing discussion about establishing a national grid operator.

Open season procedures have increased but actual developments remain moderate

During 2007, interconnection capacity was extended at some European border points and further development plans have been made, predominantly through open season procedures. An open season is a useful tool both to assess the market demand for capacity and then to allocate it. In the first phase of an open season procedure, a TSO asks shippers to express their interest in new capacity. In the second phase, the TSO asks shippers to submit binding requests for the new capacity, sometimes backed by financial guarantees.

The Larrau interconnection went into operation in November 2007 and now provides 87 GWh/d of interconnection capacity between the French and Spanish markets. The MidCat project, again an interconnection infrastructure between France and Spain planned by TIGF (French TSO) and Enagas (Spanish TSO), will provide additional 240 GWh/day and will be possibly used to flow the gas of the Medgaz pipeline, taking gas from Algeria to Spain. An open season procedure is in place for the MidCat project and also for the extension of existing interconnections at Larrau and Biriatu border points.

The Balgzand Bacton Line (BBL), an existing interconnection taking gas from the Netherlands to the UK that started operations in December 2006, is also planned to be expanded. The BBL Company launched an open season procedure in May 2007 for forward capacity and has received requests—up to the maximum level—for booking its capacity till 2016. In March 2008, four shippers signed binding agreements. The BBL Company is also expected to implement the reverse flow service.

In April 2007, Fluxys and GRTgaz launched an open season procedure for the North-South transit in Belgium and the entry into France through the interconnection point of Blaregnies-Taisnières. 39 shippers in Belgium and 37 shippers in France sent non-binding capacity requests. Shippers, though, are required to postpone the second, i.e. the binding, phase of the open season procedure.

The TAG pipeline, connecting Austria with Italy and taking Russian gas to the peninsula market, is also being extended by 6.5 bcm/year.

TSOs made plans to extend capacity also within their gas networks and not only at the interconnections with the other national systems.

Key issues in Switzerland
Liberalization of the electricity market and preparation for the future

The main topic in the Swiss electricity market is the **preparation of the first stage of market liberalization**. Starting on January 1, 2009, customers with an annual consumption of more than 100,000 kWh will be free to choose their electricity supplier. Liberalization for remaining customers is planned five years later, following a referendum set for 2014.

In September 2008, most suppliers have announced significant rises in electricity prices (average +15 to +20%) for all segments of customers.

In 2008, the old net control areas moved to **a countrywide Swiss control area managed by Swissgrid**, the TSO established in 2006. This is a new commitment to act in accordance with the key elements of EU rules (EU Directive 1228/2003). Negotiations about an agreement between Switzerland and EU on mutual market access, proof of origin, security standards and electricity transit are still ongoing.

The two Swiss companies **Atel and EOS have decided to merge** with a participation from French EDF. The launch of the new Group, active on a European basis and estimated to generate around €13 billion turnover, is expected in early 2009.

Security of supply is still a concern. BKW and Axpo founded together a new company (Resun AG) aimed at evaluating the build of two new nuclear power plants. Atel has also registered a new project for building a new power plant in Gösgen. They are not expected to be online before 2025. In the meantime, CCGT projects should be realized. Renewable projects are also flourishing all over the country.

Axpo launched via its subsidiaries (EGL and NOK) strategic gas and water investments. BKW made several investments to increase production capacity, for e.g. in renewable or hard coal power projects. It is very active in trying to increase its market share in Switzerland.

The European Parliament is in favor of an option between OU, ISO and ITO

The third gas directive includes measures to attain the single European gas market and an increased collaboration among national TSOs.

Within this scope, the GTE, which is the transmission column of Gas Infrastructure Europe, has launched the initiative for the establishment of the European Network of Transmission System Operators of Gas (ENTSOG). The main task of ENTSOG is to enhance collaboration among European TSOs and, above all, foster investments in infrastructure.

Other similar initiatives include the creation of the Regional ISO by EFET, the European Federation of Energy Traders, and the actions to put forward the Gas Regional Initiative, i.e. development of plans and meetings with interested parties of ERGEG, the European Regulators' Group for Electricity and Gas.

Market consolidation is taking place also in the gas transmission business

During 2007 and 2008, Gasunie, which owns Gas Transport Services, the Dutch gas TSO, finalized the acquisition from Exxon and Shell of the German gas transportation business of BEB and ExxonMobil Gastransport Deutschland. Gasunie became also a partner in the Nordstream project, taking gas from Russia to Germany through the Baltic Sea.

In the first months of 2008, RWE agreed to sell its 4,100 km long German gas transportation network, within the next two years as part of a deal to settle an EU antitrust proceeding against the company.

In May 2008, during a meeting with the European Commission, Eni's CEO proposed to create a European natural gas network company by merging the existing main transmission assets across Europe. The parent companies, i.e. Eni, E.ON, Gasunie, Gaz de France and others, would hold a share of this giant gas network business in proportion to the value of their respective networks.

If the RWE and Eni initiatives get the go ahead, the gas transmission activity in Europe could see further consolidation.

Ownership unbundling in gas — C/M/S/ Bureau Francis Lefebvre

The third legislative package, made public by the EC on September 19, 2007, includes a draft Directive modifying the applicable Directive regarding gas liberalization.

Unlike the situation in the electricity sector, the EU Parliament agreed to the compromise that was reached between the Member States that supported the Commission's views and the Member States that were opposed to Ownership Unbundling of TSOs, at the Energy Council meeting of June 6, 2008. **Therefore, there is little doubt that the option between OU, ISO and ITO (Independent Transmission Operator) will eventually be adopted for the gas TSOs.** There are four main reasons for this.

First, **there is so far no precedent of an ISO system in any gas market** and therefore nobody can assure that it is workable. Second, **the EU is more and more dependent on foreign suppliers** and there are concerns both on their reliability and ability to make the enormous investments necessary to comply in the long run with their contractual commitments. Additionally, **disintegrating the incumbent Utilities could endanger new investments in infrastructures** (pipelines, LNG terminals, and storage facilities) that are necessary to follow the increase in European consumption and diversify the sources of supply.

Third, transportation in HP pipelines accounts for significant proportions in revenues and profits of gas Utilities: The OU would destabilize such big companies in a strategic sector. Fourth, **non-European companies have the financial means to gain control of such strategic assets.**

This last concern pushed the EC, approved by Member States and the Parliament, to include a provision of reciprocity, neutralizing the risk of having "persons from third country" acquiring the control of transmission system owners or TSOs. This controversial provision is informally called "anti-Gazprom clause," since not only Russia refused to ratify the Energy Charter and its Protocol that provide for non-discriminatory third party access to pipelines, but Gazprom has recently taken the control of several TSOs in neighboring countries which are situated on the routes of the pipes used to supply Europe.

As a consequence, the real situations will probably continue to widely differ in the long term. GDF Suez has, for instance, a business model that maximizes transportation revenues, whereas RWE announced its intention to divest its gas networks. **This does not mean a setback for the integration of the gas market in Europe, but a greater need for regulation.**

Gas Storage

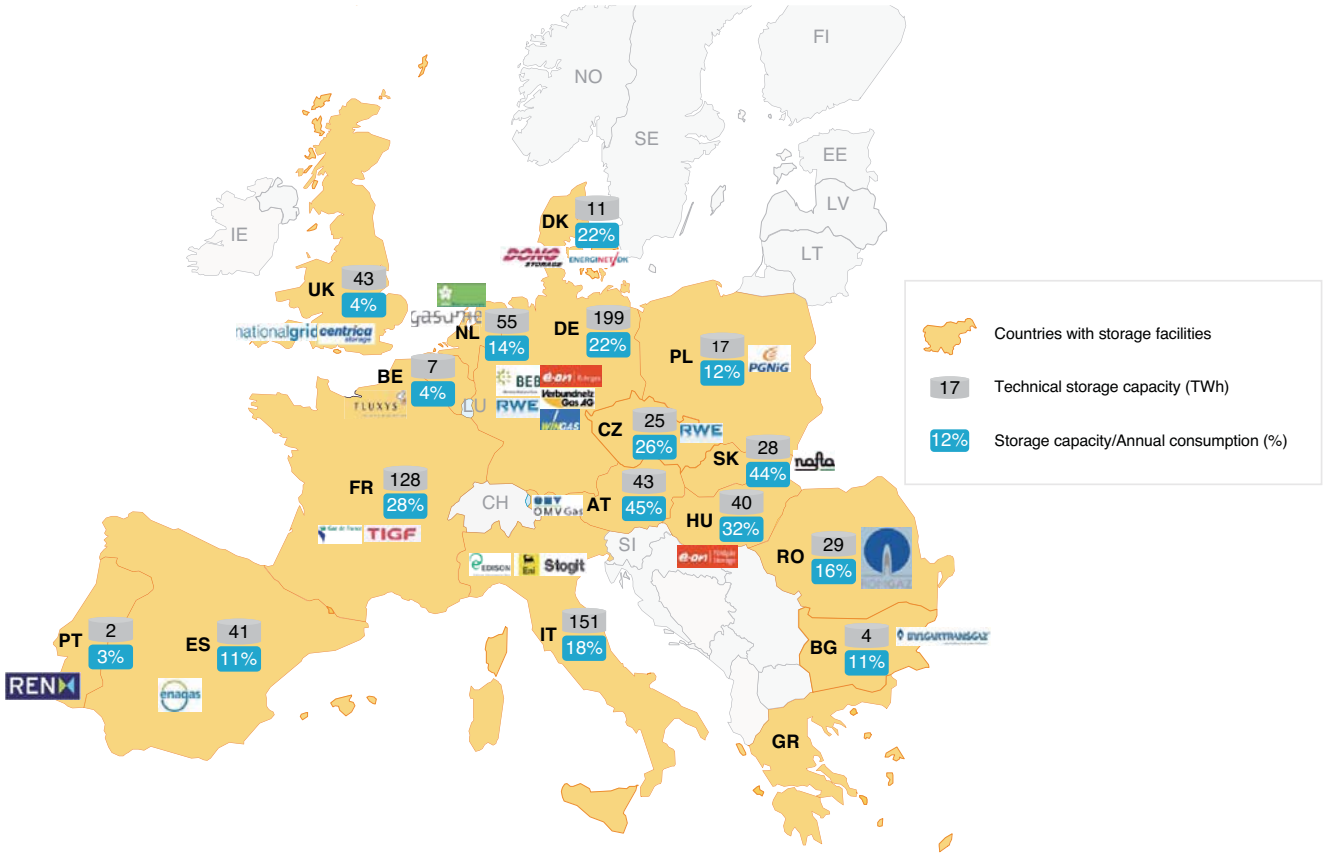
With European countries becoming more dependant on imported gas, storage of natural gas is increasingly becoming a necessity to balance supply and demand

Storage allows pipeline operators and suppliers some flexibility in the event that imported gas flows are disrupted or reduced. Given the significant European seasonal swing (28% in EU-27), there is an important need for flexibility. Historically, seasonal flexibility has been delivered through increased production and imports, along with a minimum storage capacity. With domestic gas production declining, new storage is therefore now a priority for companies as well as governments. The current working gas volume stored is around 76 bcm (823 TWh). The top three players in terms of storage capacity include Eni (13.6 bcm), E.ON (11.7 bcm) and GDF Suez (10.6 bcm). Gazprom, the fifth player after RWE (5.1 bcm), with 3.9 bcm, is investing heavily in Europe and has also signed many Memorandum of Understanding with European countries to work on gas storage projects.

According to GSE, the storage column of Gas Infrastructure Europe, storage volumes of European countries need to be expanded by 60 bcm by 2025.

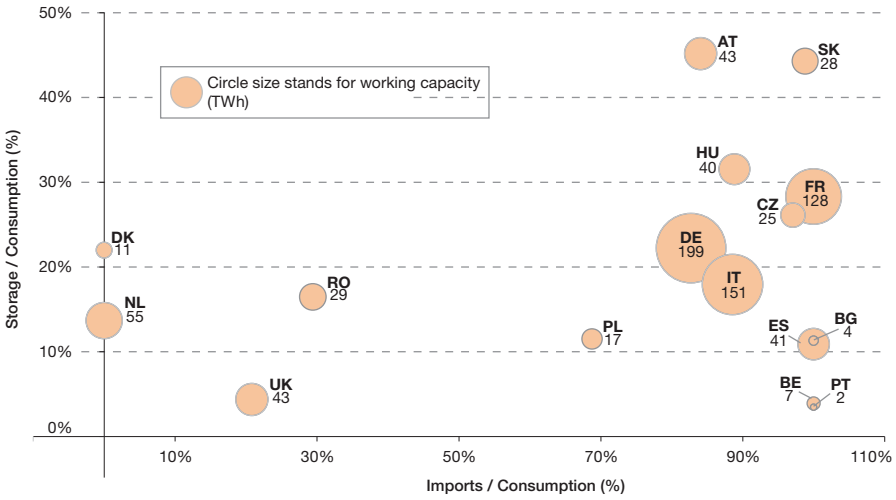
Germany, Italy and France, the largest European gas consuming nations who mostly rely on imports, seem to be at the border of reduced security of supply (see Table 10.2). These three countries hold most of the European storage capacity (58%).

Table 10.1 Map of gas storage (2007)



Source: GIE gse, BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

Table 10.2 Gas storage capacities (2007)



Source: GIE gse, BP statistical review of world energy 2008 – Capgemini analysis, EEMO10

Germany has the biggest European storage facility, Rehden with 4.2 bcm, which is owned by Wingas (a joint venture of German's Wintershall and Russia's Gazprom). Furthermore, four German municipal Utilities plan to jointly build an additional gas storage facility in North Rhine Westphalia.

In **Italy**, the approvals for additional storage facilities have been delayed, awaiting approval by both the economy and environmental ministries.

The UK has always met modulation with production control instead (and with peak shaving facilities). However, the UK relies increasingly on imports and hence needs to develop storage. Most of its current gas storage capacity is at Centrica Storage's giant offshore gas field Rough (the second largest European storage facility with 3.3 bcm).

- The first new capacity is due to come from the 4.2 bcm Aldbrough salt caverns being brought on in mid-2008 by Scottish & Southern Energy and StatoilHydro,
- Centrica plans to build a new 1.7 bcm gas storage facility at an undisclosed location offshore the UK, and has already announced a facility at Bains in the East Irish Sea. Centrica is also planning another UK Continental Shelf site with 60 bcf capacity,
- Gaz de France signed an agreement with chemicals major Ineos Enterprises for commercial development of a proposed salt cavern natural gas storage facility at Stublach, Cheshire, Northwest England.

These projects are at various stages of development. If they all get the necessary permissions and come on stream in line with their stated ambitions, then the UK's gas storage capacity will increase significantly in the coming years (see Table 10.3).

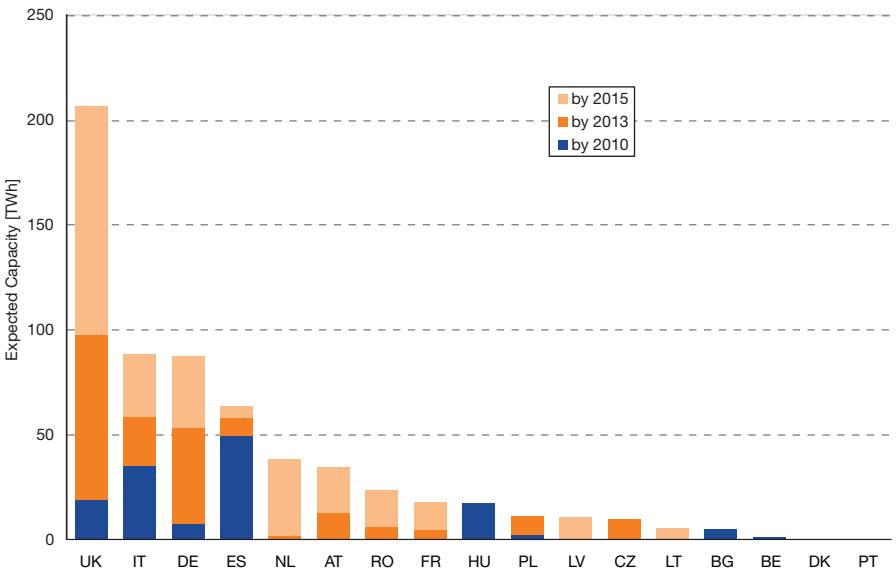
With the opening of Haidach, a joint venture between Rohöl-Aufsuchungs Aktiengesellschaft (RAG), Gazprom and Wingas, in the second half of 2007, **Austria** now has five depleted gas fields that can provide 4 bcm of storage. OMV holds three storage facilities and 52.5% of the Austrian storage capacity. As the annual 2007 demand was 8.9 bcm, storage covers 45.2% of the same, while the rest could be utilized by nearby countries.

At present, **Spain** has two major gas storage facilities. There are plans to develop other gas storage facilities off the Mediterranean coast, but there is limited potential for gas storage in Spain because of geological constraints. Countries like Spain (and Portugal) rely on spot LNG for modulation.

The EU's second gas directive allows Member States to opt for regulated (tariff set by an independent regulator) or negotiated (tariff set by storage operators) access

The existing legislative framework allows Member States to determine whether storage capacity must be offered for third party access and, for the storage offered for TPA, to choose between two possible regimes (negotiated / regulated). Different choices have been implemented in Member States. The existing Directive is completed by good practice guidelines: Various regulatory regimes are possible in Europe to give access to storage resources for competitors and facilitate long term investments in new capacities. These principles have been complemented with Guidelines for Good Practice for Storage System Operators (GGPSSOs). These guidelines have been promoted (and adherence to them is monitored) by ERGEG. Whatever the TPA regime chosen, negotiated or regulated, there is a "soft" regulatory requirement on storage

Table 10.3 Storage facilities projects



Source: GIE gse – Capgemini analysis, EEMO10

operators to follow common guidelines.

Italy, the UK and France have chosen different regimes, all of which appear to provide reasonable arrangements for TPA. Only Italy, amongst these three countries, has adopted a regulated approach.

Opinions diverge on the necessity of strategic storage in a fully liquid gas market

In gas, strategic stocks do not exist, except 5.1 bcm in Italy and 1.2 bcm being built in Hungary. It is understandable that the non-producing countries with the higher gas share in their primary energy mix (Hungary and Italy) were the first to decide to build gas strategic storage as they are the most vulnerable to a supply crisis. The EC could try to implement legislative and / or regulated changes on strategic storage that could impact the entire European gas market.

However, the GSE organization doubts that strategic gas stocks can increase security of supply. It is reported that emergency gas stocks could be "extremely expensive" and could distort the open commercial gas markets. Consumers could be better protected from supply shocks by creating a well connected and integrated market and by diversifying supply sources, both geographically and technologically. If the EC was to impose a regulation on security stocks, it would add more pressure on an already stressed investment market for gas storage.

Key issues in Belgium

Prices hikes and environmental challenges

The **increase of energy prices is a hot topic in Belgium**, and electricity and gas prices are critically looked at. Every stakeholder is having their say on the subject, i.e. regulators, government officials, producers and retailers, leading to a debate that has become largely public, with regard to the strong press coverage. The delay in the establishment of a stable and fully operational federal government in Belgium is not helping the definition and implementation of efficient measures to tackle the issue.

A **number of initiatives to address the environmental challenges have been launched** in the three Belgium regions, and **green offers as well as energy efficiency have been incentivized significantly** more than in the past. The opportunity to reconsider nuclear power plants life extension or the building of new nuclear power plants is part of the debate.

Asset swaps

Without any doubt, the **merger between Gaz de France and Suez has been the main subject** of discussion in the last couple of year in Belgium. The merger that has been (finally) approved in July 2008 will lead to a major redesign of the Belgian electricity and gas landscape.

As required by the European Commission, **Gaz de France and Suez will have to divest some of their Belgian assets** to maintain a competitive environment.

In this context of asset swaps, **Centrica** was selected against EDF to acquire Gaz de France's 25.5% share in **SPE**, hence bringing his participation to 51%, while **Eni** was selected against EDF and E.ON to acquire the 57% share of Suez in **Distrigas**. Another divestment demanded by the European Commission concerns Suez's participation in **Fluxys**, which needs to decrease by 12.5%. While an agreement was sealed with a UK investment company, Ecofin Limited, a grouping of Belgian municipals, Publigas, used its pre-emptive right on those 12.5% shares to get the same share as GDF Suez (i.e. 45% each), before taking control with over 51% in 2010. At the same time, the creation of **Fluxys International** to manage the **Zeebrugge LNG hub** was agreed upon; GDF Suez will own 60% of this organization while Publigas will be in charge of its management.

All these changes will certainly have some impact on the Belgian Utilities market and will lead to the repositioning of the different actors.

Gas Distribution

Unbundling and independence still difficult to reach

In 2007, DNOs had to face the challenges of legal unbundling requirements. The European Gas Directive 2003/55/EC required network and sales activities was to be separated by July 1, 2007.

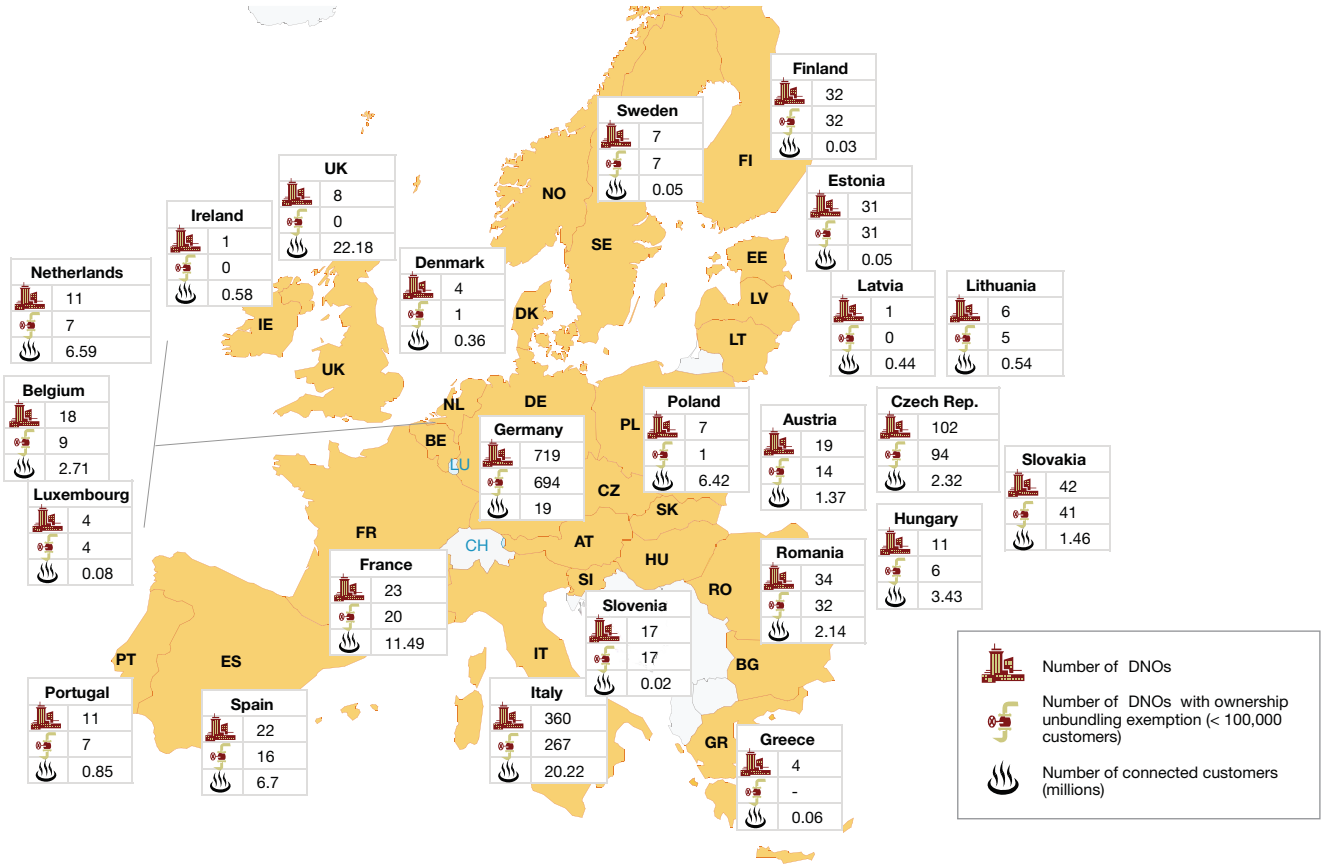
Legal unbundling implementation, in line with the deadlines of the directive, has been less apparent in gas than in electricity, where some 50% of regulators reported no significant change in unbundling—at least six Member States had no gas DNO legally unbundled at the end of 2007.

Since then, new improvements towards unbundling have occured including:

- Many network companies have been created in Germany. The most common model is a divestment of electricity and gas distribution systems toward small network companies which operate the holding company's leased network with few own staff members,
- The creation in 2008 by Bord Gáis (Irish gas company) of a separate company responsible for the operation of Irish gas transmission and distribution networks,
- The creation of the Gaz de France's subsidiary Gaz Réseau Distribution France.

It seems that the derogations allowing DNOs with less than 100,000 customers to be exempted from legal unbundling requirements for gas were used extensively. Table 11.1 shows the number of these small DNOs in each country. The major gas DNOs throughout Europe are subsidiaries of the historical national energy group.

Table 11.1 Gas DNOs in Europe (2007)



Source: European Commission, Eurogas – Capgemini analysis, EEMO10

An emergence of gas distribution operators with similar role and characteristics

With unbundling pressures, obligations placed on DNOs across Europe by the European Commission and a convergence in the regulatory framework, gas distribution system operators emerged through 2007 with a set of common activities. Their role is to provide non-discriminatory access to the networks, which includes not only designing, building, operating and maintaining the distribution network in a safe and reliable way, but also to contribute to the competitiveness of natural gas by operating efficiently.

Various situations throughout Europe in terms of organization and operating constraints

There are different DNO organizational structures throughout the EU, since natural gas markets developed differently in individual countries, and because of local political or economic factors:

- Presence in many countries of either one or a few large entities belonging to incumbent players with numerous very small entities belonging to local authorities (up to 700 in Germany and 360 in Italy) or to service companies,
- Very different potential for network development from one company to another according to gas market share and customer density,
- A strong heterogeneity in gas customer penetration from one distributor to another (1% in Sweden, and more than 80% in the Netherlands).

Gas distribution networks are typically located in urban areas and, unlike electricity distribution, they don't have to deliver to all customers in their operating area. Every investment—especially expansion—needs careful economic evaluation and must take into account the price of competing energies or technological alternatives.

Table 11.2 Gas distribution market penetration (2007)

Share of gas distribution customers (2007)*		
Less than 30%	Between 30 and 50%	More than 50%
Spain, Denmark, Portugal, Sweden, Ireland,Greece, Finland, Norway, Estonia, Romania	Austria, France, Poland, Germany, Luxembourg, Lithuania	Belgium, Netherlands, UK, Italy, Hungary, Czech Rep., Slovakia

Note: (*)Number of gas distribution customers divided by the number of electricity distribution customers in 2007
Source: European Commission – Capgemini analysis, EEMO10

Key issues in The Netherlands
Ownership unbundling and market model changes

In mid 2007, the Minister of Economic Affairs decided to launch full **ownership unbundling** aimed at safeguarding investments required in electricity distribution. The **impact** of this will be immense.

Unbundling creates transparency for revenue and cost streams of the incumbents—like Essent, Nuon and Eneco—and should **foster retail competition**. As the net profit of incumbents has dropped significantly, some incumbents have launched projects to simultaneously increase customer satisfaction and decrease the cost-to-serve. Furthermore, unbundling increases the likelihood of (inter)-national **retail mergers and acquisitions**. In recent years, companies like Centrica and E.ON entered the Dutch market through the takeovers of Oxxio and NRE retail respectively.

Distribution companies—like Essent Netbeheer, Continuon and Stedin (formerly: Eneco)—are challenged to meet unbundling requirements and to remain profitable as **regulation sharpens**. With unbundling making profits transparent, meeting the unbundling legislation requires higher effort. Some incumbents—like Continuon and NRE—have progressed in meeting the unbundling requirements, while others are still challenged to comply before January 2011.

The deployment of **smart meters** will be **delayed**. The original plan was to replace all manual meters over the next six years starting with a one-year pilot period in 2008. The Chamber of Parliament recently decided to wait for an even "smarter" meter and only replace and install meters for renovation and construction projects. All large distribution companies have started **pilots** to test functionalities, communication technologies and the mass deployment of meters.

Smart metering is part of a changing **market model** requiring the optimization of market processes and reassignment of responsibilities. In the new market model proposed to start January 2010, **retailers** will become responsible for also **billing** the distribution part as well as for the collection, validation and distribution of **metering data**. Related to the process of retail billing, distribution fees will be converted to **capacity-based fees** instead of usage-based fees from January 2009.

High differences of gas market shares throughout Europe

Throughout Europe in 2007, it was possible to differentiate three categories of countries as shown in Table 11.2 in terms of gas distribution market penetration, by comparing the numbers of gas and electricity distribution customers.

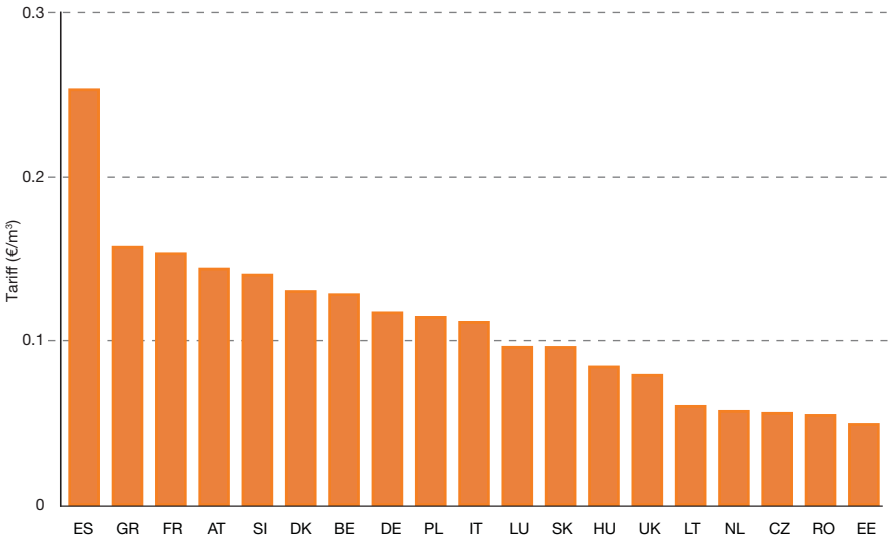
Iberian and Scandinavian countries have a low natural gas market penetration mostly due to low customer densities and/or insufficient distribution network development. At the opposite end, Belgium, the Netherlands, the UK, Italy and part of Eastern Europe countries have a high gas market penetration share. It is assumed that there is little potential for gas distribution network improvements in these countries. Countries such as Spain, Portugal, and Ireland, as well as Scandinavian countries could be considered as having some potential for a distribution network expansion. In particular, Spanish and Portugal gas markets are expected to grow fast but mainly due to electricity generation from gas rather than residential customers.

Structural and regulatory constraints still strongly push the costs up

DNOs are overseen by National Regulatory Authorities, which lay down the rules of access to the distribution networks. The regulatory framework leads to major cost constraints:

- The market opening to all customers, started in many countries in July 2007, which led to important investments in new IT systems,
- Growing regulatory constraints for safety rules drastically weigh on investment and operating costs. These are, in particular, obligations to replace some of the mains technology (e.g. remaining grey cast iron mains which have been replaced by many DNOs),
- Aging assets is an important issue that drives investments and operating costs, as safety requirements are threatened,
- Likely reduction in gas consumption (European gas consumption decreased by 1.5% in 2007) in the future could lead to stranded assets issues for gas DNOs and therefore difficulties to cover their costs.

Table 11.3 Approximate network tariff for small commercial and household (2007)



Source: European Commission – Capgemini analysis, EEMO10

High variability in the level of tariffs but economic regulation practices slowly converge towards cost optimization incentives

As a consequence of the variations in costs, and organizational as well as environmental constraints, the gas distribution tariffs vary greatly within the EU (see Table 11.3).

Regulatory progresses on economic incentives are difficult to take up with crucial safety constraints

Many countries have implemented (or are implementing) an incentive-based regulation for their main gas DNOs (see Table 11.4).

However, they first have to take into account regulations for safety which are often not compatible with productivity improvement.

For instance, in the UK, the new price control package for gas distributors (2008-2013 regulatory period) set a 2% annual increase in DNOs' allowed revenue (RPI+2), despite an improvement of 2.5% per year applied to Opex. It takes into account a need for more than €7.5 billion in investment over the five year period, in particular to comply with replacement programs (this is 36% more than they spent in the previous regulatory period).

Smart metering in gas distribution

Unlike electricity distribution, only a few projects of automated metering management were reported in 2007 for gas distribution. They were mainly for commercial and industrial customers. However, some large multi-Utilities undertake wide projects for collecting meter data of both gas and electricity distribution at the same time (in the Netherlands for instance).

Table 11.4 Gas distribution regulatory regime (2007)

Countries where gas DNOs' regulation scheme can be considered as a **cost plus regime** (tariffs set to cover the annual costs + a regulated rate of return for capital)	Countries where gas DNOs' regulation scheme can be considered as **price cap regime** (or incentive based income regulation)
Austria, France*, Belgium, Spain, Portugal, Czech Rep., Poland	UK, Denmark*, Ireland, Germany, Netherlands, Italy

Note: (*): incentive based regulation implemented in 2008.
Source: ERGEG – Capgemini analysis, EEMO10

Sustainable Energies and Climate Change

Quantitative evidence suggests that the energy system in the EU-27 still has a long way to be considered as sustainable

Figures from the end of 2006 showed some encouraging improvements[28]. Final energy consumption grew less in 2006 than the average during the last decade (+0.3% versus +0.9%). Energy intensity of the economy (tons of oil equivalent per unit of GDP) decreased by -2.9%, compared with -1.7% on average.

Unfortunately, the road to environmental sustainability was paved with bad surprises:

- The overall CO_2 emissions decrease was halted to a 0% reduction. It needs to decrease by -1.3% per year in order to reach the 2020 target (see Table 12.1),
- The CO_2 emissions from the electricity and heat sectors increased by +1.1% (+0.7% for road transport)[29]. The share of coal as primary energy for electricity generation increased from 17.8% to 18.3%,
- Recent announcements of plans to build 60 coal-fired power stations with a 50 year lifespan. This would keep Europe for decades far above the "Factor 4" trajectory that would lead to 60-75% CO_2 reductions in 2050,
- The share of renewable generation of electricity rose to 14.5% (+0.5%), despite poor hydro levels. The objective of 21% in 2010 will not be reached.

Meanwhile, Europe's energy dependence increased by +1.1%, up to 52.3% (42% in 1996).

To curb these negative trends, stiffer regulatory actions and further investments are crucial.

Preliminary discussions for post-Kyoto agreements remained sterile and real decisions have been postponed till 2009

The Bali conference in December 2007 did not meet quantified commitments concerning the reduction of emissions by 2020, neither was there an agreement on the system that should replace the Kyoto system after 2012. Yet it stated that an agreement should be found at the latest during the Copenhagen conference in December 2009, and the US committed itself formally to the process. The post-2012 discussions have started; however, it is still an observation round.

Nevertheless, Climate Change and Energy Security of Supply are on the top of the agenda of European and G8 leaders. The summits in June and July of 2008 repeatedly focused on this topic, endorsing the International Energy Agency (IEA) recommendations for energy efficiency action, energy mix diversification and carbon capture (see box on CCS).

The IEA estimated that tackling climate change would increase energy investments by 7% to 17%. Over $254 trillion in investments are required to meet the global growth in energy demand by 2050, while bringing global CO_2 emissions back to 2005 levels or reducing them by 50% would cost respectively $17 trillion and $45 trillion more[30].

In January 2008, the EU Energy and Climate Change Package set explicit targets for 3x20

The EU announced the "Energy and Climate Change Package" in January 2008. The package represents strong commitment including political decisions on actual objectives at country level.

The package divides the 3x20 objectives into sub-objectives and provides regulatory texts around the reduction of Green House Gas (GHG) emissions and the development of renewable energy.

The objective for GHG emissions reduction is split between ETS and Non-ETS sectors as follows:

- 21% reduction for the emissions of the ETS sector (power, energy, and large industry) compared to 2005. The EC expects that this will lead to a CO_2 price of about €39/ton in 2020. The objective is managed at the European level, with National Allocation Plans (NAP) being suspended after 2012,

Table 12.1 3x20 EU climate change objectives

	Indicator chosen by the European Commission	2006	2006 vs. 2005	2020 target	Yearly increment to reach 2020 target
Energy efficiency	Primary energy consumption (Mtoe)	EU-25: 1,764	-0.15%	EU-25: 1,520	-1.1%
Renewables	Share of energy from renewable sources in final consumption of energy (%)	EU-27: 9.2%	+0.7%	EU-27: 20%	+0.8%
CO_2 emissions	Emissions of carbon dioxide (Mt CO_2)	EU-27: 4,258	+0.002%	EU-27: 3,541	-1.3%

Source: European Commission, Eurostat – Capgemini analysis, EEMO10

[28] The latest available Eurostat figures for 2006

[29] EEA Community greenhouse gas inventory 1990-2006 and inventory report 2008, Submission to the UNFCCC Secretariat

[30] IEA, Energy Technology Perspectives 2008

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1_5,

- 10% reduction for the emissions of the non-ETS sector (buildings, transport, small industries, agriculture, etc.). This objective varies country by country, based on current situation and GDP per capita (see Table 12.2).

The renewable energy directive forces each Member State to increase its share of renewable energies in line with specific objectives, based on current situation and per capita GDP. This is an effort to boost the EU's current share of the final energy originating from renewable sources from 9.2% (2006) to 20% (2020).

The directive also proposes rules for a market of renewable certificates at European level. Two options are being discussed, the second being included in the proposal. Large industry associations and Eurelectric advocate for a market of certificates fully tradable at European level by private players. This would lower the cost of the 20% objective by allowing the lowest cost renewable opportunities to be developed first. The opposing views from several Member States including Germany and Spain, as well as the renewable industry organizations is that countries need to understand and develop their own potential rather than rely on action taken in other countries. Therefore, they advocate for certificates to be traded only at Member States level and not at company level, in order to allow governments to maintain a control on the renewable policy in their country.

Reaching the CO_2 and Renewable objectives will be very challenging for most Member States and the EU as a whole.

The renewable objectives is in fact equivalent to the maximum technical potential at European level, bearing in

Implementation of the EU Energy and Climate Change package — C/M/S/ Bureau Francis Lefebvre

The Energy and Climate Change Package, aiming at turning Europe into a low carbon economy, is one of the three pillars of the "European Energy Policy," decided in spring 2007 and frequently summarized as the "3x20" policy. On January 23, 2008, the Commission made public a set of proposals, the passing of which is one of the priorities of the French Presidency.

The new draft legislation consists of **three Directives and one Decision,** jointly known as "20 20 by 2020":

1) **A renewed Emissions Trading Scheme (ETS),** covering more gases and more sources of emissions (new plants, and also new sectors like aviation which is already the purpose of a draft Directive as of 2006), organizing at EU level the delivery of a decreasing number of allowances (more and more through auctions), and setting a cap for the use of CDM credits to match internal obligations;
2) Instead of the current indicative objectives, **a new Directive would establish an overall binding target of a 20% share of renewable energy sources in European consumption, leading to global binding national targets by 2020 for electricity, heating and cooling, and transport, as well as a specific 10% binding minimum target for biofuels in transport,** to be achieved by each Member State. The draft Directive also lays down a system of transferable guarantees of origin of electricity, and heating and cooling produced from renewable sources;
3) **A Directive on the geological storage of carbon dioxide,** based on a mechanism of storage permits, monitoring and long term financial security, with the aim of securing costly investments in such technologies and facilities; and
4) Since the revised ETS will cover less than half of the GHG emissions, **a decision enforcing specific and legally enforceable targets, reasonably designed State by State,** covering non-ETS areas like buildings, transport, agriculture, waste and industrial plants falling under the threshold for inclusion in the ETS; CDM credits could be marginally used.

The Council reached a common position and the French Presidency is making efforts to speed up the process in order to strike an agreement on this legislation between the three angles of the institutional triangle, and even having the Parliament vote upon each of the bills under discussion before the end of 2008.

So far (as of September 2008), four main questions are under discussion. First, if everybody agrees that the EU must remain the leading player in the international process and commit itself on binding obligations, **there are still discrepancies about whether the draft Directives are ambitious enough or not;** for instance, the target of -20% of -30% for GHG emissions.

Second, **progressivity is discussed,** that is a key point for, inter alia, allowance auctions, ETS application to electro-intensive sites, or carbon capture and storage experiences; the whole set of measures is intended to be credible and efficient in order to trigger positive anticipations and real investments.

Third, even though solidarity and equity are agreed principles, **the apportionment of the initial burden is a matter of negotiation,** whereas minimizing the cost for the European economy means an optimization of the efforts where they are more likely to be made.

Last, should a worldwide binding agreement not be reached, **ongoing discussions are about topics like taxation at EU external borders for products made in countries that do not conform to the same rules,** compatibility of such measures with WTO rules, and risks of "carbon leakage."

The coming months will be crucial. The EU needs a strong and clear common position to negotiate in Poznan (December 2008) with its partners, as regards a global set of rules applicable after 2012, thus paving the way to a conclusive conference in Copenhagen (December 2009). Apart from the fact that these meetings will take place in Europe, **there is no doubt that should there be no success then the EU would stop being the leading player.** As a consequence, in a difficult moment for the European institutional process, this "climate package" is becoming a symbol of the willingness and ability of the Europeans to design their common future and enforce new integrated mechanisms.

mind the world demand for equipment (turbine, poles, etc.). While the targets for each technology is not set yet, but just as an illustration for France, an ambitious plan would entail an increase in wind capacities from the current 2.5 GW to 20 GW in 10 years. A target of 15% of total energy from renewable sources for the UK translates into 30% of electricity demand. UK power companies have already noted the significant challenge in meeting this target given the capacity of the manufacturers to provide renewable technologies.

Concerning the CO_2 objectives, stiffer measures are required to stay in line with the targets. As an illustration, the "Grenelle de l'Environnement" in France suggested that complying with the CO_2 objective of 14% reduction for the non-ETS sectors, translates in reality into a reduction of 38% in electricity, gas and fuel needed to heat commercial and residential buildings by 2020.

The impact assessment study released by the EC estimated that the cost of the package would not exceed 0.5% of the European GDP. However, we can expect much debate and clarification over the coming months, particularly in the current context of a world economic crisis. The package should be validated in the first half of 2009 at the latest, while the NAPs for renewable should be finalized by March 2010. In the meantime, Utilities can expect much uncertainty and tough negotiations with governments, equipment manufacturers, etc. This will not encourage players in setting a strong strategy.

Table 12.2 EU Member States renewables and GHG emission reduction objectives

	Share of energy from renewable sources in final consumption of energy		GHG emission reduction for non-ETS sectors
Countries	2006	2020 target	2020 target compared to 2005 levels
AT	25.2%	34%	-16%
BE	2.6%	13%	-15%
BG	9.0%	16%	20%
CZ	6.4%	13%	9%
DE	7.8%	18%	-14%
DK	17.1%	30%	-20%
EE	16.6%	25%	11%
ES	8.7%	20%	-10%
FI	28.9%	38%	-16%
FR	10.4%	23%	-14%
GR	7.2%	18%	-4%
HU	5.1%	13%	10%
IE	3.0%	16%	-20%
IT	6.3%	17%	-13%
LT	14.6%	23%	15%
LU	1.0%	11%	-20%
LV	31.4%	42%	17%
NL	2.7%	14%	-16%
PL	7.5%	15%	14%
PT	21.5%	31%	1%
RO	17.1%	24%	19%
SE	41.4%	49%	-17%
SI	15.5%	25%	4%
SK	6.8%	14%	13%
UK	1.5%	15%	-16%
EU-27	9.2%	20%	-10%

Source: European Commission, Eurostat – Capgemini analysis, EEMO10

CO_2 market mechanism is operating successfully

Phase I of the ETS (2005-2007): Electricity generation allocations short by 7.2%

The EU Emission Trading Systems (ETS) has established a price for carbon and proved that trading in GHG emissions works. However, the environmental benefit of the first phase was limited due to allocations of 2.5% in excess of real emissions. Allocations were calculated before reliable and verified emissions references became available thanks to the EU ETS. As a consequence, the CO_2 price collapsed down to €0.03/ton in December 2007 (see Table 12.3).

Nevertheless, the electricity sector on the whole was short by -7.2% over the period. For instance, Essent and British Energy had to buy more than 30% of the certificates used for compliance from other players. That is why the EU ETS has grown rapidly its traded volume to 1,456 $MTCO_2$, from 260 $MTCO_2$ in 2005.

Phase II (2008-2012): Global ETS allocations are 7% tighter

Calculations suggest that the level of allocation for Phase II is around 200 Mt/year lower than current emissions forecasts, based on prevailing fuel and CO_2 prices[31]. The 3.1% of the allowances should be auctioned, instead of 0.1% during Phase I, and the use of Kyoto credits has been allowed up to 13.4% of the total cap (280 $MTCO_2$ per year out of total cap of 2,083 $MTCO_2$).

From January to June 2008, the market volumes exchanged increased by 50%, up to 1,090 $MTCO_2$, with average prices ranging €20-€25/TCO_2.

Phase III: Full auctioning for power sector

The 21% reduction objective means that the annual cap will fall from the current level of 2,083 $MTCO_2$ to 1,720 $MTCO_2$ in 2020[32]. Unlimited banking from Phase II into Phase III will be allowed. However, power generators will lose their free allocation of emissions allowances, i.e. they will have to buy 100% of their allowances in auctions.

[31] Pointcarbon

[32] European Union directive (2008/0013)

Key issues in Sweden

Increasing price level and 3x20 commitments put focus on capacity investments and infrastructure for energy efficiency

Both residential and industrial customers are feeling the strain of rapidly increasing prices for electricity and heat. The increase is due to higher global commodity prices and emission trading rights which have an effect on the price setting mechanism at Nordpool. The price inflation adds to the ongoing capacity growth debate.

Investments and restructuring of electricity and heat assets

Investments in renewable, mainly wind and bio-fuelled CHP, continue to be a hot area for capacity growth, and the race is on to develop and buy assets. Two new industry/Utility alliances have emerged (Statkraft and SCA, a forestry industry giant; and Vattenfall and Sveaskog, a state-owned alliance) to facilitate land-based wind power development.

A multi-billion asset swap between E.ON Sweden and Statkraft, where Statkraft gets one-third of E.ON's hydropower assets in return for selling their shares in E.ON Sweden, was finalized in July 2008. Statkraft thereby becomes the fourth largest renewable energy provider in terms of generation capacity.

Linked to EU's energy and climate change policies, district heating generated using biofuels is getting more attention from customers, policy makers and investors alike. This also eases Sweden's supply/demand balance for electricity, and not the least, the peak load strain seen during wintertime in recent years. The inherent monopoly situation of district heating networks has sparked further investigations regarding market transparency.

Large investments are further underway by all DNOs to facilitate legislated remote meter readings, required for all household customers by July 1, 2009.

Continued dynamic end customer market

Switch rate increased additionally in 2007 and averaged 42,000 switches per month (from a total household customer base 5.2 million customers). The switching rates have decreased several months in a row in early 2008, possibly reflecting the fact that more and more customers have variable price contracts that follow the price development on NordPool.

Customer service levels are in strong focus, both from the legislator and from the Utility sector itself. In addition to the monthly meter readings starting on July 1, 2009, Utility companies, through the Swedish Energy Association, are involved in the EMIX project (see Focus) to improve the information exchange linked to supplier switching, meter readings, etc.

A new step was taken by the Nordic Ministers Council to create a common market, giving customers full access to all retailers in the Nordic marketplace.

Clean Development Mechanism (CDM) market is now mature and may be short for the second period

During the past year, the size of the primary market (Certified Emission Reductions (CER) directly bought to project developers/sellers) has increased steadily up to $7.4 billion (+28%)[33]. The breaking news is that the secondary market (trading of already existing certificates, as well as derivatives) surged to $5.4 billion (+1,122%). CER market price followed the price of the ETS allowances with a €7-10 discount for secondary CERs and €10-14 for primary CERs.

The CDM initiative has already registered more than 1,000 projects (38% registered in the UK) and is anticipated to produce CER credits amounting to about 2,000 $MTCO_2$ in the first commitment period of the Kyoto Protocol, 2008-2012[34]. Yet, the demand should amount to 2,400 $MTCO_2eq$, out of which up to 1,400 $MTCO_2eq$ is for ETS compliance alone. Additionally, the private carbon investment market is growing. The UK is dominating with 65% of the global carbon funds under management.

Renewable and Cleantech: The valuation of the renewable energy sector is increasing in response to an increasing investment in assets

Investment pace for renewable power sources is increasing and new players are getting involved

The pace for investment into renewable and sustainable energy is increasing fast according to calculations made by the UN[35]. Latest estimates indicate that 10% ($117 billion) of total investments in all forms of energy in 2007 was for the "clean tech" sector (including projects and technology companies). This is an increase of 41% compared to 2006.

Investment in cleantech companies is growing in significance

Several of the large banks are responding to the surge in investment, and have introduced dedicated cleantech groups. One strong factor motivating this move is the 142% increase in M&A activities related to renewable energy, compared to the 32% drop in overall global value of M&A deals.[36]

Investments by Venture Capital and Private Equity firms grew substantially in Europe during 2007 and the beginning of 2008. The number of completed deals went up from 91 (2006) to 135 (2007). Also, the total deal size and volume increased considerably by some 165% to over $4.6 billion compared to $1.8 billion in 2006.

Investments increased particularly by firms located in traditional financial markets. The UK is the leader in Europe and had a considerable growth in 2007 up to $1.9 billion from $277 million in 2006. From an almost non-existing deal flow in

[33] WorldBank

[34] Société Générale

[35] New Energy Finance "Global Trends in Sustainable Energy Investment" 2008

[36] Reuters, 17 July 2008

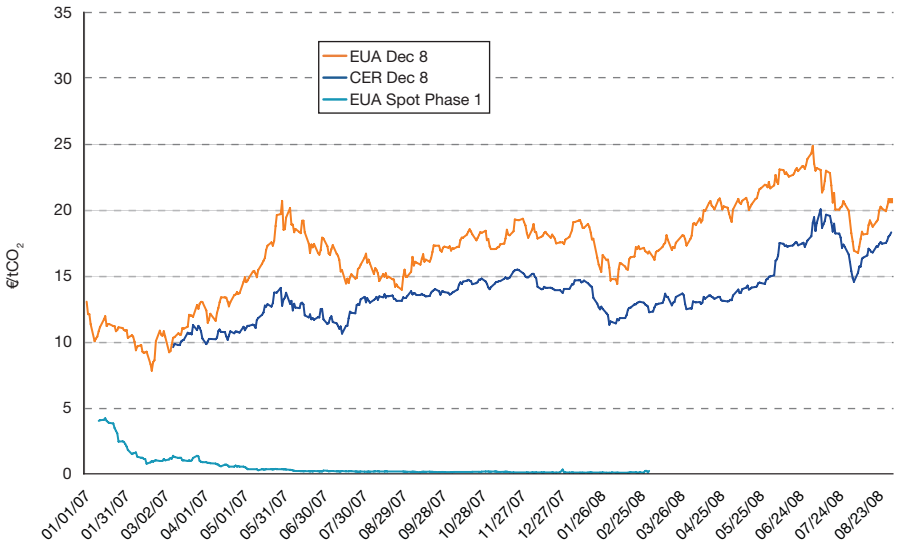
[37] New Energy Finance "Global Trends in Sustainable Energy Investments" 2008

2006 in France, 2007 saw 13 deals at a total value of close to $900 million[37]. The volume is still small compared to the US, but there has been a clear shift towards a higher risk / reward mentality.

Large Utilities announced floatation of their renewable assets to generate funds for further investment

The $7.2 billion IPO and creation of Ibernova (by Iberdrola) stands out as the major deal executed during the period. Several additional suggested IPOs were postponed due to the weakening financial market during 2007 and the beginning of 2008. Energias de Portugal postponed the floatation of its wind power assets in early 2008 (EDP Renovaveis), as did Spain's Eolia Renovables and Italian Enel. In Germany, RWE created a subsidiary, reusing the Innogy brand, to manage their renewable assets and future investments.

Table 12.3 CO_2 prices (2007 & H1 2008)



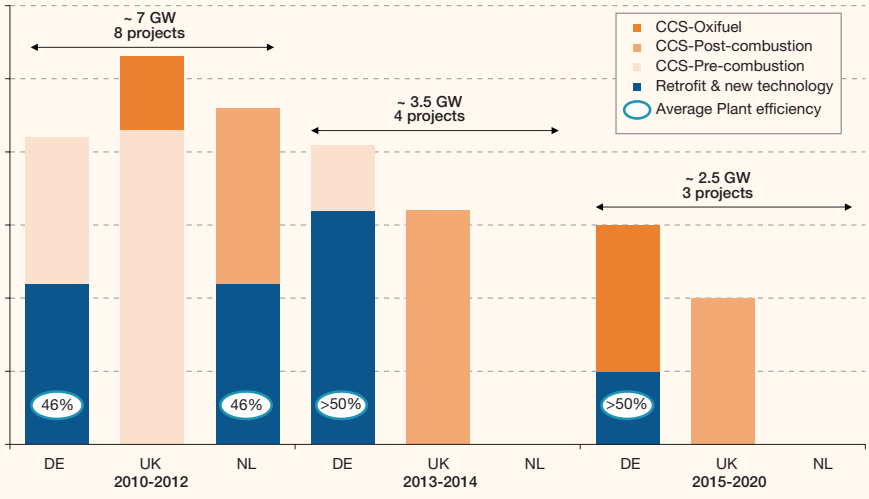
Source: SG Commodity Research – Capgemini analysis, EEMO10

Political focus on CO_2 sequestration

The IEA expects the world's energy consumption and CO_2 emissions to grow 50% between 2005 and 2030, with a strong increase of coal-fired generation. Development of commercially viable Carbon Capture and Storage (CCS) technology and methods are therefore a necessity. CCS could account for about 15 to 30% of the needed reductions of CO_2 emissions in the long term.

CCS is theoretically possible at a price ranging from €30 to 90/TCO_2. With a carbon market value of about €40/TCO_2, the cheapest segments should begin commercial applications by 2020. **About 40 demonstration projects are reported and most major Utilities are involved in some sort of development; however, large scale use is not expected before 2015-2020.** Several big issues need to be solved for large scale industrial deployment, particular regarding cost, security in storage, and juridical issues. Still, projects such as the Norwegian Snøhvit project which includes CCS aspects, and Vattenfall's 30 MW thermal pilot plant at Schwarze Pumpe in Germany indicate that the development is progressing.

Clean coal projects in Germany, UK and Netherlands



Source: IEA, EPRI, WCI and companies' reports – Capgemini analysis, EEMO10

CCS technology has further reached the political agenda. In January, the EC has proposed a directive on geological storage and has decided that after 2013 the third phase of the EU Emissions Trading Scheme (ETS) will allow companies that invest in CCS to earn credits for each ton of carbon they store. The G8 meeting in July 2008 "strongly supported the recommendation that 20 large scale CCS demonstration projects need to be launched globally by 2010," and the EU wants to encourage up to 12 CCS demonstration projects by 2015. The support will be logistical rather than financial.

Organic growth in renewable capacities by all Utilities instead of consolidation and inter-company deals

Investment in renewables is still strong. Germany remains the leader in most of the renewable technologies based on current installed capacity. Spain has increased strongly particularly in wind (3.5 GW per year) and photovoltaic (see Table 12.4).

Horizontal investments to secure position in the booming equipment market

Vertical and horizontal investments including consolidation of complementary technologies occurred during 2007. Areva (France) made a decision to diversify their nuclear business with cleantech through acquisitions of wind turbine equipment manufacturers. Areva lost to Suzlon in a bid to take control of German Repower in early 2007. This failure was followed by successful bids to take majority stakes in Brazilian biomass project designer Koblitz (70%) and German wind turbine designer and manufacturer Multibrid (51%). Suzlon made further advances through the purchase of wind gearbox manufacturer Hansen.

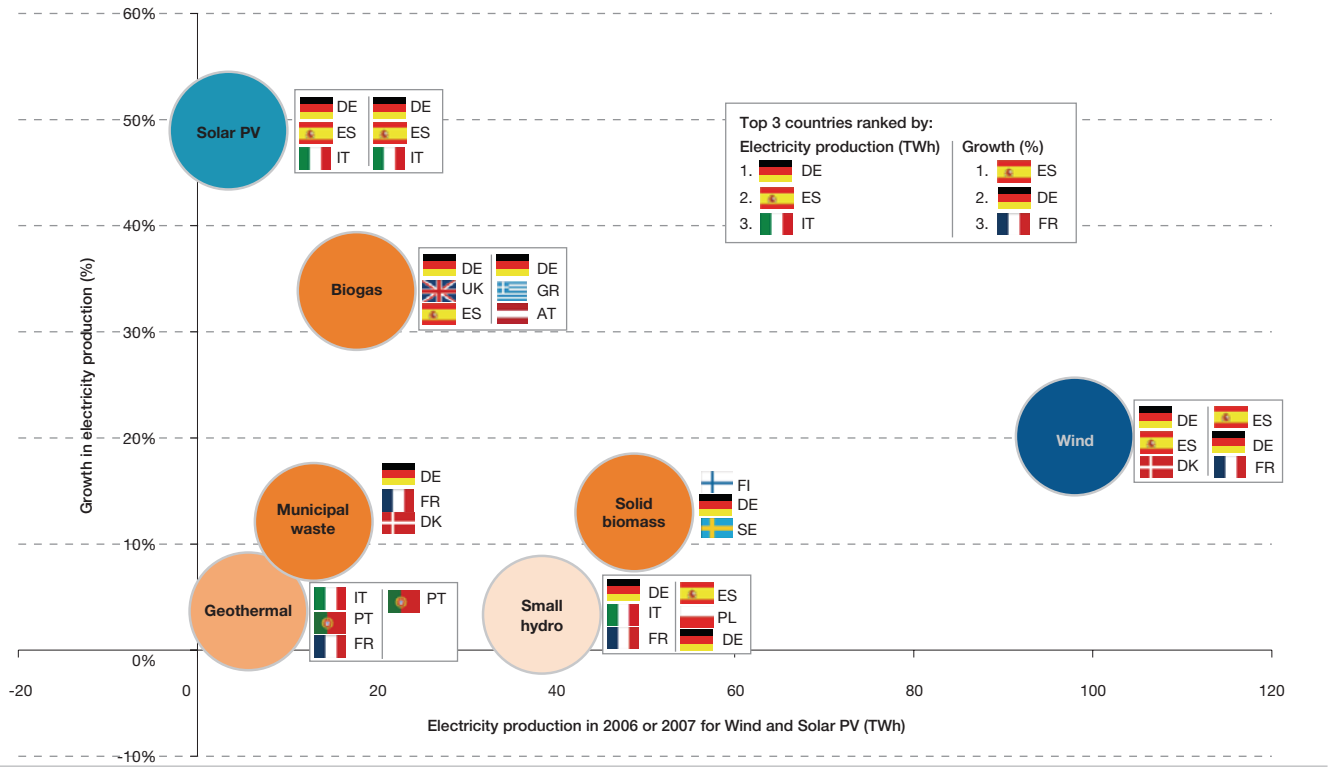
Wind is on the top of the agenda of investors. This caused bottlenecks in the supply of equipment

Wind energy continues to be the industry's favorite investment. Statistics from the Global Wind Energy Council suggested that 20 GW of new capacity was installed in 2007. The US and China are growing fast and Spain is the leading European country based on recent growth. Major deals include E.ON's acquisition of Irish based Airtricity's US wind assets for $1.4 billion, and Scottish & Southern Energy's purchase of the remaining of Airtricity's assets for $3.2 billion in early 2008. The total size of these deals was 16 existing wind farms (500 MW) and an additional nine farms (600 MW) in a late development stage. Additionally, Portugal's EDP bought US based Horizon Wind Energy for $2.15 billion in 2007.

The strong development and high demand for equipment to build new wind farms and upgrades of existing ones have caused major price inflation and increased lead times as equipment design and manufacturing bottlenecks became more common[38]. Consolidation of small and specialized equipment companies have begun and will improve the wind industry supply chain over time. However, currently large backlogs and waiting times are reported.

The major equipment manufacturers are gearing up to the increasingly competitive and lucrative global market. Alstom's purchase of turbine manufacturer Ecotecnica of Spain for $506 million is an attempt of gaining control of the complete value chain.

Table 12.4 Growth rate of electricity generated from RES



Source: Eur'Observer barometers and 9th inventory – Capgemini analysis, EEMO10

[38] Clean Tech – Is it feasible to bridge the gap? Point of view by Oskar Almén & Alain Chardon, Capgemini 2008.

Vestas of Denmark is still the world leading turbine manufacturer, thanks to the Danish government's long term backing of the wind industry in the past couple of decades. Gamesa of Spain and GE Energy are the runners up, but Suzlon of India poses—together with the current smaller Chinese manufacturers—the major threat regarding future market share[39].

Suzlon has quickly become a world player in this industry since introducing its products in 1994. China's booming market is dominated by domestic manufacturers with Gold Wind and Sinovel accounting for 42% of total new capacity and only 37% provided by Gamesa, Vestas and GE Energy combined. This is a clear indication that the European leaders are facing increasing global competition.

Solar technology is still small scale but seen as the next gold rush; big money is being poured into the market with increasing valuations

Solar technology continues to grow fast, albeit on a small scale. Estimates suggest a global investment of close to $20 billion during 2007. The sector is highly dependent on subsidies and is still seen as a high risk investment area with strong growth isolated to specific countries including Germany, Italy, and most recently Spain. In fact, the growth in Spain was far more than the forecast made by the government just a few years ago, and the cap of 371 MW set to be reached in 2010 was already achieved by 2007. The surge in demand has created new global players and Chinese SunTech's target of producing equipment to generate 2GW by 2010 is suddenly become realistic.

In-home energy usage display units vaasa ett

Energy efficiency and demand response programs are all facing one common challenging question: **How can Utility companies best communicate with their customers to let them know if they are consuming electricity efficiently or not?**

In the past year, research has advanced in customer feedback methods, which could negate the need for expensive in-house displays. Though these may still be appropriate in certain cases, they are no longer seen as necessarily the most cost effective. **Advances are being made in new innovative delivery methods using text messages, screen savers, or even lighting fixtures.**

In order to motivate long term behavioral change, **information must relate to customers' psychological need drives.** Intensive research is therefore being carried out into the most effective methods for tapping into these drives to ensure maximum behavioral change. **As a kWh is a relatively meaningless measurement for most European electricity consumers, new feedback methods strive to communicate information such as CO_2 and financial savings using charts and even visual images of plants and animals[a].**

It is also important to integrate customer feedback systems into a larger, holistic package of services including an education program and, for example, a peak pricing or gaming scheme[b]. This will ensure continued relevance over an extended period of time.

Thus far, however, the results are encouraging; **feedback systems which combine all three of these elements**—i.e. an appropriate method of delivery, meaningful content and a holistic package of services, **do achieve timely and cost effective long term behavioral change.**

[a] Tested by such organizations as the University of Art and Design, Western Finland Design Center Muova and Capgemini

[b] Christina Ohman of the Interactive Institute

Energy savings and energy efficiency programs are increasing as Utilities are taking a bigger responsibility towards the market

Eurelectric reports that Utilities are increasing their efforts regarding energy efficiency and introducing a variety of programs to curb energy use by consumers. One of the more innovative programs is EDF Energy's insulation support for households qualifying for benefits. Still, the main challenge is the lack of harmonized procedures to monitor, report and verify energy savings across Europe. On a country level, Ireland has launched the National Energy Efficiency Action Plan which includes measures such as smart metering and building improvement in a bid to reduce the energy demand by 1.2 GW by 2020.

Ofcom in the UK reported that 75% of the population is concerned about energy waste[40]. However, there is a lack of action; as an example, Ofcom estimates that a potential annual waste from leaving appliances and home electronics on standby in the UK is in parity with the annual output of an average size CCGT power station. Energy savings awareness is leading to new products including gadgets which can turn off all standby equipment in a house using one switch.

Business model of the traditional Utility is changing from selling KWh towards selling services

Most of the Utilities are launching programs to add to their historical core business of supplying energy. A clear movement is towards becoming "energy consultants," which includes both supply of energy as well as dispensing advice on usage. Vattenfall of Sweden launched an ambitious online service to help customers become more aware of the environment and how to contribute through energy efficiency. Vattenfall has teamed up with the National Geographic Society to further increase their credibility, and together they have launched a "Global climate map" tracking the development.

[39] Clean Tech – Is it possible to bridge the gap? Point of View by Oskar Almén and Alain Chardon. Capgemini 2008.

[40] Ofcom, The Communications Market Report 2008

Strategy and Finance*

For our tenth edition, we examine 33 companies (versus 28 last year). Our sample represents the full spectrum of European Utilities and concerns the year 2007 (see Table 13.1).

For both historic and regulatory purposes, the number and the size of players in the Utilities industry varies greatly from one country to another. Countries such as France, Belgium, Sweden, Finland and Italy have national champions, while markets in other countries such as Spain, Germany and the UK are split amongst a small group of players. Finally, some countries such as Switzerland, the

Table 13.1 Companies on the panel and their main characteristics (2007)

Company	Country	Type	2007 sales (€m)	2006 sales (€m)	% change	Total number of customers (m)	Total GW	Nuclear (%)
GDF Suez	France	Integrated	74,252	71,931	3%	14.7	63.0	11
E.ON	Germany	Integrated	68,731	64,091	7%	40.0	54.0	21
EDF	France	Integrated	59,637	58,932	1%	38.5	128.2	52
ENEL	Italy	Integrated	42,695	38,513	11%	50.0	75.5	6
RWE	Germany	Integrated	42,507	44,256	-4%	43.0	44.5	19
Centrica	UK	Gas	23,883	24,552	-3%	17.0	4.3	0
Endesa	Spain	Integrated	17,734	16,170	10%	23.0	39.3	7
Gasterra	Netherlands	Gas	17,713	18,400	-4%	-	0.0	0
Iberdrola	Spain	Electricity	17,468	11,426	53%	24.0	42.5	8
Vattenfall	Sweden	Electricity	15,529	15,715	-1%	4.7	35.2	14
EnBW	Germany	Integrated	14,712	13,219	11%	6.0	15.0	32
Scottish & Southern Energy	UK	Integrated	17,343	17,712	-2%	7.8	10.0	0
Gas Natural	Spain	Gas	10,093	10,348	-2%	11.1	6.5	0
Essent	Netherlands	Electricity	7,378	6,442	15%	2.2	3.6	6
Union Fenosa	Spain	Integrated	6,011	6,057	-1%	5.9	11.7	7
Dong	Denmark	Integrated	5,574	4,819	16%	1.1	5.7	0
Nuon	Netherlands	Electricity	5,100	5,598	-9%	2.1	4.0	0
Distrigas	Belgium	Gas	4,285	4,626	-7%	-	0.0	0
Eneco	Netherlands	Electricity	4542	4288	6%	2.1	0.2	0
Fortum	Finland	Electricity	4,479	4,491	0%	2.9	10.9	46
British Energy	UK	Electricity	4,108	4,430	-7%	-	12.0	84
Verbund	Austria	Electricity	3,038	2,878	6%	-	8.4	0
MVV Energie AG	Germany	Distributor	2,259	2,276	-1%	-	2.5	0
EVN	Austria	Distributor	2,233	2,072	8%	4.0	1.7	0
Drax Power	UK	Electricity network	1,823	2,070	-12%	-	4.0	0
Total/average			**473,126**	**455,312**	**4%**	**300.0**	**582.8**	**22**
Snam Rete Gas	Italy	Gas network management	1,868	1,789	4%	-	-	-
Gasunie	Netherlands	Gas network management	1,319	1,251	5%	-	-	-
Terna	Italy	Electricity network management	1,296	1,229	5%	-	-	-
Red Electrica	Spain	Electricity network management	1,031	949	9%	-	-	-
Enagas	Spain	Gas network management	817	778	5%	-	-	-
Elia	Belgium	Electricity network management	706	696	1%	-	-	-
Fluxys	Belgium	Gas network management	433	436	-1%	-	-	-
Tennet	Netherlands	Electricity network management	399	401	-1%	-	-	-
Total/average			**7,869**	**7,529**	**5%**	**-**	**-**	**-**
Total			**480,995**	**462,841**	**4%**	**300.0**	**582.8**	**45**

Source: SG Equity Research - Capgemini EEMO10

* This chapter was written in collaboration with Société Générale Equity Research.

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1_6,

Are windfall profits undue?

The debate on windfall profits continues. **Windfall profits occur when Utilities are able to invoice (pass-through) a large part of CO_2 market value to their customers in the electricity wholesale or retail markets, while they are granted their CO_2 allowances for free.**

For phase II of ETS (2008-2012), a study released by Pointcarbon and appointed by WWF [a] established that in Germany, the UK, and Spain, windfall profits should amount respectively to €4.8 billion, €2.1 billion and €0.5 billion per year, corresponding to €11.3, €7.3 and €3.2 per MWh sold.

Already in 2005, the large electricity users' association, VIK had complained that German consumers paid €5 billion for an actual 9 Mt CO_2 reduction in German emissions—about €550 per actually reduced ton of CO_2, "the equivalent of €10/MWh that companies are taking from customers without any service in return."

Example of potential windfall profits, with a theoretical 100% pass-through

	2007 Emissions ($MTCO_2$)	2007 Allocations ($MTCO_2$)	2007 Theoretical Windfall profit (€ bn)	in % of EBITDA	Notes
RWE	187.1	169.8	3.3	42%	RWE data for Europe
Enel	46.8	40.8	0.8	8%	Enel in Italy
E.ON	87.5	81.0	1.6	13%	E.ON emits also 33.8 Mtons in USA
EDF	20.5	7.8	0.1	1%	EDF emitted 78 Mtons at group level w/o Edison and Dalkia – 20.5 Mtons in France
GDF Suez	42.5	44.5	0.9	7%	Kyoto perimeter of Suez

Note: Calculated with the average 2007 CO_2 market price of €19.5 per ton
Source: SG Equity Research – Capgemini analysis, EEMO10

Do windfall profits impair the objective of the ETS to reduce CO_2 emissions? According to WWF, theory shows that irrespective of whether allowances would be allocated for free or auctioned, both cases would lead to pass-through being paid by the final consumer. In the near term, the market optimization between clean and dirty kWhs produced by existing power plants would work correctly, even with free allocations. However, providing free allocations to Utilities for their existing highly emissive power plants would prevent them from making the necessary investments for future efficient generation. Therefore, customers pay for only half the benefit expected from the ETS.

What should be done? A temptation would be to tax windfall profits; however, it would be a complex process. So how do we demonstrate the amount of the CO_2 market value that has been passed through, not only to wholesale markets, but also to the final retail market? The above studies do not answer this question. In countries where sales prices to final customers are below the market price (France among others), the tax would add even more distortion in the competition between players. It might even result in a further increase of the prices to retail markets (households and industries).

Another solution would be to reduce immediately the amount of allowances granted for free. In late August 2008, the UK was seriously considering this alternative, setting up the amount of auctioned allowances at 10% versus the 7% initially decided. The earnings (about £0.7 billion) would be used to subsidy the households suffering from fuel poverty.

Utilities are against a tax, and deny that free allocation leads to such high windfall profits, considering that 100% pass-through to final consumers is not a reality.

Concerning the Phase III of ETS, Eurelectric announced it accepts auctioning as the principle allocation method after 2013, provided that all sectors are treated in a fair manner. The project of directive specifies that no free allowances will be granted to the electric power generation sector (100% auctioning in 2013), while it will be progressive for the other sectors (industries), beginning at 20% in 2013 and reaching 100% in 2020.

[a] EU ETS Phase II – The potential and scale of windfall profits in the power sector - A report for WWF By Point Carbon Advisory Services – March 2008

Netherlands—which has no listed Utilities—Denmark and most Eastern European countries have highly fragmented energy markets.

2007/2008 saw either the emergence or the strengthening of three major players:

- Creation of GDF Suez after nearly two and a half years of discussions and negotiations,
- Strengthening of Enel's European positions after the acquisition of Spanish firm Endesa,
- Strengthening of Iberdrola's European positions after the acquisition of Scottish Power.

Company overview

Together, these 33 companies generated sales of €481 billion, or about 90% of Europe's total Utilities sales. The top five players generated 60% of this amount, suggesting that the industry is highly concentrated—more so than last year, when they generated 49% of total sales. Between 2006 and 2007, the companies in our sample generated sales growth of 4%, with some companies diverging from this trend mostly due to one-off events.

The top five players are GDF Suez, E.ON, EDF, Enel and RWE.

In terms of the biggest decliners, Drax Power (-12% in euro terms) was hurt by a decrease in its electricity production in 2007 (+1TWh produced in H1 08).

Iberdrola was the top performer in terms of growth, with its 2007 sales up 53%. Note, however, that the Spanish group acquired and consolidated the UK firm Scottish Power in 2007.

Companies were bolstered in 2007 by firm selling prices and, in most cases, price hikes implemented on end-market prices.

Unbundling still a theme

Last year we said that the unbundling theme could come to the forefront. We still think this is the case given the proposal for a directive by the European parliament in June 2008.

For further details on the matter, please refer to the unbundling focus of this report.

Profitability

The Utilities in our sample generated average growth in EBITDA (Earnings Before Interest, Tax, Depreciation and Amortization) of 11%.

In 2007, the companies generated an EBITDA margin of 21.8% on average, versus 20.3% in 2006, with EBITDA growth outpacing sales growth. We believe that EBITDA margin expansion was driven by both the increase in energy prices and firm productivity levels (see Table 13.2).

Far outstripping this average with an EBITDA margin of 60%+, are companies such as Enagas and Red Electrica (network players or network managers), whose rates are set by the regulator and which must use their margins to finance major capital expenditure programs.

Table 13.2 Profitability evolution (2007)

	2007 sales (€m)	2007 EBITDA (€m)	2007 margin	2006 margin	Change
GDF Suez	74,252	12,627	17.0%	15.8%	+
E.ON	68,731	13,649	19.9%	18.4%	+
EDF	59,637	15,200	25.5%	23.6%	+
ENEL	42,695	10,023	23.5%	20.8%	+
RWE	42,507	7,902	18.6%	17.8%	+
Centrica	23,883	3,654	15.3%	12.2%	+
Endesa	17,734	6,314	35.6%	36.8%	-
Gasterra	17,713	31	0.2%	0.3%	
Iberdrola	17,468	5,538	31.7%	34.0%	-
Vattenfall	15,529	4,835	31.1%	29.6%	+
EnBW	14,712	2,336	15.9%	17.5%	-
Scottish & Southern Energy	17,343	1,906	11.0%	11.6%	-
Gas Natural	10,093	2,277	22.6%	17.9%	+
Essent	7,378	1,499	20.3%	23.3%	-
Union Fenosa	6,011	2,062	34.3%	31.5%	+
Dong	5,574	1,302	23.4%	16.4%	-
Nuon	5,100	1,477	29.0%	15.2%	+
Distrigas	4,285	461	10.8%	9.2%	+
Eneco	4,542	690	15.2%	17.9%	-
Fortum	4,479	2,298	51.3%	42.0%	+
British Energy	4,108	1,289	31.4%	40.7%	-
Verbund	3,038	1,099	36.2%	34.2%	+
MVV Energie AG	2,259	359	15.9%	16.6%	-
EVN	2,233	351	15.7%	19.2%	-
Drax Power	1,823	744	40.8%	38.8%	+
Total/average	**473,126**	**99,923**	**21.1%**	**19.6%**	**+**
Snam Rete Gas	1,868	1,511	81%	78%	+
Gasunie	1,319	831	63%	61%	+
Terna	1,296	795	61%	60%	+
Red Electrica	1,031	723	70%	69%	+
Enagas	817	596	73%	72%	+
Elia	706	309	44%	42%	+
Fluxys	433	176	41%	39%	+
Tennet	399	132	33%	34%	-
Total/average	**7,869**	**5,072**	**64%**	**63%**	**+**
Overall average			21.8%	20.3%	+

Source: SG Equity Research - Capgemini EEMO10

The top electricity performers in our sample include Fortum (51% EBITDA margin), Verbund (36%), Endesa (36%), Unión Fenosa (34%) and British Energy (32%), companies which have a strong presence in either nuclear and / or hydraulic production and which benefited from high market prices.

Capital expenditure in the industry

Investment spending in the industry rose substantially in 2007 on our estimates and should continue to increase going forward.

Capital expenditures represented nearly 17% of the industry's sales versus just 13.4% in 2006. We have highlighted this pick-up starting with the 2005 data (see Table 13.3).

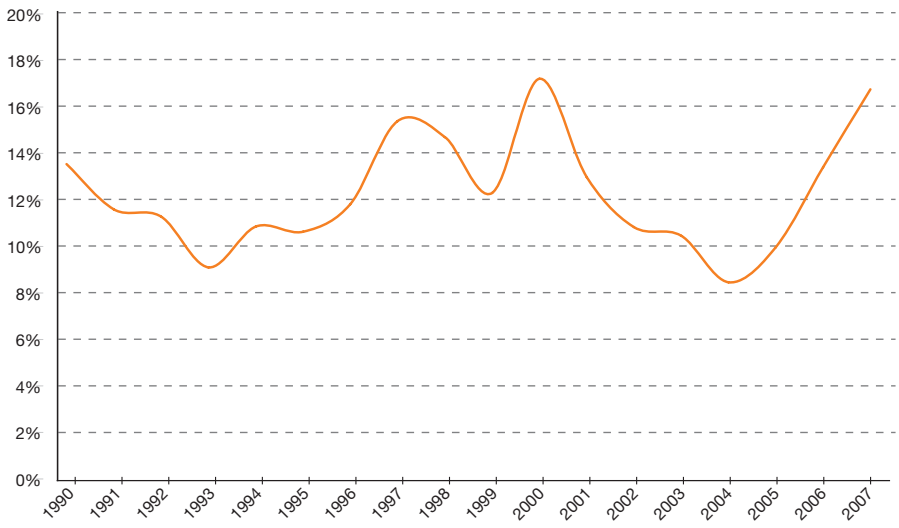
In absolute terms, capital expenditures came to around €70 billion in 2007, versus €53 billion in 2006.

Investments are likely to grow further in absolute terms, driven by new production capacity needs linked to major programs aimed at overhauling existing plants, steady growth in consumption and an increase in high-voltage network capacity.

Most of the big players have unveiled CAPEX plans worth tens of billions of euros covering the next few years (see Table 13.4). We have highlighted seven companies in this report whose CAPEX programs total €151 billion (€47 billion per year on average, with CAPEX representing 17% of annual sales).

While these investments may appear substantial in absolute terms, they pale in comparison to actual need, which is estimated at €1 trillion over the next 25 years (2005-2030); see prior editions of EEMO).

Table 13.3 Total investment as a % of sales (1990-2007)



Source: SG Equity Research – Capgemini EEMO10

Table 13.4 Examples of investment plans (2007)

Company	Period	Total amount
GDF Suez	2008-2010	€30bn
E.ON	2008-2010	€28bn
EDF	2008-2010	€35bn
RWE	2008-2010	€30bn
Vattenfall	2008-2012	€7bn
Gas Natural	2008-2012	€12bn
Union Fenosa	2007-2011	€9bn

Source: SG Equity Research - Capgemini EEMO10

Financial valuations

Since the beginning of 2008, the performance of the Utilities sector compared with the DJ Eurostoxx 50 index, which we have used as the benchmark since we first began this analysis, has been a modest 5% (see Table 13.5).

2007 was however a good year for companies in the sector, with the index having continued the rising trend seen in the previous three years. Utilities stocks clearly outperformed between 2003 and 2007 (gaining more than 70% over the period).

The market capitalization of our sample of stocks amounted to €567 billion (August 28, 2008).

The sector P/E (Price/Earning per share) at July 24, 2008 stood at 16.2x (versus 14.6x on July 31, 2007), pointing to a further increase in the sector's valuation over the past 12 months (see Table 13.6).

In our view, the further increase in the sector's valuation is explained by:

- The recurring nature of profits for Utilities (partly due to weak demand elasticity),
- The low risk of government intervention, even if these resurface regularly, for e.g. through potential taxes or the obligation to provide a universal service to low income households,
- The confidence of investors in the sector which offers an attractive yield (3.7% on average).

Table 13.5 Utilities sector compared with the European equity index (base one on January 1, 1995)

Source: SG Equity Research – Capgemini EEMO10

Table 13.6 Sector performance (2007)

As of August 28, 2008	Curr	Share price	Market cap (millions)	Performance since January 1, 2008	Relative performance over 12 mths Sept 07 to Aug 08	P/E 2007 (X)	Market cap/ Sales 2007 (X)	Net dividend yield 2007 (%)
GDF Suez	€	38.5	84,396	-3.7	49.6	15.4	1.1	3.3
E.ON	€	39.4	78,759	-18.9	27.1	10.3	1.1	3.5
EDF	€	57.2	104,301	-29.8	0.9	22.9	1.7	2.2
ENEL	€	6.18	38,228	-24.0	5.3	10.8	0.9	7.9
RWE	€	73.0	38,198	-24.0	15.7	13.6	0.9	4.3
Centrica	£	3.14	11,631	-12.6	8.0	10.3	0.5	4.1
Endesa	€	29.4	31,106	-19.2	-5.3	12.3	1.8	5.2
Iberdrola	€	8.12	40,549	-21.9	5.2	14.8	2.3	3.0
EnBW	€	44.7	4,791	-25.7	-6.8	15.1	0.3	3.4
Scottish & Southern Energy	£	14.4	12,526	-12.2	32.9	16.2	0.7	3.3
Gas Natural	€	31.2	13,980	-22.0	0.2	15.6	1.4	3.7
Union Fenosa	€	17.4	15,859	12.7	70.4	16.1	2.6	3.1
Distrigas	€	6,727	4,729	26.5	100.3	13.8	1.1	2.8
Fortum	€	28.3	25,081	-8.2	53.6	23.0	5.6	4.2
British Energy	£	7.29	7,626	32.8	102.0	24.6	1.9	5.4
Verbund	€	50.5	15,576	5.6	85.1	26.9	5.1	1.8
MVV Energie AG	€	32.4	2,138	3.7	55.0	18.6	0.9	2.5
EVN	€	18.47	3,020	-16.6	12.9	13.3	1.4	2.0
Drax Power	£	7.37	2,501	21.8	48.8	7.4	1.4	3.0
Snam Rete Gas	€	4.22	8,256	-3.4	43.4	16.9	4.4	5.0
Terna	€	2.64	5,282	-4.2	51.6	12.8	4.1	5.7
Red Electrica	€	39.4	5,323	-9.0	58.6	19.7	5.2	2.3
Enagas	€	17.1	4,075	-14.6	29.2	15.8	5.0	3.2
Elia	€	26.5	1,274	-4.7	16.2	16.4	1.8	3.7
Fluxys	€	2,390	1,678	-4.3	29.7	21.8	3.9	3.4

Source: SG Equity Research - Capgemini EEMO10

Sector war chest: Not currently a key theme

The sector's war chest decreased by 26% based on the sample used (see Table 13.7).

We calculate the war chest as potential debt, calculated as 3x EBITDA, from which we subtract the existing level of debt.

The decline in potential debt is partly explained by the sharp increase in investment and by multiple small acquisitions made in recent months.

A number of large-scale M&A deals have been completed over the recent period:

- Creation of GDF Suez (July 2008),
- Finalization of the Endesa acquisition by Enel (rather than E.ON, which nevertheless acquired Endesa's European assets) (October 2007),
- Acquisition of Unión Fenosa by Gas Natural (August 2008),
- Acquisition of British Energy by EDF (September 2008).

The total value of these deals comes to more than €150 billion.

We do not expect that there will be many financial deals in 2008, or indeed in 2009. We believe that Vattenfall could take an interest in the UK market (Scottish & Southern Energy). We also see potential for privatizations (possibly Dong? in Poland?) but we expect the overall amount represented by these deals will be limited.

Table 13.7 War chests comparison

(€bn)	Estimated 2006 war chest	Estimated 2007 war chest	
GDF Suez	16.0	19.9	+
E.ON	28.2	26.6	-
EDF	26.9	29.3	+
ENEL	12.4	-27.7	-
RWE	24.2	23.5	-
Centrica	6.9	10.2	+
Endesa	-0.9	-0.4	-
Iberdrola	-1.9	-4.0	-
Scottish & Southern Energy	4.0	3.5	-
Gas Natural	2.6	2.9	-
Union Fenosa	0.6	0.9	+
Distrigas	2.1	2.3	+
Fortum	1.3	2.4	+
British Energy	6.0	4.4	-
Verbund	1.3	1.5	+
MVV Energie AG	-0.2	0.0	-
EVN	0.2	0.1	-
Drax Power	2.1	1.9	-

Source: SG Equity Research - Capgemini EEMO10

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 authorized 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 CO_2 allowances or quotas within the European Trading Scheme and Kyoto protocol (see EUA)

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

CCS
Carbon Capture and Storage, technologies for isolating carbon dioxide from flue gas (at combustion plants) and storing it. This means that a significantly lower amount of CO_2 is emitted into the atmosphere

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 CO_2 emissions

Clearing
Administrative and financial settlement of a contract

Clearing house
Organization 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: first by gas combustion in the turbines, and second 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)

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

Demand response
Any program which communicates with the end-users regarding price changes in the energy market and encourages them to reduce or shift their consumption

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

DNO
Distribution Network Operator

EBIT
Earnings Before Interest and Taxes. Calculated by taking the pre-tax profit of a company and adding back only the total interest charges which it has paid on debt. EBIT is a commonly used way of measuring the profitability of a company

EBITDA
Earnings Before Interest, Taxes, Depreciation and Amortization. EBITDA looks at the cash flow of a company

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 authorized 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

C. Lewiner (ed.), *European Energy Markets Observatory*, DOI 10.1007/978-94-007-0102-1,

ERGEG
European Regulators Group for Electricity and Gas

ETS
Emissions Trading Scheme. An administrative approach used to control pollution by providing economic incentives for achieving reductions in the emissions of pollutants. The European Union Emissions Trading Scheme has been in operation since January 1, 2005

ETSO
European Transmission System Operators

EUA
European Union Allowances. The official name for the CO_2 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

EC
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 standard contract agreement for delivery of a given quantity at a given price, for a given maturity (OTC markets)

Futures
A standard contract agreement for delivery of a given quantity at a given price, for a given maturity (organized exchanges). The maturities may differ across power exchanges (weekly, half-yearly, quarterly, monthly, annually).

Maturity Y+1 corresponds to the calendar year after the current year.

Gas release
A program to introduce competition on the market. Players put on the market a certain amount of gas for other players through call for tenders or bilateral negociations

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' Organization

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 industrialized countries with a greenhouse gas reduction commitment to invest in emission reducing projects in another industrialized country as an alternative to emission reductions in their own countries

Kyoto Protocol
The United Nations regulatory frame for greenhouse gases management. It encompasses six greenhouse gases: CO_2, CH_4, N_2O, HFC, PFC, SF_6

LNG
Liquefied Natural Gas. Natural gas that has been subjected to high pressure and very low temperatures and stored in a liquid state. It is returned to a gaseous state by the reverse process and used as a peaking fuel.

Load balancing
Maintaining system integrity through measures which equalize pipeline (shipper) receipt volumes with delivery volumes during periods of high system usage. Withdrawal and injection operations into underground storage facilities are often used to balance load on a short term basis

Load factor
Ratio of average daily deliveries to peak-day deliveries over a given time period

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)

Nomination
A request for a physical quantity of gas under a specific purchase or transportation agreement

Nordel
Organization 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

Open season
A period (often one month) when a pipeline offers to accept bids from shippers and others for potential new transportation capacity. Bidders may or may not have to provide “earnest” money, depending upon the type of open season. If enough interest is shown in the announced new capacity, the pipeline will refine the proposal and prepare an application for construction before the appropriate regulatory body for approval

OTC
Over The Counter, bilateral markets

Oxyfuel combustion
Process to eliminate nitrogen from the flue gas by combusting the fuel in a mixture of oxygen and recycled flue gases. After combustion, the flue gas is cleaned. The cleaned flue gas primarily consists of CO_2 and water vapour. By cooling the flue gas, the water vapour condenses thereby creating an almost pure CO_2 stream. The CO_2 can be compressed, dried and further purified before being transported to a storage site

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

Post combustion
In post combustion capture, CO_2 is captured from the flue gases in a "scrubber" using an absorption process based on chemical solvents, like amines. On leaving the "scrubber" the solvent can be reused. The captured CO_2 can be transported to a storage site

Pre combustion
Pre combustion CO_2 capture involves removing all or part of the carbon content of a fuel before burning it. The fuel is processed to produce a gas stream that primarily consists of CO_2 and hydrogen. The CO_2 is then captured for storage and the hydrogen is combusted

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

Shippers
The party who contracts with a pipeline for transportation service. A shipper has the obligation to confirm that the volume of gas delivered to the transporter is consistent with nominations. The shipper is obligated to confirm that differences between the volume delivered to the pipeline and the volume delivered by the pipeline back to the shipper is brought into balance as quickly as possible

Spot contract
Short-term contract, generally a day ahead

Spread (spark, dark…)
Differential between the price of electricity and the price of natural gas or other fuel used to generate electricity, expressed in equivalent units

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. Recognized 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 transmission network)

UCTE
Union for the Co-ordination of Transmission of Electricity. European organization 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, fictional production capacity, non-designated, sold to an operator and used to withdraw on demand energy at a previously set price from a generator

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 and Energy Authorities

Countries	Abbreviation	Regulators	Ministries or authorities for energy-related topics
Austria	AT	E-control	Ministry of Economic Affairs: www.bmwa.gv.at/ Environment Agency: www.umweltbundesamt.at/ Competition Authority: www.umweltbundesamt.at/
Belgium	BE	CREG CWAPE (Walloon) VREG (Flanders)	Ministry of Economic Affairs: www.mineco.fgov.be/energy/
Bulgaria	BG	DKER	Ministry of Economy and Energy: www.mi.government.bg/
Czech Republic	CZ	ERU	Ministry of Industry and Trade: www.mpo.cz/ Competition Office: www.compet.cz/
Denmark	DK	DERA NordREG	Ministry of Climate and Energy: www.ens.dk/ Ministry of Economic and Business Affairs: www.oem.dk/ Ministry of Environment: www.mim.dk/
Estonia	EE	ETI	Ministry of Economic Affairs: www.mkm.ee/ Competition Authority: www.konkurentsiamet.ee/
Finland	FI	EMV NordREG	Ministry of Employment and the Economy: www.tem.fi/ Ministry of Environment: www.ymparisto.fi/ Competition Authority: www.kilpailuvirasto.fi/
France	FR	CRE	Ministry of Energy: www.industrie.gouv.fr/energie/ Ministry of Economics, Finance and Employment: www.minefe.gouv.fr/
Germany	DE	BNetzA	Federal Environmental Ministry: www.bmu.de/ Energy Agency: www.dena.de/
Greece	GR	RAE	Ministry of Development: www.ypan.gr/ Ministry of Environment: www.minenv.gr/
Hungary	HU	MEH	Ministry of Transport, Telecommunication and Energy: www.khem.gov.hu/
Ireland	IE	CER (Republic of Ireland) NIAUR (Northern Ireland)	Department of Communications, Energy & Natural Resources: www.dcenr.gov.ie/
Italy	IT	AEEG	Ministry of Environment: www.minambiente.it/ Ministry of Economic Development: www.sviluppoeconomico.gov.it/ Competition Authority: www.agcm.it/
Latvia	LV	VEI	Ministry of Economy: www.em.gov.lv/ Competition Council: www.kp.gov.lv/
Lithuania	LT	REGULA	Ministry of Economy: www.ukmin.lt/
Luxemburg	LU	ILR	Ministry of Economic Affairs: www.eco.public.lu/ State's energy service: www.see.etat.lu/
Netherlands	NL	DTe	Ministry of Economic Affairs: www.ez.nl/ Energy Council: www.algemene-energieraad.nl/ Competition Authority: www.nmanet.nl/
Norway	NO	NVE NordREG	Oil and Energy Ministry: www.regjeringen.no/ Competition Authority: www.konkurransetilsynet.no/
Poland	PL	URE	Ministry of Economy: www.mg.gov.pl/
Portugal	PT	ERSE	Ministry of Economics: www.min-economia.pt/ Directorate General for Energy and Geology: www.dgge.pt/
Romania	RO	ANRE	Ministry of Energy and Resources: www.minind.ro/
Slovakia	SK	URSO	Ministry of Economy: www.economy.gov.sk/ Ministry of Environment: www.enviro.gov.sk/
Slovenia	SI	AGEN	Ministry of Environment and Energy: www.mop.gov.si/
Spain	ES	CNE	Ministry of Industry: www.mityc.es/ Ministry of Environment: www.marm.es/ Competition Authority: www.cncompetencia.es/
Sweden	SE	EMI NordREG	Ministry of Energy: www.regeringen.se/ Competition Authority: www.kkv.se/
Switzerland	CH	BFE	Federal Department of Environment, Transport, Energy and Communications: www.uvek.admin.ch/ Competition Authority: www.weko.admin.ch/
United Kingdom	UK	OFGEM	Department of business, enterprise and regulatory reform: www.berr.gov.uk/ Competition Authority: www.competition-commission.gov.uk/

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